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Theoretical foundations for enhancing social connectedness in online learning environments

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(Received 5 March 2009; final version received 5 August 2009)

Group social structure provides a comfortable and predictable context for interaction in learning environments. Students in face-to-face learning environments process social information about others in order to assess traits, predict behaviors, and determine qualifications for assuming particular responsibilities within a group. In online learning environments, however, negotiating social information and maintaining social connectedness can pose challenges for participants. Nonverbal strategies one typically uses for enhancing communication and overcoming ambiguity – such as an approving smile or a questioning brow – must be approached differently while learning online where fewer sensory communication channels are typically available. We present the theoretical foundation for how social information processing and group structure theories may be combined to assist instructional designers in further examining the social system perceived by the online learner. We propose a framework for thinking more systematically about the development of group social structure in online learning environments.

Keywords: e-mmediacy; social connectedness; social cognition; online learning; group structure; social context online; computer-mediated communication

Despite the continued growth of Web-based course offerings and the great promise of anytime any place learning, it appears that higher than average attrition rates remain an issue for online learning (Frydenberg, 2007; King, 2002; Liu, Gomez, Khan, & Yen, 2007; Moshinskie, 2001; Phipps & Merisotis, 1999). Students in online courses continue to report feelings of social disconnectedness, missing familiar *teacher immediacy*, and likewise missing *interpersonal interactions* and *social cues* they more typically have when learning face to face (Haefner, 2000; Menchaca & Bekele, 2008; Reisetter & Boris, 2004).

According to social learning theorists, successful learning takes place in an environment where individuals can construct ideas, culture, histories, and meaning as the result of ongoing social interactions and collaborative functioning (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991). The opportunities afforded learners working to construct their own knowledge, through experiencing the multiple perspectives of others, is well documented in the literature (Brown & Palincsar, 1989; Johnson & Johnson, 1994; Kagan, 1992; Sweller, 1989). Similarly, students working

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collaboratively on real life problems are reported to demonstrate greater construct retention (Cohen, 1994; Jonassen, 1999). In these collaborative learning environments students develop networks of communication as they work to achieve learning goals. Through these pathways, learners strive to communicate in a knowable pattern of expectations and communication cadence. Johnson and Johnson (1994) have referred to this developing network as group structure or the 'stable pattern of interactions among group members' (p. 18).

Although the development of group social structure necessary for productive interactions might well happen more seamlessly in face-to-face learning environments, creating and maintaining these social connections in online learning environments can be impeded by students' unfamiliarity with the type and number of communication channels available in computer-mediated communication (Haefner, 2000; Reisetter & Boris, 2004; Zielinski, 2000). References to successful social interactions in the online learning environment frequently point to the 'social presence' construct as the marker to achieve in facilitating mediated interactions (Short, Williams, & Christie, 1976). Social presence was originally conceived of as the number of communication channel affordances in mediated communication and further evolved in recent literature to include students' perception of the presence of another in an online learning environment (see Gunawardena, 1995; Kreijns, Kirschner, Jochems, & van Buuren, 2004). According to Biocca, Harms, and Burgoon (2003), the focus of social presence must remain 'fundamentally a theory of how technology mediates social interaction' (p. 474). Computer-mediated communication inherent in the online learning environment poses new avenues for learners, therefore, in achieving social perception as they negotiate the social encounters they will experience there. It is the focus of this article to examine the cognitive social processes that occur as participants in strictly online learning environments engage in and process their computer-mediated communication environment.

Participants in computer-mediated learning environments attempt to adapt to the new social environment and proceed in processing any social information available even if that information is in the absence of many of the social cues participants are accustomed to (see Culnan & Markus, 1987; Walther, 1996). In the computer-mediated learning environment, therefore, participants will analyze and negotiate the social environment toward creating a baseline social context in which to comfortably interact. According to Kreijns et al. (2004), this stable state of communication patterns in an online learning environment might also be referred to as the 'sound social space' achieved in the perception of others engaged in the learning environment. Kreijns et al. also point out that the effectiveness of group learning online is dependent on these social interactions that students engage in.

To date, however, few studies have been conducted to synthesize what we know from social cognition theory into a set of design guidelines for facilitating the development of group social structure in online learning environments. If online instructors had access to design guidelines that addressed specific limitations of human interactions in computer-mediated learning environments during the development of group social structure, it might be possible to enhance learners' feelings of social connectedness in online learning environments – or *e-mmediacy* (Slagter van Tryon & Bishop, 2006). According to Kehrwald (2008), in online learning environments, '... "presence" creates the illusion of reality (or direct experience) in participant's perceptions of mediated situations' and we agree. We then ask, what, however, creates the perceived *presence*? This article seeks to provide the theoretical foundation for the

effective design of the social context of an online course that accounts for guiding the revision of social schema for achieving such perception. We refer to this state of social cognition as experiencing e-mmediacy – those feelings of social connectedness one has with fellow online class participants (classmates, instructor, teaching assistant) through computer-mediated communication experiences that simulate the episodic perception of immediacy. We present the theoretical foundation for how social information processing and group structure theories may be combined in order to assist instructional designers in further examining the social system perceived by the online learner.

Social cognition's role in social connectedness

There is an underlying cognitive process involved in the development of social connectedness without which a true sense of e-mmediacy cannot be realized. This cognitive process bridges communication and group structure theories in a way that allows individuals to participate comfortably in group communication while simultaneously predicting social interactions within the group (see Galambos, Abelson, & Black, 1986; Nye & Simonetta, 1996). The term for this process is *social cognition*, which can be defined simply as how people make sense of the social environment (see Wegner & Vallacher, 1977). The cognitive mechanism for comprehending one's social environment is *social information processing*.

Social information processing can be likened to Atkinson and Shiffrin's information processing model (1968) in that social information is first perceived through a sensory register to be accepted into a short-term store followed by the information either being dropped or further encoded and moved into a long-term store for later retrieval. According to Markus (1977), the difference between social information processing and *regular* information processing occurs at the initial, sensory register stage and arises out of the concept of *self*. Unlike anything else that humans perceive, when perceiving another person we compare him or her to ourselves in order to set a reference point for making status assessments of others (Schneider, Hastorf, & Ellsworth, 1979). In addition, we know that the other person – or *target* – is perceiving us back, which causes us to have different processing motives and subsequent interpretations than when the target is an inanimate object (Fiske & Taylor, 1991). It is social cognition that provides context and shapes behavior for all participants in an interaction through the expectations that each has of the other's intentions and predicted *next move* during an encounter.

An individual's ability to process, evaluate, and *adapt* his or her thinking in social situations is dependent upon the *schemas* he or she has developed for processing incoming social information (Bartlett, 1954; Fiske, 1995). Olson, Roesse, and Zanna (1996) proposed that social schemas are the repertoire of 'expectancies' (p. 228) or cognitive shortcuts one uses to filter, assess, and categorize the traits of others during initial status assessments, and then during norm development and role differentiation that occur during the development of group social structure. Each will be discussed below.

Status assessments and person schemas

A person entering a face-to-face class for the first time will immediately attend to his or her social environment for the purpose of perceiving those present in the room (Rezabek & Cochenour, 1994). The *perceiver* may ask him- or herself 'who is here?'

‘what do they have?’ and ‘where do I fit in?’ The purpose of these initial *status assessments* is to collect and synthesize social information about others in the newly forming class group in order to form a knowable pattern of interactions that can reduce stress and confusion while learning (Hsu & Bruce, 1998; Johnson & Johnson, 1994).

There are a number of models in the literature that specifically address the role of person schemas in status assessments (for example, see Chaiken, Liberman, & Eagly, 1989; Fiske & Taylor, 1991; Hastie, 1988; Petty & Cacioppo, 1981). Of these, the most frequently referenced is Brewer’s person perception model (1988) (see Figure 1).

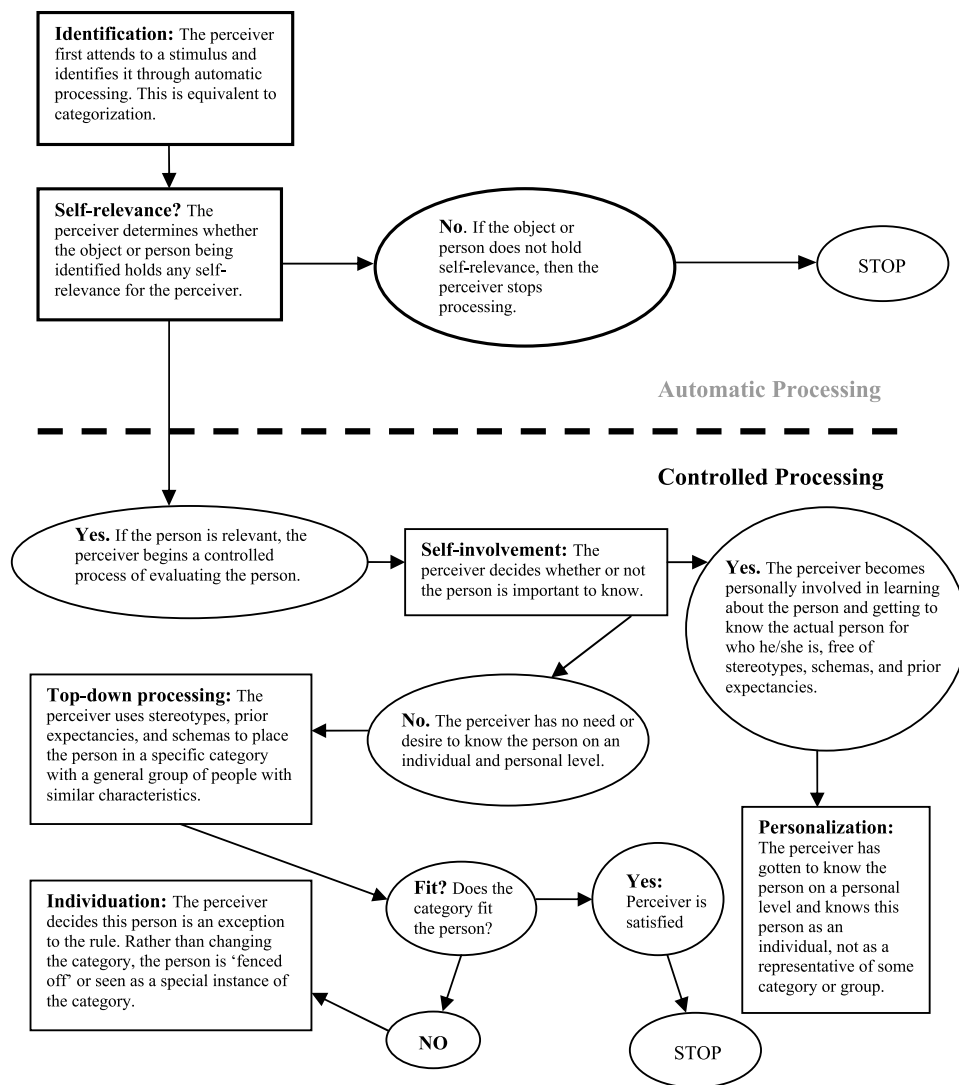


Figure 1. Brewer’s dual-process person perception model (1988), adapted from Moskowitz (2005, p. 196).

Brewer's person perception model (1988) is called a *dual-process* model because it is divided into two levels, *automatic processing* and *controlled processing*. The automatic processing level is initiated by *identification* of the presence of a target by a perceiver. Identification further involves a quick, cursory accounting of the surface characteristics of the target – such as voice, body language, gender, race, and behavior. From data gathered during automatic processing, the perceiver will determine the target's *self-relevance*, or the extent to which the perceiver is motivated to know the target better. If the perceiver finds relevance, he or she will engage in more thoughtful, controlled processing during which the perceiver will explore the target beyond the quick preconscious examination and conduct a more in-depth accounting of the target's characteristics.

Although the perceiver may initially find relevance, upon further processing he or she may decide that knowing the target further, or *self-involvement*, is not desirable. Processing wanes at this point, as the perceiver simply relies on *top-down processing* to find some attribute with which to categorize the target through existing stereotypes and prior expectancies, or *person schemas*. The perceiver spends little time here and exerts only moderate effort to locate the best fit for the target in a particular category. If a discrepancy arises, the perceiver will extend an exception to the best fit category by creating a special instance.

In a hypothetical example, if a perceiver walks into her first-year anatomy class and watches a group of young people file in, she may initially decide they are not important to know further and simply apply cursory top-down processing to categorize them all as first-year students, just like herself. However, if one of the *first-year students* filing in the door suddenly turns, walks to the front of the class, and announces that he is 'Dr Morgan, the youngest medical doctor in the state of Nevada,' the perceiver quickly notices a clear discrepancy in her *first-year student* person schema. The perceiver will then *individuate* the target by adding the target's actual credentials to the immediately apparent characteristics (such as age). Dr Morgan now becomes a special, *unusually young medical doctor* case of the group of young people on the perceiver's college campus. If Dr Morgan does not announce himself and, instead, sits down in the back of the room to observe the class, the perceiver does not notice the discrepancy with her person schema and her processing simply ends with the *first-year student* best fit category for the group.

If, on the other hand, *self-involvement* piques and the perceiver is personally motivated to study the target further, *personalization* will take place. This next stage may include processing of details such as education level, belief structure, socioeconomic status, and agenda. During personalization the perceiver moves beyond his or her stereotypes, person schemas, and past experiences. It is here, when the perceiver is free from *automatic processing*, that he or she comes to know the target for who he or she really is as a unique individual. In this way, person schemas facilitate status assessments, marking the earliest stage of group structure development. Similarly, event schemas play an important role in norm development.

Norm development and event schemas

In addition to making initial status assessments, a perceiver immersed in a face-to-face learning environment will also attend to his or her surrounding social environment in order to begin making judgments on expected and appropriate behaviors within that social context (Bonner, 1959; Duval & Wicklund, 1972). These judgments and the

corresponding behaviors they influence during social encounters mark the beginning of *norm development* among the individuals in a group. They may be implicit and reinforced simply by a strong glance, or explicit and expressly written with sanctions against any member who challenges the norms (Horne, 2001). These expected behaviors enable group members to predict interactions and determine appropriate responses – potentially reducing stress and misunderstandings among group members (Kagan, 1992).

According to Wyer and Carlston (1994), little work has been done to derive a model for what happens at this stage of social cognition (for exceptions see Newston, 1976; Schank & Abelson, 1977). However, there is general agreement among researchers that, during a social encounter, an individual activates particular *event schemas* to be used as guides for anticipating what a social encounter will be like and deciding how to respond (see Anderson, 1980; Bartlett, 1954; Collins & Loftus, 1975; Fiske & Taylor, 1991; Higgins & Bargh, 1987; Stangor & Ruble, 1989). Event schemas are cognitive organizers for the order of interactions one has experienced over the duration of prior social encounters (Mandler, 1979). Whereas person schemas provide categorical models that facilitate person perception, event schemas provide temporal agendas that facilitate event perception. Much like the *best fit* category for understanding others during person perception, during event analysis a perceiver looks for the *best bet* on what will be acceptable behaviors within the particular social context (Smith & Mackie, 2000).

So, turning back to our hypothetical example, if the first-year anatomy student has settled into her seat, opened her notebook, and realized that she has forgotten to bring a pen to class, she is likely to turn to a nearby classmate to ask if he has one she may borrow. She turns to the young man on her right because, in her initial status assessment of him, she decided that he likely is not only just prepared, but the type to be carrying a backup pen as well. Given the din of pre-class discussions, she gets his attention by smiling at him first, and then loudly voices her request. If, on the other hand, class has already started and the instructor is speaking, she will whisper her request instead. Given the event schema this student has formed from her prior classroom experiences, she knows to whisper without being told – or even really thinking about it. She knows that, if she were to disrupt class by speaking to her neighbor in full voice, the instructor would likely respond with a strong glance or some other sanction that makes clear that she has violated a group norm. In essence, our event schemas help us fill in the blanks in a quick and efficient manner while interacting (Markus & Zajonce, 1985).

Unlike person perception, which often occurs internally and without much interaction between the perceiver and the target, event analysis involves both internal or *intrapersonal communication* and external or *interpersonal communication* (Planalp & Hewes, 1981; Roloff & Berger, 1982). So, after the first-year anatomy student's activated event schemas have helped her determine the volume to use when speaking to her colleague during class (intrapersonal communication), they will come into play again to help her interpret his reply and decide how to respond (interpersonal communication). If he replies with an agitated 'Shh!', she is unlikely to initiate any further contact with him while the instructor is speaking, if ever. On the other hand, if he smiles back, digs into his backpack, and hands her a pen, then her event schema for interactions with him will include the fact that, when she has an immediate need, it is okay to speak with him quietly during class. Regardless of the type of interaction, all of these potential ongoing responses during social interactions shape norm development (see Bonner,

1959; Forsyth, 1999; Johnson & Johnson, 1994; Krauss, Freedman, & Whitcup, 1978; Ridgeway & Balkwell, 1997; Shaw, 1981; Worchel, 1996).

According to Wyer and Srull (1989), when a perceiver is immersed in a social situation and *event schemas* are activated, the perceiver will rely both on prior knowledge and person perception to move through the current encounter even if the new context is varied from the perceiver's stored event schema. In the case of varied activity, the perceiver has the ability to utilize his or her stored schemas to make any assimilation necessary for comfortable interactions to continue. So, given her classmate's surprisingly harsh rebuff, the first-year anatomy student might yield by mouthing the words 'I'm sorry' and hanging her head shamefully in the hope that future interactions will not be uncomfortable. That said, in much the same way that the level of one's motivation to know the target shapes person perception (self-relevance), personal motivation also influences event analysis (Fitzsimons & Bargh, 2003). This means that, if the first-year anatomy student is highly motivated to take notes because she believes it is the key to doing well in a class she needs in order to get into medical school, then she may actually disregard everything that her event schemas are telling her about how to interact with this classmate and ask him again if she might borrow a pen, despite his rebuff.

Given the influence of personal motivation on the perceiver's analysis of events and subsequent responses to a situation, Shechtman and Horowitz (2006) proposed a model of interpersonal interactions based on two broad dimensions of behavior, *communal* and *agentic* (see Figure 2). Communal behavior (horizontal axis) involves the extent to which the perceiver attempts to commune with the target and ranges from disconnecting (demonstrating distance) to connecting (demonstrating engagement). Agentic behavior (vertical axis) involves the extent to which the perceiver attempts to have agency over the target and ranges from influencing (demonstrating dominance) to yielding (demonstrating submission). Their model is presented in quadrants with each behavior continuum crossing the apex denoting a positive, neutral, or negative behavior along the continuum. The personal motivation of the perceiver dictates behavior in either dimension and in either direction. So, if the classmate gives the first-year anatomy student advice ('You might want to think about hiding a spare pencil in your backpack in case you need one; that's what I do'), then his behavior is positive in communion and positive in agency. However, if he harshly reprimands her instead ('You ought to come better prepared for class!'), then, while his behavior is still positive in agency, it is negative in communion.

In this way, each participant in a social encounter plays a role in negotiating the interaction by continually assessing and re-assessing salient person and social context characteristics and responding based on his or her event schemas and personal motivation. Eventually, the sum of behaviors over the duration of a social encounter – regardless of their positive, negative, or neutral affect – gives rise to the group's social norms. It is the tenor of these social norms that dictate the nature of ongoing interactions within the group and, ultimately, give rise to role differentiation.

Role differentiation and role schemas

The last stage of group structure development involves assigning members to particular roles within the group – such as leader, follower, and information seeker (Benne & Sheats, 1948; Levine & Moreland, 1991). This *role differentiation* facilitates efficient group functioning by identifying the *best person* to accomplish

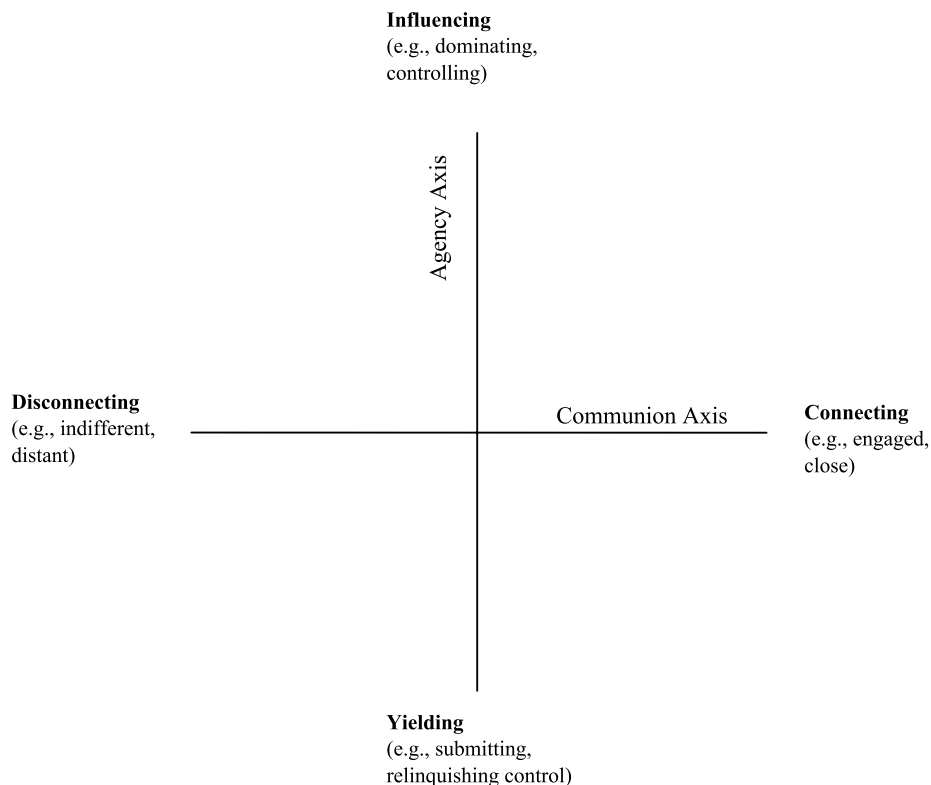


Figure 2. Shechtman and Horowitz's model for the structure of interpersonal space (2006, p. 1128) (© 2006 Society of Personality and Social Psychology, Inc.).

particular aspects of a task (Ridgeway & Balkwell, 1997; Shelly, Troyer, Munroe, & Burger, 1999). From person schema revision during status assessments through event schema revision during norm development, each next step in social information processing leads toward the eventual differentiation of roles that group members will assume (Shaw, 1981).

Clark (1997) observed that, in order to accomplish tasks, individuals within a group will specialize and develop specific roles for which there are expected behaviors (see also Bonner, 1959; Forsyth, 1999; Levine & Moreland, 1995; Shaw, 1981). Individuals differentiate roles within the group according to their existing *role schemas*. Role schemas guide a person's assessment of expected behaviors and particular qualifications for carrying out specific functions in a particular social context (Fiske & Taylor, 1991). Because role schemas are involved in the evaluation of qualifications, they are initially activated along with person schemas during status assessments as part of determining whether or not to move beyond cursory automatic processing to higher-level controlled processing of others. This partially explains why our first-year anatomy student decided to exert additional effort to resolve the inconsistency between *first-year student* and young Dr Morgan, who needed also to fit into her role schema for *teacher* after he identified himself as the person assigned the role of course instructor.

For some groups roles are assigned – as when an instructor is assigned to lead a class of students. More often, however, roles within a group are ascribed over time.

When this is the case, role schemas supply a hierarchical framework for identifying the *best person* to accomplish particular aspects of the task at hand, in much the same way that person schemas provide categorical models for finding the *best fit* for understanding others and event schemas provide temporal agendas for deciding on the *best bet* for interactions within the social context (Lord, Foti, & De Vader, 1984).

For example, when the first-year anatomy student asked her classmate for a pen, this was his first impression of her. If his role schema for *good group leader* includes that the person in this role must always be prepared, then it is likely that he will not initially assign her to the *good group leader* category, even if this is the first time in 10 years that she has not been prepared for class. While it is possible that he might eventually change his mind after additional interactions with her, this type of baseline, automatic role assessment can be difficult to overcome – particularly when the initial impression is negative (Wyer & Gordon, 1984). He will not reassess his role schema categorization of her unless some event occurs that motivates him to resolve the inconsistency between her action and his initial assessment – like if she were to take the initiative to create a draft outline of their group presentation without being asked. In this way, roles gradually evolve as group members continue to interact over time (Levine & Moreland, 1995).

According to Johnson and Johnson (1994), it appears that two role types that need to develop in order to attain group goals are those directly related to the task and those directly related to the socio-emotional wellbeing of the group. *Task roles* involve goal-oriented behaviors whereas *socio-emotional roles* involve supportive interpersonal behaviors (Benne & Sheats, 1948). As had Shechtman and Horowitz (2006) with their model of interpersonal behaviors (see Figure 2, above), Callero (1994) observed that group members who desire influence over others are more likely to seek task-oriented leadership roles (positive agency) as opposed to socio-emotional supportive roles (positive communion). Further, both Bales (1950) and Burke (1974) have suggested that these two complementary role types develop within groups in a quite predictable pattern of interactions. In this way, these specialized role categories function to sustain successful group interactions as groups move forward toward accomplishing their goals.

Thus, the ongoing interactions that take place almost seamlessly as status is assessed, norms are developed, and roles are differentiated, yield a complex network of social schemas and, eventually, a steadfast group structure. Group structure offers balance and, as mentioned previously, that *knowable context* for comfortable interactions among group members. But all this assumes that group members have the ability to observe first-hand the personal characteristics and behaviors of others that guide their interpretation of the social context and how to respond as a member in that group. So, what happens to social cognition and the development of group social structure when many of the verbal and nonverbal cues that individuals have come to rely upon for social information processing are not as readily available, as is the case in many computer-mediated learning environments?

Social cognition and the development of group social structure in online learning environments

According to Garrison, Anderson, and Archer (2001), the only thing that changes in an online learning environment is the channel across which learners communicate, not the social information processing mechanism that students use to make sense of the

social environment. This means that, when beginning an online course, students make a concerted effort to use their well-established social information processes and schemas in much the same way they do when meeting students in a traditional, face-to-face course. In their attempts to develop a group social structure in the absence of typically available verbal and nonverbal social cues, it seems that students will inevitably interject personality and *person characteristics* by revealing personal information about themselves during online interactions – even without being told to do so (Lebie, Rhoades, & McGrath, 1995; Richardson & Swan, 2003). In addition, it appears from the literature that, when additional support for the development of group social structure is designed into the learning environment, online learners can more easily adapt their social information processes to accomplish status assessments, norm development, and role differentiation – even when they cannot observe others' personal characteristics and behaviors first-hand. According to Heinze and Procter (2006), this online social interaction is a valuable asset in that it enables greater ease in dialogue and this in turn helps to facilitate knowledge sharing as students work collaboratively to solve problems.

Online status assessments

Research into the development of group social structure online indicates that, when the means for perceiving person characteristics is supplied in the learning environment so that students can identify, establish relevance, and individuate their classmates, some initial status assessments do occur. According to Riva (2002), a group of *social actors* in a computer-mediated communication interaction will negotiate the social situation by engaging in psychosocial relationships in the construction of meaning. For example, Korenman and Wyatt (1996) surveyed participants in a college-level online course to identify what factors made the students feel their online group was connected. They discovered that when online learners engaged frequently in communications in which they shared personal information, they felt a stronger bond with the group and assessed the group's ability to function well together more highly. They concluded that, even while on a focused task, these sorts of interpersonal communications gave participants opportunities to learn about each other in order to form initial status assessments of one another – just as is done face to face.

In similar work, McDonald and Gibson (1998) were able to create a rudimentary atmosphere for online status assessments to occur by designing introductory activities into a graduate course that allowed students to learn some personal information about each other. As the semester progressed, students discussed each week's textbook readings within small work groups to which they had been assigned. Each group was then also responsible for creating and posting a weekly summary of their discussion. In McDonald and Gibson's analyses of these ongoing group interactions they discovered that, regardless of the task at hand, a large portion of the students' communications were interpersonal and that, over time, there was an increasing level of openness and group solidarity behind the *intent* of students' messages. McDonald and Gibson noted that these student interactions resembled initial group structure developments observed in face-to-face classroom environments and attributed this occurrence to the opportunity students had to make status assessments during the introductory course activities.

In contrast, other researchers have also noted potential negative effects on group development when person characteristics are revealed in college-level online learning

environments (see Lea & Spears, 2003). For example, Garrison et al. (2001) found that, in order to create a *safe environment* for all to voice their opinions and to facilitate more equitable involvement among participants as the group develops, it was better for students to reveal only a very limited set of person characteristics. Similarly, Taylor and MacDonald (2002) reported higher incidences of *flaming* (mean or degrading textual messages sent electronically) when person characteristics were revealed as opposed to when person characteristics were withheld. It appears that, in addition to supplying person characteristics for initial status assessments, it may also be necessary to supply online learners with a set of online etiquette guidelines (Salmons & Wilson, 2008).

Online norm development

As was the case with online status assessments, it also seems that when the online environment provides opportunities for learners to collect the information they need in order to determine what the social encounter will be like and how to respond in it, norm development will take place (Wenger, McDermott, & Snyder, 2002). For example, in a landmark study by Davis and Brewer (1997) that examined discourse in a college-level online learning community, participants developed their own text-based strategies for engaging in a form of *written talk*. This more personal form of communication allowed online course participants to move textually within the social norms that emerged – much like they would aurally in face-to-face communications. In this way students conformed over time to the group's social norms by adapting their writing to the new form of communication.

In a similar study, Baker and Lund (1997) incorporated *discussion-based tools* for online communications within a college-level online course. Discussion-based tools were designed to give online participants a *structure* within which to frame their communications by making clear to message recipients the type of information the sender was attempting to convey (such as informative, questioning, or social). Participants were given a menu of phrases to choose from – such as 'I propose to ...,' 'I think that ...,' or 'I made a mistake ...' Once chosen, these phrases automatically appeared at the beginning of the message body in order to frame students' interactions. Baker and Lund found that discussion-based tools promoted more effective collaboration during problem solving than when these tools were not made available to participants. They concluded that utilizing this type of communication framework supplied online learners with some of the additional social context they needed in order to make sense of group interactions and to discern how to behave as a group member – similar to that achieved in face-to-face encounters through verbal and nonverbal cues.

Brooks and Jeong (2006) conducted a similar study adding not only discussion-based message descriptors but also incorporated pre-structured threads as well. They reported that this type of guidance further facilitates group communications and promotes critical thinking and managed discourse between learners in computer-mediated learning environments.

In addition to supplying the means for norms to develop in online environments, it appears there may also be a need to provide learners with appropriate strategies for maintaining those norms once established. McLaughlin, Osborne, and Smith (1995) designed a large-scale study that identified an entire taxonomy of norm *offenses* and *penalties* used to sanction norm violators in online learning environments. Reported

offenses ranged from incorrect use of the technology to use of inappropriate language, with group members engaging in mild to quite serious attacks on violators for their infractions. McLaughlin et al. (1995) contended that the determining factor for the development of online norms and participants' conformity to them was the intent of the online group itself and the way group interactions were designed into the online environment by the instructor.

Online role differentiation

Similar to status assessments and norm development, it appears that role differentiation also will occur in online environments when learners are supplied with the information they need to assess their classmates' qualifications for carrying out specific functions (Gunawardena & Zittle, 1997). For example, De Wever, Van Keer, Schellens, and Valcke (2008) examined online asynchronous discussions among first-year university students who were supplied with instruction as to their particular assigned roles within their online discussion groups. Discussion themes were divided into chronological segments and roles were assigned randomly at successive time intervals. The researchers reported that when roles were assigned at the start of a discussion segment, those students maintained higher levels of knowledge construction than those students receiving their role assignment instructions within the latter discussion segments. This study demonstrates that during this structured type of interaction, there is potential for successful role development online as the students receiving early role support were better prepared to successfully carry on with their role in online discussion interactions even as the researchers began to phase out the role support for further discussion segments.

As part of a study to analyze the processes that took place during group structure development in a semester-long online course, Johnson, Suriya, Yoon, Berrett, and LaFleur (2002) examined role differentiation and found that specific roles did not always emerge from online group interactions as had been expected. The researchers divided students in the course into online groups and charged them with completing a content-related group task in a specified amount of time using only course materials and the online collaboration tools available to them (email, synchronous and asynchronous chat, and a discussion board for communications). After analyzing the textual exchanges and responses to a questionnaire regarding the students' perceptions of their online group, Johnson et al. discovered that the roles among group members were not clearly defined. While some groups reported that a *revolving* leadership role did emerge, others reported that no sort of leadership role had formed. Johnson et al. attributed the lack of clearly defined roles to the lack of time allocated to allowing group members to get to know each others' qualifications and the lack of general knowledge students had about what makes an effective online group. They concluded that more time should be allocated to *establish relationships* online and suggested that instructional materials that address online group effectiveness, formation, planning, and facilitation be included for students in their course materials.

Thus, it appears from the literature that some semblance of group structure can develop in post-secondary online learning environments, even with a very limited amount of additional social information processing support. What may be missing as a result of moving instruction online, however, are the revised person, event, and role schemas learners need in order for group structure to develop more efficiently and effectively – as it often does in traditional face-to-face courses. If instructors could

find more systematic ways to incorporate revision strategies for social schemas, this might enhance feelings of social connectedness that will, in turn, help alleviate certain social stresses that contribute to online course attrition and free up cognitive resources for learning from the online environment (Patterson, 1996). But what are the specific social cognition problems that one encounters in online learning environments and which e-mmediacy strategies might help to address them?

An initial examination of e-mmediacy

In order to broaden the current research into what can be done to enhance social connectedness and the development of group structure in online learning environments, the authors conducted a Delphi study aimed at identifying the *social connectedness* problems instructors experience in 100% online learning environments and exploring potential e-mmediacy solutions to those problems with the help of a panel of experts in the field (for a complete report, see Slagter van Tryon & Bishop, 2006), we chose the Delphi technique as it is a particularly good method for deriving consensus among a group of experts on a particular topic where information sought is subjective and where participants are separated by physical distance (Borg & Gall, 1979; Linstone & Turoff, 1975).

According to Linger and Tresolini (2001), a Delphi study begins by carefully developing an initial, open-ended question to be answered by a panel of chosen experts on the topic. The researcher then compiles the experts' responses and develops a second-round questionnaire in which the experts rate and rank the first-round responses. In the third and any subsequent rounds, panel members receive feedback about the previous round and are asked to rank their responses again. In a Delphi study, this process is repeated until consensus is achieved.

We discovered that this new form of computer-mediated group communication posed a host of e-mmediacy problems for instructors and students ranging from technical difficulties in delivering messages to gaps in frequency and efficiency of group communication due to lack of student experience in being online learners. Our study further revealed three categories or common *themes* of expert-recommended strategies for overcoming social connectedness problems in the online learning environment.

- (1) *Increased interactions.* Data from the expert panel revealed that, in computer-mediated learning environments where students may experience channels of communication that are different than they are accustomed to and instructional communications are relegated mostly to text, it may be necessary to increase the quantity and quality of those interactions in order for a group social structure to develop. In other words, given the online communication channels available, the online instructor must supply sufficient interaction opportunities for students to gather the information they need to assess status, develop norms, and differentiate roles.
- (2) *Comprehensive technical support.* According to the expert panel, when computer-mediated communication technologies fail, this can introduce further unfamiliar channels and impede the normal development of a class's group structure. Student stress levels are likely to rise in this situation and unlike their face-to-face counterparts, who will seek help and assurance from the peers who have assumed the *support role* within their group structure, anxious online students are more likely to have difficulty initially knowing

where to turn. This may explain why experts recommended that the online instructor be prepared to fill the technology support role.

- (3) *Persistent follow-up*. In online learning environments where a student's means of interacting is computer-mediated and students consequently remain largely isolated from one another, they are unlikely to be able to easily assess status or gauge their relative position within the group. Unlike their face-to-face counterparts, online students cannot easily check around the room to see how many others have their assignments well underway or judge for themselves how to keep pace with their coursework by comparing themselves with their peers. Without the means to assess status within the online class group, assessing one's own progression through the course can become an isolating experience. As a result, it becomes necessary for online course instructors to incorporate course elements that dictate *pace*.

From these findings it appears that in learning online, where communication is computer-mediated, students new to the learning environment may be unfamiliar with communication channels. As a result, it may be necessary to increase the quantity and quality of online social interactions in order for a group social structure to develop. In other words, given the computer-mediated communication channels available, there is a potential for frustrations and miscommunications to occur in the online learning environment. Therefore, the online instructor must proactively create opportunities for students to revise their social schemas so that they can assess status, develop norms, and differentiate roles. Reducing ambiguities and building back into the online instructional communication system the missing cues that are necessary for social cognition may be the only means by which feelings of social connectedness will develop among online learners.

A framework for thinking more systematically about social connectedness in online learning environments

Therefore, in order to think more systematically about the design of the social environment of computer-mediated online learning courses, we have developed a design framework based on our examination of the literature and our prior research in social connectedness, social information processing, and group structure theory. The goal here is to supply the amount of social information students need in order to form and revise their social schemas as they interact over the available communication channels in the computer-mediated learning environment (see Table 1).

The rows in Table 1 represent each developmental stage of group structure – status assessments, norm development, and role differentiation – while the columns represent the three broad e-mmediacy strategies for supporting learners in the computer-mediated instructional communication system. The cells at the intersections of group structure development and the e-mmediacy strategies supply specific guidelines about the sort of information necessary for social schema revision at each juncture.

Following the cells vertically down each column, it appears that each of the e-mmediacy strategies has a role to play at each stage of social structure development in an online course. For example, instructors should design into their online courses the sorts of interactions that will allow learners to observe individuating social characteristics, dynamic social behaviors, and salient social functions (column 1). Similarly, online instructors need to be certain their students have the support they

Table 1. Social connectedness design framework.

	Increased interactions	Comprehensive technical support	Persistent follow-up
Status assessments	1. Facilitate status assessments by designing interactions that allow learners to observe individuating social characteristics.	2. Facilitate status assessments by providing the support needed to overcome technical barriers to perceiving individuating social characteristics.	3. Facilitate status assessments by requiring ongoing interactions that help learners process individuating social characteristics more deeply.
Norm development	4. Facilitate norm development by designing interactions that allow learners to observe dynamic social behaviors.	5. Facilitate norm development by providing the support needed to overcome technical barriers to perceiving dynamic social behaviors.	6. Facilitate norm development by requiring ongoing interactions that help learners process dynamic social behaviors more deeply.
Role differentiation	7. Facilitate role differentiation by designing interactions that allow learners to observe salient social functions.	8. Facilitate role differentiation by providing the support needed to overcome technical barriers to perceiving salient social functions.	9. Facilitate role differentiation by requiring ongoing interactions that help learners process salient social functions more deeply.

need to overcome communication barriers to their perceiving individuating social characteristics, dynamic social behaviors, and salient social functions (column 2). And, finally, the course must include the persistent follow-up necessary to assure that learners deeply process individuating social characteristics, dynamic social behaviors, and salient social functions (column 3).

Moving from left to right horizontally, group structure theory helps focus the nature of e-mmediacy support needed at each stage. For example, for initial status assessments to occur within the computer-mediated instructional communication system, learners must first be given the opportunity to observe individuating social characteristics, have the support they need to overcome communication barriers to perceiving individual social characteristics, and interact at a level that allows them to process social characteristics more deeply (row 1). Next, for successful norm development to occur, learners must be given the opportunity to observe dynamic social behaviors, have the support they need to overcome communication barriers to perceiving dynamic social behaviors, and interact at a level that allows them to process dynamic social behaviors more deeply (row 2). Finally, for successful role differentiation to occur, learners must be given the opportunity to observe salient social functions, have the support they need to overcome communication barriers to perceiving salient social functions, and interact at a level that allows them to process salient social functions more deeply (row 3).

Thus, it appears that, at each stage of group structure development, the e-mmediacy strategies supply the suggested context for infusing the course design with the social information necessary for successful social schema revision. And, likewise, the group structure theory informs the nature of the content for each of the e-mmediacy strategies. The net result is a framework of potential online course design guidelines for systematically facilitating schema revision within the context of the computer-mediated communication system.

Facilitating online status assessments by sharing individuating social characteristics

A student entering a computer-mediated online course for the first time may not be supplied with the verbal and nonverbal social cues he or she is accustomed to having when assessing the status of group members in a face-to-face course. It appears this information must be proactively built back into the environment using the following guidelines.

Facilitate status assessments by designing initial interactions that allow learners to observe individuating social characteristics

For status assessments to occur, learners must have access to individuating social characteristics such as physical traits, occupation, place of origin, details about background, prior experiences, current hobbies, likes and dislikes, personal style, and languages spoken. While superficial information such as name and contact information is useful to collect and share as well, the type of social information required for status assessments must go beyond this – providing students with the same quality and quantity of individuating social characteristics, about each other *and* about the instructor, that is available to them in face-to-face learning environments. The key to this guideline is to supply the individuating social characteristics necessary for students to

engage in the first automatic step in person perception and the formation of person schemas. From here, learners will make decisions about self-relevance and whether or not they are motivated to get to know particular individuals better.

Facilitate status assessments by providing the support needed to overcome communication barriers to perceiving individuating social characteristics

For status assessments to occur, each participant in a course must be able to function successfully within the computer-mediated communication system being utilized. Consequently, initial activities that engage students with the communication technology are equally as important as initial activities that share social information. Clearing away any potential *channel noise* and the distractions that come from any communication difficulties students are having will allow them to refocus their cognitive resources on processing others' individuating social information and assessing status. The key to this guideline is to ensure that each participant in the course understands and can successfully function within the computer-mediated communication system being utilized in order to acquire social information about others in the group. Taking care of communication issues up front can eliminate confusion and the frustration of spending countless hours addressing software and hardware problems when more valuable conversations about course content should be occurring instead.

Facilitate status assessments by requiring ongoing interactions that help learners process individuating social characteristics more deeply

For status assessments to occur, learners will need additional information in order to move beyond automatic processing and into more deliberate, controlled processing and an in-depth accounting of individual characteristics. Thus, the sharing of individuating social characteristics should not only be done at the start of class, but also on a more continual basis as well. The key with this guideline is to supply *frequent* opportunities for learners to observe individuating social information.

Facilitating online norm development by sharing dynamic social behaviors

While norm development can happen fairly naturally when learners are physically together, this part of the process requires some proactive planning when learners are connected through a computer-mediated communication channel. It appears the course design must supply opportunities for learners to obtain the necessary dynamic social information using the following guidelines.

Facilitate norm development by designing interactions that allow learners to observe dynamic social behaviors

For norm development to occur, learners must progress from processing individuating characteristics to processing dynamic social behaviors. The type of social interactions required for norm development are those dynamic exchanges that reveal both the values and opinions of each participant and the choices they make about how to respond – anything that allows individuals to reflect on their own responses as compared to the others.' The key to this guideline is to supply the opportunity for students to interact with each other in a variety of contexts. When students are able to

observe dynamic social behaviors, they can begin to process others' responses and adjust their own event schemas for the sequence of responses accordingly. Each of the behaviors observed and each response decision made as a result, shapes norm development among the group for communicating and interacting.

Facilitate norm development by providing the support needed to overcome communication barriers to perceiving dynamic social behaviors

Computer-mediated communication can introduce additional *channel noise* due simply to the almost exclusive reliance on text-based communications. When communication is solely text-based, there is a greater likelihood for misunderstandings to occur, and learners' event schemas for what is and is not an appropriate response during text-based interactions may become cloudy. To further facilitate norm development, it will be necessary to guide the learner through this potential noise. The key to this guideline is to demonstrate how to enhance exclusively text-based messages with social cues that reveal the true intent of the message. The idea here is to eliminate confusion by proactively guiding students in the nuances of text-based communication that can more effectively supply the cues necessary to interpret the intended meaning of a statement.

Facilitate norm development by requiring ongoing interactions that help learners process dynamic social behaviors more deeply

Facilitating the formation and revision of individuals' event schemas and the eventual development of norms requires extended interactions among all group participants, including the instructor, over time. Here again, ongoing interactions must be sufficiently deep to elicit personal convictions as well as personal styles in communicating. The key to this guideline is to supply *frequent* opportunities for learners to observe dynamic social interactions. When exposed to a variety of interactions over time, students have the opportunity to observe their colleagues' behaviors so that they can create and revise their event schemas. From these event schemas, the group will establish the norms they need for comfortable interactions to occur and for feelings of social connectedness to develop.

Facilitating online role differentiation by sharing salient social functions

In a face-to-face learning environment, roles can evolve fairly effortlessly as group members continue to interact over time. But students in a computer-mediated learning environment may need some help getting to know each other well enough to be aware of their colleagues' talents, strengths, and weaknesses – essential information for differentiating the various functions each member will serve within a group. It appears this information must be proactively built back into the environment using the following guidelines.

Facilitate role differentiation by designing interactions that allow learners to observe salient social functions

To facilitate role differentiation, it will be necessary for students to progress from processing dynamic social behaviors to processing information about their colleagues'

unique qualifications for carrying out specific functions in a particular social context. The type of social interactions required for role differentiation are those salient exchanges that reveal each participant's strengths and weaknesses while also allowing them to perceive the same in others – anything that allows individuals to reflect on who is best suited to each group function. The key to this guideline is to supply the opportunity for students to interact in a variety of contexts on specific tasks that require individuals to take on specific roles within the group. When students are able to observe their classmates undertaking these functions, they can begin to process others' strengths and weaknesses for particular tasks and adjust their role schemas accordingly. From these role schemas, students will decide who will emerge as the group's task and socio-emotional leaders.

Facilitate role differentiation by providing the support needed to overcome communication barriers to perceiving salient social functions

Among the types of potential 'channel noise' in the computer-mediated communication system is the additional time it takes to complete even the most mundane tasks. Even when circumstances make it possible for online class participants to communicate synchronously, missing visual and verbal social cues still often reduce the efficiency of a group's communication. To assure that a class group has the time it needs over the duration of a course to get around to differentiating roles at all, it will be necessary to begin supplying information about salient social functions much earlier than typically occurs in a face-to-face learning environment. The key to this guideline is to make sure that learners have the information they need to differentiate both task and socio-emotional roles for their colleagues. Assigning students to specific jobs lets each one demonstrate for the group his or her unique functional skills. When groups are able to find individuals to fill both the task and socio-emotional role types, they are typically more successful in accomplishing their goals.

Facilitate role differentiation by requiring ongoing interactions that help learners process salient social functions more deeply

Facilitating the formation and revision of individual's role schemas and the eventual differentiation of roles requires ongoing interactions over time that reveal group members' strengths, weaknesses, special talents, and specific knowledge. Here again, it is important that the social information shared during these interactions is sufficiently detailed to allow students to make decisions about others' potential roles within the group. The key to this guideline is to supply *frequent* opportunities for students to process their colleagues' salient social functions and to incorporate strategies that will assure that all students participate. When group members have the opportunity to observe their classmates undertaking a variety of tasks, they are able to create and revise their role schemas. From these role schemas, role differentiation and the further development of group social structure will occur.

An agenda for further research

The next logical step in the examination of the social context for post-secondary online learning environments involves designing online courses that incorporate the

guidelines suggested by the framework and systematically exploring each level of social information processing that occurs as individuals negotiate the online learning environment. Some potential research questions with regard to the design of the necessary social information, the use of online communication technologies, and the potential outcomes that may be realized are suggested below.

The design of social information

- How might the needed social information be reintroduced into the online learning environment and how should this social information be designed and observed to be optimally effective for the development of group social structure?
- What amount and quality of social information must be supplied in the online environment for status assessments to occur?, for norm development to occur?, for role differentiation to occur? What amount of social information is too much, causing undue cognitive stress? What is the balance?

The online technologies

- What specific communication barriers are present in the computer-mediated instructional communication system that impede learners' perception of individuating social characteristics?, dynamic social behaviors?, salient social functions?
- What types of online communication technologies are available to facilitate social information processing at each stage of group structure development? What are the characteristics of those technologies? (For example, might synchronous versus asynchronous make a difference? Does visual or auditory modality make a difference?)

Outcomes

- How does the design and maintenance of the *social context* within the online learning environment affect the participant's ability to observe individuating social characteristics?, dynamic social behaviors?, salient social functions?
- To what extent does incorporating the framework's design guidelines facilitate the development of group social structure?
- Will learners who take an online course that integrates the frameworks' design guidelines feel more socially connected to class participants? Will this, in turn, lead to greater satisfaction with the online course?, to better learning outcomes?

Conclusion

The benefits of the development of group social structure and continued social interactions among individuals in an educational environment are well documented in the literature (see Brown et al., 1989; Johnson & Johnson, 1994; Tinto, 1997). Most recently, there has been a growing emphasis on the need for increased social interactions

in online education as well (see Dabbagh & Bannan-Ritland, 2005; Garrison et al., 2001; Lee, Carter-Wells, Glaeser, Ivers, & Street, 2006). The extent to which students in distance education courses feel socially connected is frequently cited as a key factor in online course success (see DiRamio & Wolverton, 2006; Gunawardena, 1995; Richardson & Swan, 2003). Nonetheless, few instructional design guidelines are available to instructors for facilitating schema revision necessary during each stage of development of group social structure in a computer-mediated learning environment.

This article has suggested a theoretical framework for the systematic design of group social structure into the social context of the online learning environment. It is our hope that this framework will be the impetus to extended research into social connectedness and to the development of instructional materials for implementing best practices in supplying that *knowable* social context online students need in order to interact with others more extensively than and as effortlessly as they experience communication in face-to-face settings. When less cognitive resources are needed to ponder navigating a new social learning environment, more cognitive resources can be applied to course content and the prescribed learning outcomes designed for the course.

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