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Article abstract

The role of social presence as defined by the community of inquiry (CoI) framework is critiqued through a review of recent literature. Evidence is presented that questions the actual extent of knowledge co-construction that occurs in most higher education settings and therefore challenges the framework's underlying assumption of the need for sustained, contiguous, two-way communication in higher-level online learning environments. The CoI framework has evolved from the description of a learning process within a social constructivist paradigm to an empirically testable construct in an objectivist paradigm. Related research results indicate that social presence does not impact cognitive presence in a meaningful way and that best teaching practices suggested by CoI-based studies are informed by objectivist, cognitively oriented learning theories. These suggest that higher-order cognition may be achieved through wide and varied combinations of learner–teacher, learner–content, and learner–learner interaction. Controlled studies can and should be undertaken to compare learning outcomes using sustained, contiguous, two-way communication to other learning models. To facilitate this, subcategories of social and teaching presences need to be revamped and analysis adjusted to separate processes that support explicitly group-based learning activities from those used by individual students.

Social Presence within the Community of Inquiry Framework

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Abstract

The role of social presence as defined by the community of inquiry (CoI) framework is critiqued through a review of recent literature. Evidence is presented that questions the actual extent of knowledge co-construction that occurs in most higher education settings and therefore challenges the framework's underlying assumption of the need for sustained, contiguous, two-way communication in higher-level online learning environments. The CoI framework has evolved from the description of a learning process within a social constructivist paradigm to an empirically testable construct in an objectivist paradigm. Related research results indicate that social presence does not impact cognitive presence in a meaningful way and that best teaching practices suggested by CoI-based studies are informed by objectivist, cognitively oriented learning theories. These suggest that higher-order cognition may be achieved through wide and varied combinations of learner–teacher, learner–content, and learner–learner interaction. Controlled studies can and should be undertaken to compare learning outcomes using sustained, contiguous, two-way communication to other learning models. To facilitate this, subcategories of social and teaching presences need to be revamped and analysis adjusted to separate processes that support explicitly group-based learning activities from those used by individual students.

Keywords: Online learning; online pedagogy; communities of inquiry; distance education; constructivism; cohort-based learning; individualized learning

Introduction

One of the most commonly referenced means for researching formal higher-level online education continues to be the community of inquiry (CoI) framework proposed by Gar-

rison, Anderson, and Archer (2000). Based on the content analysis and coding of computer conference call transcripts, emergent themes were identified and structured into three main attributes, which were described as social, teaching, and cognitive presences. The three subcategories within teaching presence were appropriate design of learning materials, facilitation of online discussions, and subject area ("directed") instruction. Cognitive presence was described as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000, p. 89). Four levels of increasingly desirable, overlapping subcategories of cognitive presence were proposed: triggering event, exploration, integration, and resolution. Garrison, Anderson, and Archer (2001) suggested that these measures of cognitive presence are "a means to assess the systematic progression of thinking over time" (p. 11). Garrison et al. (2000) described social presence as the projection of learners' personal characteristics into a community of inquiry through use of emotional expression, open communication, and various means to establish group cohesion.

In its original formulation, the three presences were represented as overlapping and interacting processes that determined the quality of the online learning experience. The now-familiar diagram is shown in Figure 1 below.

Figure 1. Elements of an educational experience (Garrison, Anderson, & Archer, 2001).

At about the same time, Garrison (2000) argued that theoretical developments in distance education were shifting from an emphasis on organizational issues to the more important nature of the educational transaction. Limiting effects of geography—the original impetus

for distance education—were largely eliminated with the advent of electronic communication technologies, along with learning theory predicated on this model (e.g., Holmberg 1989; Moore, 1993). Distance education's prior reliance on mass production of standardized learning packages and other features of the "industrial" era of distance education (Peters, 1983) was superseded because cost-effective, sustained, contiguous, two-way interactions among learners and between learners and instructors were now possible. The previous tensions between independence and interaction had been eliminated (Daniel & Marquis, 1979). The paced, cohort-based, electronic classroom model that best supports this interaction was later redefined as "online learning" by Garrison (2009a), as opposed to the traditional industrialized distance education model that allowed greater learner independence but restricted interaction among learners and between instructor and learner.

Rourke and Kanuka (2009) critiqued the CoI framework. They considered the central indicator of a successful online learning experience to be "deep and meaningful learning." They defined this as "the critical examination of new facts and the effort to make numerous connections with existing knowledge structures," contrasting it with surface learning, defined as "the uncritical acceptance of new facts and ideas" (p. 24). Following a review of almost a decade of CoI research, they concluded that deep and meaningful learning did not occur as described in the framework because "students are not engaged in the constituent processes" (p. 39) proposed by the framework, at least not in the context of an objectivist/empiricist paradigm, where deep and meaningful learning is regarded as the dependent variable under examination. Rather, students seemed to report instances of surface learning and to associate these more with instructional material (e.g., completion of assignments) rather than sustained interaction with the instructor or other learners. Only lower levels of cognitive presence had been identified to date in the literature. CoI-based research, they argued, suggested that students judge most learning, such as it is, to occur when didactic instruction is used, particularly individual written assignments and projects, rather than as a result of collaboration with their peers. They concluded that the CoI framework is deficient as a means to develop deep and meaningful learning, as a model for online learning, and as a program of research.

Akyol et al. (2009) responded to the issues raised by Rourke and Kanuka (2009) by first stating that the CoI framework is primarily a process model focused on the educational transaction within a constructivist orientation, rather than an outcomes-based measure within an objectivist orientation. Deep and meaningful learning, they argued, is a means to practically investigate the educational transaction process, not a dependent variable in an empirical research program. Indeed, measuring deep and meaningful learning as an outcome "does little to inform the teaching and learning process" (p. 131).

The purpose of this article is to raise additional concerns about the CoI framework and to support the position of Rourke and Kanuka, who argue that the framework, as it is popularly conceptualized, does not adequately inform the development of online education theory and practice. In particular, the influence of social presence on the learning experience within online higher education appears to be overstated. There are also significant inconsistencies in the way online learning environments are visualized as communities of inquiry and

how they are organized in practice. These points are discussed below.

The Question of Social Presence

Garrison and Shale (1990) suggested that sustained, contiguous, two-way communication between student and instructor was the appropriate hallmark of distance education because this process allows learners to negotiate and structure personally meaningful knowledge much like the educational transactions that occur in traditional classrooms. This need for sustained dialogue is integral to and interwoven throughout the CoI framework. Several authors (Garrison & Arbaugh, 2007; Shea & Bidjerano, 2009a; Garrison, 2009b; Shea et al., 2010) have asserted that knowledge construction within a community of inquiry must be a "moment by moment" negotiation of meaning as it occurs in a physical classroom setting. Without group-based interaction, learners cannot create the common values, goals, and language necessary for effective learning to occur. The many-to-many types of interactions this connotes are operationalized primarily within the concept of social presence.

Akyol, Garrison, and Ozden (2009), referencing Garrison and Anderson (2003), considered social presence to be critical and "an important antecedent to collaboration and critical discourse because it facilitates achieving cognitive objectives by instigating, sustaining, and supporting critical thinking in a community of learners" (p. 67). The authors also point out that students value social presence as a means to "share ideas, to express views, and to collaborate" (p. 76).

Much CoI-based research has focused on the role of social presence in the online learning experience. Garrison, Anderson, and Archer (2010) noted that the conceptualization of social presence has changed over time in order to show the connection of this activity more clearly to the formal educational experience. A progressive schema was proposed to illustrate social presence: initially, identification with the community, then purposeful communication within a trusting environment, and finally development of social relationships. Even so, Garrison et al. noted that more study of the relationship between social presence and cognitive and teaching presences was needed.

Shea and Bidjerano (2009b) noted that asynchronous group-based communications per se are insufficient to develop an effective community of inquiry, and this was the main point of Garrison and Cleveland-Innes (2005). However, the unexamined question is whether social presence and sustained, continuous, two-way communication (an integral component of it) is necessary *at all* to facilitate the development of higher-order cognitive presences and thence deep and meaningful learning.

Careful reading of CoI-based research seems to indicate that students do not attach much value to the group-based influences of social presence. A few studies have found social presence to be beneficially linked to some aspects of higher education learning experiences. For instance, Boston et al. (2009) analyzed results of a survey administered to almost 29,000 undergraduate students enrolled in the American Public University System. They found

that a small number of social presence indicators could significantly predict reenrollment patterns. But for the most part, support for the construct of social presence is limited at best. Kupczynski, Weisenmayer, and McCluskey (2010) studied a total of 643 students in two different educational programs at separate US higher education institutions, one two-year college and one four-year university. Though findings related to differences between the two student populations were conflated because courses and instructors differed, the researchers stated that variations in responses from the two student populations indicated that preferences for strategies like direct feedback were higher at the college level, perhaps indicating that the teaching strategy of direct instruction should be gradually replaced with more discourse as the course level increases to encourage greater social presence. However, while some of the student ratings of important instructor practices were considered by the researchers to enable social presence, these did not require collaborative activities (e.g., clarification of thinking, providing feedback, or communicating important course topics). Rather, these should be considered direct instruction techniques. As such, the overall influence of collaborative activities on social presence remained questionable.

Nagel and Kotze (2010) surveyed students in two master's and doctoral level courses in research methodology conducted within the Faculty of Economics and Management Science at the University of Pretoria during 2009. Each course had more than 125 students, so the amount of one-on-one time the instructor could provide was limited. However, the researchers still reported positive social, cognitive, and teaching effects, higher completion rates, and higher-category cognitive presences (such as integration and resolution). But the main technique that produced the observed effects was the one-on-one peer review, not group-based interaction, and this was an unexpected result. Nagel and Kotze also opined that social presence may develop as a *result* of other presences' interactions and may not be a precursor to cognitive presence at all. Shea et al. (2010) used a quantitative content analysis of approximately 1,000 online interactions across two identical undergraduate business courses taught by different instructors to measure the extent of the three presences and their interactions. They concluded that their findings indicate a possible lack of correlation between social presence and learning, noting that,

> ...several specific indicators of social presence are very difficult to interpret reliably. All of these issues indicate that the social presence construct is somewhat problematic and requires further articulation and clarification if it is to be of use to future researchers seeking to inform our understanding of online teaching and learning. (p. 17)

In a study conducted by Akyol and Garrison (2008), weekly discussion questions that required students to collaboratively discuss one specific aspect of a major individual assignment were associated with higher-level cognition. The activity, they proposed, allowed students to synthesize their ideas. Diaz, Swan, Ice, and Kupczynksi (2010) also concluded that online discussions that required problem-solving tasks allowed students to co-create knowledge and develop higher levels of cognitive presence when the group was supported by appropriate instructor facilitation. However, a different interpretation of the findings of

these two studies indicates that instructional design focusing learners on a major course requirement was the essential element contributing to the development of higher-order cognitive presences and that one-on-one peer review activities that require neither collaborative activities nor intentional creation of social presence are preferable.

Ke (2010) conducted interviews, transcript analyses, and surveys with 16 adult learners enrolled in nursing, education, and business management programs at the undergraduate through doctoral levels within a major research university in the United States. The purpose was to study the nature of and relationships among cognitive, social, and teaching presences reported by students and instructors. Adult learners preferred individual assignments and timely, encouraging, individualized feedback from instructors. Most respondents reported instances of deep learning but listed written assignments and direct instruction as the techniques that contributed most to these experiences. Students perceived online collaborative learning to be a "bonus" that was overemphasized. They considered it more useful for social purposes; also, it contributed to their learning by clarifying their own thoughts through the posting process rather than by enabling socially constructed learning. Motivations to participate were generally reported to be superficial and grade-driven.

Shea and Bidjerano (2009a) found that the "vast majority" of students achieved higher-level cognitive presences (integration and resolution) but that this seemed to be the result of activities other than online discussion forums. They surmised that online discussions "initiated" thought rather than completed the cognition process, but they also noted that collaborations consisted not so much of knowledge construction related to course content but of more administrative activity focused on the completion of group assignments. In other words, collaborative activities were necessary to complete collaborative activities, and students did not necessarily learn from them. Social presence effects on learning therefore could be either small or ancillary.

In a study of 124 distance- and classroom-based students enrolled in an advanced quantum mechanics course at the Open University of the United Kingdom, Gorsky, Caspi, and Smidt (2007) found that students tended to rely significantly on instructional material to learn, supplemented by limited but crucial dialogue with instructors—and that this was the case regardless of age, gender, prior acquaintance with other students, motivation, and importantly, mode of instruction. Classroom-based students learned individually at lectures and tutorials; online students tended to learn individually from instructional resources and one-to-one interaction with instructors. Greater *interpersonal* (among participant) dialogue was found in courses with limited enrollments and subject matter that was perceived as moderately difficult. *Intrapersonal* (within participant) dialogue was facilitated by learner–instructor interaction, used by students more when subject matter was perceived as easy or difficult, and more prevalent in large class settings. In a difficult course, Gorsky et al. argued, students are unable to help each other since most experience similar cognitive difficulties. In an easy course, interpersonal dialogue is perceived by learners to be unnecessary. In large courses, efficacious many-to-many dialogues are difficult to structure formally and instructor access is limited. Gorsky et al. thus argued that the importance of interpersonal dialogue is overrated in practice and is context-dependent and that social

learning theories generally tend to overstate the importance of group-based interaction in the learning process.

Gorsky and Blau (2009) used the CoI framework to analyze the practices of two instructors in online graduate-level discussions offered at the Open University of Israel. They found that the 42 volunteer students' perceptions of learning were not affected by differing instructor facilitation practices and surmised that higher-order cognitive presences were lacking because the course was only rated as average in difficulty. They concluded that cognitive presence correlates with difficulty of subject matter, not social presence.

Shea and Bidjerano (2008) found that social presence does not predict learner satisfaction and stated that prior research on factors similar to those measured by the CoI framework's concept of social presence did not contribute to self-perceived or actual learning. These did positively correlate with perceptions of group interaction and instructor effectiveness, but the links from these intermediating variables to actual learning were not established. They suggested that the importance of social presence, at least as it was developed within the design of the dozens of online courses their study covered, should be validated by additional research and different theoretical approaches. Akyol and Garrison (2008) studied the progression of constituent parts of the three CoI presences over time in a group of 16 graduate students by coding about 500 discussion forum messages. Their study did not find any correlation between social presence and learning and reported that "only two presences (teaching and cognitive presence) showed a significant relationship with perceived learning and satisfaction" (p. 15).

Analysis of the CoI framework was significantly enhanced by the development of the practical inquiry model (PIM), a unified instrument with approximately 34 to 37 items that surveys students' perceptions of their online learning experiences. The instrument was validated and refined in several studies (e.g., Shea, Li, & Pickett, 2006; Arbaugh, Bangert, & Cleveland-Innes, 2010; Arbaugh et al., 2008; Swan et al., 2008, Shea & Bidjerano, 2009a).

Diaz et al. (2010) administered the PIM survey to 413 graduate and undergraduate student volunteers at four US universities and colleges to determine learners' perceptions of the three CoI presences, their interactions, and the relative importance of each PIM survey item. Items rated as relatively low in presence but high in importance indicated areas where students' expectations and needs were not well met. In this study, social presence factors were rated as least important.

The PIM and its survey instrument also enabled more rigorous analysis of the relative effects of the three CoI presences. Shea and Bidjerano (2008) developed a structural equation model of self-perceived cognitive presence based on responses to a PIM survey from over 5,000 learners in dozens of US higher learning institutions that used a common learning management system and pedagogy. Their research made explicit the evolution of the CoI framework from one in which the three presences influence and interact to create the online learning experience (see Figure 1 above) to one in which teaching and social presences are hypothesized to causally affect cognitive presence, now considered the final mea-

sure of the online learning experience. Teaching presence is also considered to indirectly affect cognitive presence through its effect on social presence. These concepts are shown in Figure 2 below.
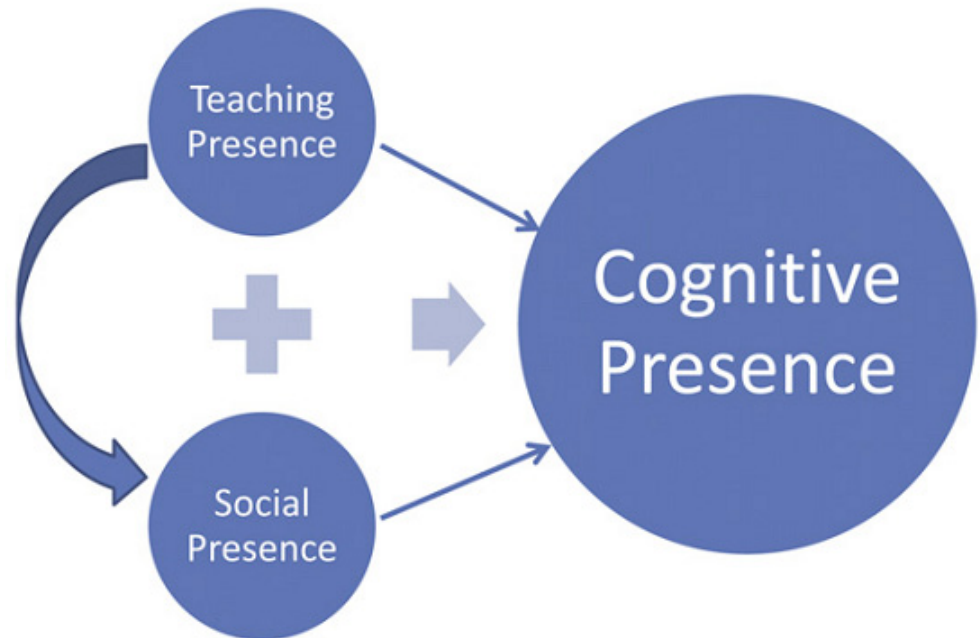

Figure 2. Relationship between teaching, social, and cognitive presences (Shea & Bidjerano, 2010).

Results from structural equation modeling seem to corroborate that social presence has a relatively unimportant effect on the online learning experience. Shea and Bidjerano (2009a) reported that students who experienced low social presence but high teaching presence still reported high cognitive presence and vice versa. They concluded that good teaching presence is an important compensatory factor in the absence of sustained, contiguous, two-way communication. However, they did not question to what extent direct instruction can or should be substituted for teaching activities that support social presence (e.g., facilitation of discussion), especially given the finite amount of time that instructors can devote to teaching. Diaz et al. (2010) also alluded to this, stating that limitations on instructional time suggest that "a higher priority be placed on providing timely feedback" (p. 25).

Shea and Bidjerano (2009b) found that three subcategories mostly identified with teaching presence explained about 67% of observed variance. Social presence factors predicted very little additional variance. Even at that, most of the social presence indicators influencing learner satisfaction consisted of individualized student activities, not group-based ones. "Facilitation of discourse," normally considered a category of teaching presence necessary to build social presence also included mostly motivational activities related to individualized learning activities (e.g., keeping students on task, providing feedback, and explaining course topics). These can be considered more akin to direct instruction activity, not tasks

that facilitate discourse and collaboration, thus reducing their social presence effects. Shea and Bidjerano also reported that appropriate course design reduced ambiguity and that this in turn appeared to make social presence factors less important.

Structural equation modeling conducted by Garrison, Cleveland-Innes, and Fung (2010) also raised interesting unanswered questions about the importance of social presence. Their data indicated that teaching presence predicted 51% of the observed cognitive presence effect, and social presence predicted 40% of the observed cognitive presence effect. However, teaching presence predicted 52% of the observed social presence effect. Taken together, the results suggest that teaching and social presences are highly correlated (see also Bangert, 2009). As a result, social presence may be either substantially produced by elements such as teaching presence, or it is an artifact of cognitive presence. Shea and Bidjerano (2010) found that combined social and teaching presences predicted only a little better than 25% of cognitive presence. They proposed a fourth construct which they called "learner presence," characterized as a combination of self-efficacy and individual effort. The combination of learning, teaching, and social presences predicted better than 75% of perceived cognitive presence in both blended and online learning environments. They proposed a revised version of the CoI framework that incorporated the effects of individual learner attributes on learning, as shown in the figure below.
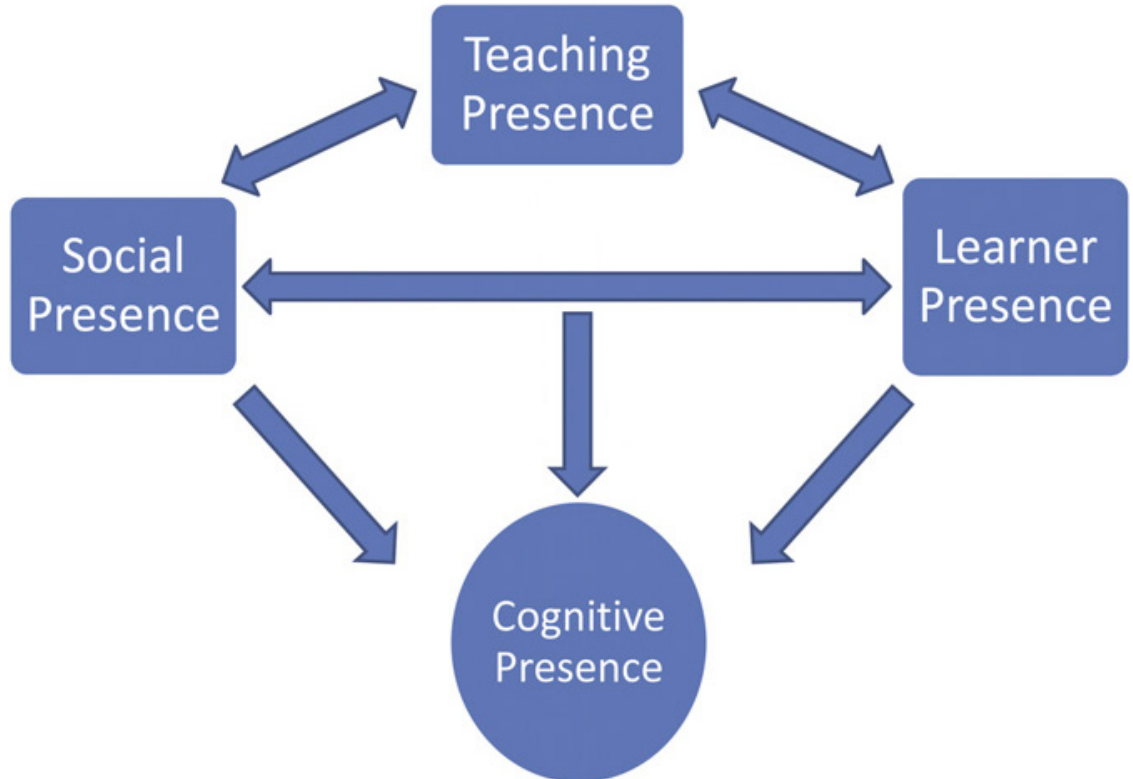

Figure 3. Revised community of inquiry model, including "learner presence" (Shea & Bidjerano, 2010).

Though informative, these three studies do not address the extent to which social presence affects cognitive presence without the mediating effect of teaching presence or, conversely, the extent to which teaching presence alone affects cognitive presence, either directly or through its mediating effect on social presence. For instance, Shea and Bidjerano (2009b) indicated that the standardized total effects path coefficient of teaching presence to cognitive presence is 0.72 (Table 2, p. 549). Garrison et al. (2010) obtained similar coefficients for teaching and social presence path effects (see Figure 1, p. 34). Depending on the correlation between teaching and social presences, teaching presence R^2 could be as high as approximately 0.50. In other words, non-collaborative teaching functions may significantly cause observed cognitive presence effects, whereas social presence effects other than those produced by teaching presence may be minimal. To illuminate these issues, additional calculations should be performed on the data sets and published.

The results of Shea and Bidjerano's research (2010) reported above and the proposed construct of learner presence also indicate that teaching activities focused on individual intellectual development have significant effects on cognition. This is similar to results reported by Means, Toyama, Murphy, Bakia, and Jones (2009). Means et al. conducted a metaanalysis of approximately 100 studies published between 1996 and 2008 comparing online, blended, and classroom learning outcomes, primarily in higher education. The most successful online metacognitive learning strategies they observed all involved encouraging individual efforts in self-reflection, -explanation, and -monitoring.

The recurring suggestion of recent CoI-based empirical research is that social presence is of questionable value in the online higher education learning experience because it does not appear to have an important effect on cognitive presence. Rather, appropriately structured learning materials, timely, non-contiguous, one-on-one instructor–learner communication, and a teaching focus that enhances individual learner attributes and effort may be the best prescriptions for effective online learning in higher education. Limited group-based collaboration may be able to uniquely develop certain interpersonal skills, like the ability to interact with multiple learners and manage group dynamics, but it may not be necessary to synthesize knowledge or achieve other valued higher-order learning outcomes. Further, CoI-based research to date has neither incorporated nor sufficiently studied unstructured, student-initiated effects on social presence—for instance, the extent of one-on-one mutual support, instruction, and encouragement students provide to one another outside of formal class structures (Gorsky et al., 2007). These possibilities all cast doubt on the assumption underlying the CoI framework that sustained, contiguous, two-way interaction operationalized within formal, paced, and cohort-based "electronic classrooms" is required for effective online learning to occur and, related to this, whether discourse facilitation by instructors is the best use of their finite time.

CoI proponents argue that sustained communication enabled by paced and cohort-based groups of students is necessary because realities are subjective and multiple, and knowledge is co-constructed. As such, learning should be practiced communally on an ongoing basis, driven by a particular question or problem that is examined within small groups which are supportive of critical discourse and multidisciplinary in nature, and the question

must be researched using methods like information collection and synthesis. This idealized version of online learning communities exhibits many similarities to communities of practice proposed by Wenger (1998) as the process of learning within organizations in general. But there are significant differences between higher education and formal work situations, with resultant effects on the way online communities generally develop and function in each environment. The main means of sustained, contiguous, two-way communication in extant higher education online learning takes place in discussion forums or similar group-based mediums. These generally mandate participation, focus on one narrow topic, and are limited in duration to usually no more than 13 weeks. Perhaps most importantly, higher education is generally characterized by the presence of one expert and many novices, particularly at the introductory and intermediate undergraduate levels. As a result (and unlike Wenger's framework), shared competence is often absent, and actual learning is based on meaning-making, an interchange of experiences, and the negotiation of subjectively perceived realities by a community of like-minded peers is restricted in both design and practice. It is this resulting artificiality of the online learning experience that impedes the formation of true communities of inquiry in most higher education settings and therefore significantly undermines in practice the perceived effects of collaboration and the assumption that co-construction of knowledge is occurring.

Recent CoI-based research that considers all aspects of the formal online learning process indicates that learning practices more closely associated with cognitive learning theory and the objectivist paradigm are most effective, though these are often couched in constructivist terminology. For instance, Swan (2010) suggested that diagnosing and remediating learner misconceptions is important, though remediation is "accommodated" rather than "corrected." Individual (or "personalized," in constructivist lexicon) learning characteristics are also important, as are continuous assessment and feedback. Swan (2010) and Ice (2010) advocate technologies like computer-based learning. Nagel and Kotze (2010) noted in their research that "behaviorist" teaching practices, like significant instructor feedback and computer-based writing analysis, were used to raise students' writing levels to an acceptable level. But their recommended "constructivist" tool set consisted of one-on-one peer review, and the practice as described had little to do with co-construction of knowledge. In fact, all of these are not simply preparatory "scaffolding" techniques in a social constructivist paradigm. They are the principal means of providing significant learning experiences in the education process and are rooted in cognitive learning theory. As Kirschner, Sweller, and Clark (2007) stated, controlled studies almost uniformly suggest that strong guidance is needed during the instruction of novices and intermediate learners to minimize cognitive load on short-term memory during the initial learning process. The practices described above support this contention. They are efficient and sufficient means to acquire domain-specific knowledge by first understanding a particular task or concept, limiting working memory cognitive load, gradually acquiring more complex cognitive skills, and finally developing a coherent knowledge structure within long-term memory that gives meaning to experience.

CoI proponents may object that these ways of scaffolding do not result in higher-order cognition but are only a partial means to this end. Sustained, grouped-based interaction is

also a necessary ingredient. But there is little evidence that problem-based or exploratory learning, continual negotiation of subjective realities, or other constructivist concepts have been applied in CoI-based research settings at most levels of higher education with added, essential effect. When all elements of a particular course are considered, the predominance of scaffolding effects on learning significantly dispute the assumptions of most CoI-based research that (a) a social constructivist learning orientation is the operational paradigm; and (b) co-construction of knowledge is taking place within most online (or classroom, or blended) higher education settings. CoI proponents need to explain more clearly how the learning environments studied and best educational practices prescribed actually differ from those based on learning theories arising from an objectivist orientation.

Other objections may be raised by CoI proponents—for instance, that cognitive learning techniques may be applied in most higher education settings, but not much higher-order cognitive presence is being achieved. Arbaugh, Bangert, and Cleveland-Innes (2010) followed this line of reasoning and added that as a result, application of the CoI framework might be better suited to "soft" disciplines rather than "hard" ones, particularly at advanced levels. In hard disciplines, theory is well established and accepted, more emphasis is placed on knowledge acquisition, and teaching is more directed than facilitative. In soft disciplines, theory tends to be contested or less developed. Consequently, teaching in soft disciplines is more constructivist-oriented and iterative, with emphasis placed on reflective practice and the development of transferrable skills, and higher-level cognitive presences are achieved. However, this is an artificial distinction. Disciplines relying on well-established and empirically supported theory may require less *resolution* activity, for instance, since outcomes are robustly predicted. But this would not limit the development of *critical thinking* skills in hard disciplines. There is little evidence that these cannot be developed within any appropriately structured course. Rather, it may be that the conceptualization of higher-order subcategories of cognitive presence within the CoI framework (such as integration and resolution) is too restricted because it associates only these attributes with critical thinking and ignores other valid constructs. The framework, its presences, and constituent subcategories originally arose from a narrow evidential base, the transcripts of formal online discussions. In these forums, resolution may indeed be indicative of higher-order cognitive presence. However, in a broader, whole-course context, higher-order cognition (or critical thinking, or deep and meaningful learning) can also involve the process of recognizing problems, determining applicable evidence, detecting unstated assumptions, evaluating arguments, and drawing logical inferences. Techniques to develop these attributes are not the sole purview of constructivism. These can be equally developed in objectivist-based learning and in hard or soft disciplines. If higher-order cognitive presence indicators within the CoI framework were more broadly formulated, hard disciplines might be as amenable to the development of learners' critical thinking capacities as soft ones.

Conclusion and Directions for Future Research

The main point of this article is that in higher-level online learning environments, the CoI

framework has evolved from a description of the learning process in a social constructivist paradigm to an empirically testable construct within an objectivist paradigm. Related research results indicate that social presence does not impact cognitive presence in a meaningful way. As such, the CoI framework's conceptualization of online learning as a process necessarily supported by collaborative, constructivist activity requiring sustained, contiguous, two-way communication is called into question. Perhaps the primary reason that these conclusions have been perpetuated is that the framework was originally developed based on the analysis of web-based conference call transcripts, evidence arising from a collaborative activity that is generally only a subset of a higher-level online learning environment. As a result, researchers assumed these discussion forums occurred within a social constructivist paradigm. The framework derived from this limited evidence has overstated the effects of sustained collaboration on the construct of social presence. This in turn inappropriately magnified the effect of social presence on cognitive presence. As CoI-based research has expanded to encompass the complete higher education online learning experience, effects of individual learner attributes and teaching processes that impact directly on cognition have become more apparent, though these are generally unacknowledged within mainstream CoI research. This research needs to be reevaluated to more clearly determine the relative influence of group-based social presence categories on the learning process.

Akyol et al. (2009) stated that "seminal CoI work does not exclude the consideration of intended learning outcomes" (p. 124). Indeed, objectivist-based distance learning theory suggests that higher-order cognition may be achievable through wide and varied combinations of learner–teacher, learner–content, and learner–learner interaction (Moore, 1989). Now that CoI-based research has moved into the realm of empiricism, controlled studies can and should be undertaken that compare learning outcomes resulting from sustained, contiguous, two-way communication to other learning models. Research should also more closely examine informal learning effects on cognition and whether more effective learning occurs in formal settings of sustained, contiguous, two-way communication compared to cohort-based learning environments where limited, formal learner–learner interactions are incorporated, and even individualized distance learning environments where formal learner–learner interactions may be significantly curtailed. To facilitate this, subcategories of social and teaching presences as currently classified in the CoI framework need to be revamped and analysis adjusted to separate those processes that support explicitly group-based activities versus individual learning activities. This would isolate social presence effects produced by sustained, contiguous, two-way interaction from those produced by, for instance, informal one-on-one student interactions and more appropriately determine the extent and types of social and teaching presences necessary to support deep and meaningful learning in online higher education.

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