

## Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework

D.R. Garrison <sup>a,\*</sup>, Martha Cleveland-Innes <sup>b,1</sup>, Tak Shing Fung <sup>c,2</sup>

<sup>a</sup> The University of Calgary, Biological Sciences Bldg, Room 530L, 2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

<sup>b</sup> Athabasca University, Centre for Distance Education, Athabasca, Canada AB T9S 3A3

<sup>c</sup> University of Calgary, Canada

### ARTICLE INFO

#### Keywords:

Community of inquiry  
Teaching presence  
Social presence  
Col survey  
Structural equation modeling  
Gender

### ABSTRACT

The causal relationships among the three presences in the Community of Inquiry (CoI) framework are explored and tested in this paper. The CoI framework has been used extensively in the research and practice of online and blended learning contexts. With the development of a survey instrument based on the CoI framework, it is possible to test the hypothesized causal relationships that teaching and social presence have a significant perceived influence on cognitive presence and that teaching presence is perceived to influence social presence. The results of this study confirm the factor structure of the CoI survey and the hypothesized causal relationships among the presences predicted by the CoI framework. These results point to the key role of teaching presence in establishing and sustaining a community of inquiry. Further research is called for to explore the dynamic relationships among the presences across disciplines and institutions as well as understand the existence and role of the specific sub-elements (categories) of each presence.

© 2009 Elsevier Inc. All rights reserved.

### 1. Introduction

Online and blended learning is pervading higher education and research activity around it has increased significantly (Allen & Seaman, 2008). It has also been reported that “[m]ethods of research, teaching and learning are expanding as new interactive media support innovative forms of pedagogy” (Dede, 2008, Overview, lines 10–11). At the same time, it has been argued that web-based teaching and learning research “efforts are often so diffuse and contradictory ... [that we] have failed to break much new pedagogical ground” (Hannafin & Kim, 2003, p. 347). This raises new research questions, particularly about communities of learning and collaborative inquiry and the potential to break new ground pedagogically. The challenge is to systematically explore the integration of pedagogical ideals and new communications technology that will advance the evolution of higher education as opposed to reinforcing existing practices. Such an approach requires a holistic framework and methodology.

It is argued here that to advance our understanding of online learning in higher education, a coherent theoretical framework must guide investigations into the research and practice of web-based online teaching and learning. Despite the fragmentation of research in

online learning, there is growing interest and optimism around its potential. Moreover, in terms of a driving pedagogical concept, a consensus concerning the importance and congruence between online learning and collaborative constructivist approaches to teaching and learning has emerged. One promising theoretical perspective based on collaborative constructivist principles is the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000).

The research reported here is a study of the online learning Community of Inquiry framework (described in next section). This theoretical framework and methodology has grown in prominence and has been used in hundreds of studies over the last decade (Arbaugh et al., 2008). As significant as this research is, much of it has relied on qualitative methodologies and focused on individual elements of the framework. In the present context, the goal is to quantitatively explore the causal relationships among all three of its core elements – teaching presence, cognitive presence and social presence. To date, little research has been reported that quantitatively analyses the dynamic relationships among the Community of Inquiry presences. Considering the inherently dynamic nature of the CoI framework, it is crucial that we begin to study the causal connections among its elements.

The first step in this quest is to establish construct coherence by assessing the interpretability of the factor structure of the Community of Inquiry survey instrument used to measure learner perceptions of teaching, cognitive and social presence. The second step is to assess whether perceptions of teaching and social presence predict cognitive

\* Corresponding author. Tel.: +1 403 220 6764.

E-mail addresses: garrison@ucalgary.ca (D.R. Garrison), martic@athabascau.ca (M. Cleveland-Innes), tfung@ucalgary.ca (T.S. Fung).

<sup>1</sup> Tel.: +1 780 675 6426.

<sup>2</sup> Tel.: +1 403 220 6941.

presence as hypothesized by the framework. The next section describes the dynamics of the framework and reviews the validating research.

## 2. Conceptual framework

The concept of a community of inquiry provides the order and structural elements needed to begin the process of understanding the complexities of online learning. The Community of Inquiry (CoI) framework reflects the dynamic nature of higher-order learning and has shown to be useful in guiding research and practice in online higher education (Garrison & Arbaugh, 2007). It is grounded in a broad base of research in teaching and learning in higher education (Garrison & Anderson, 2003). The premise of this framework is that higher-order learning is best supported in a community of learners engaged in critical reflection and discourse. The philosophical foundation of the CoI framework is collaborative constructivism and, theoretically, it is grounded in the research on deep and meaningful approaches to learning (Garrison & Archer, 2000). These ideas and beliefs are consistent with the ideals and values of higher education that are relevant as we attempt to meet the challenges of a post-Internet society.

The CoI framework identifies the core elements of a collaborative constructivist learning environment required to create and sustain a purposeful learning community. The three main elements (teaching, cognitive and social presence) and their overlap provide the structure to understand the dynamics of deep and meaningful online learning experiences. In order to create and sustain a collaborative community of inquiry, the composition and interactive effects of each of the presences must be understood. The premise is that the nature of such an environment will support purposeful inquiry and meaningful collaboration.

To establish and maintain a community of inquiry requires a thoughtful, focused and attentive teaching presence. In this context, teaching presence in the CoI framework is defined as “the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison, & Archer, 2001). The first of the primary teaching presence responsibilities is establishing curriculum content, learning activities, and timelines. The second responsibility is monitoring and managing purposeful collaboration and reflection. The third is ensuring that the community reaches the intended learning outcomes by diagnosing needs and providing timely information and direction.

The second core element of a community of inquiry is cognitive presence. Cognitive presence reflects the learning and inquiry process. Cognitive presence is formally defined by the Practical Inquiry model that identifies four phases in the inquiry process (Garrison, Anderson, & Archer, 2001). The phases are definition of a problem or task; exploration for relevant information/knowledge; making sense of and integrating ideas; and, finally, testing plausible solutions. All of this occurs in an environment of reflection and discourse; analysis and synthesis. With regard to the present study, cognitive presence is as seen shaped and predicted by teaching and social presences.

The third element of the CoI framework is social presence. Social presence has a special historical place in online learning as this was, understandably, the early focus of learning online. The question was whether a community of learners could be established without the visual cues that accompanied face-to-face communication. As research findings mounted, the evidence strongly supported the view that social presence can and should be established in online learning communities (Swan, Garrison, & Richardson, 2009). We define social presence here as “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities” (Garrison, 2009).

Theoretically, the framework suggests that social presence is a mediating variable between teaching presence and cognitive presence. That is, it is a responsibility of teaching presence and a condition for creating cognitive presence (i.e., collaborative inquiry).

While evidence has grown as to the structure of each of the presences, there is a distinct lack of confirming research with regard to the causal relationships among the presences. Theoretically, the CoI framework suggests that teaching presence directly influences the creation and sustainability of social and cognitive presence. Moreover, there is growing evidence that teaching presence is a significant determinate of student satisfaction, perceived learning, and sense of community (Akyol & Garrison, 2008; Arbaugh, 2008; Shea, Li, Swan, & Pickett, 2005). What needs to be empirically demonstrated is that teaching presence significantly influences social and cognitive presence. The question has also been asked, whether social presence is really a necessary precursor of cognitive presence (Swan et al., 2008). To this end, Shea and Bidjerano (2009) have provided initial insights into these causal relationships. The goal now is to provide confirmation and deeper understanding of them.

There is a growing knowledge base associated with research that has utilized the CoI framework to study various aspects of online and blended learning environments. Several recent articles have attempted to review the salient work that has used or tested the framework (Arbaugh, 2008; Garrison & Arbaugh, 2007; Swan, Garrison, & Richardson, 2009). In these reviews and an article discussing methodological issues associated with the CoI framework (Garrison, Cleveland-Innes, Koole, & Kappelman, 2006), the need to turn from descriptive to more predictive quantitative studies that can address the interaction effects of the presences and large scale cross-disciplinary studies has been identified.

While the results of this research support the CoI's utility, of particular relevance here is a collaborative research effort that has validated the structure of the CoI framework and created a survey instrument designed to be used for large scale studies (Arbaugh et al., 2008; Swan et al., 2008). The CoI Survey consists of 34 items derived directly from the constructs (i.e., presences) of the CoI framework. One use of the instrument is to further refine the CoI framework through large scale quantitative studies. Another use of this instrument is to study the contextual dynamics of the three presences over time (Akyol & Garrison, 2008).

The present study explores the relationships among the CoI presences and examines potential influence of program of study and student gender on them. Program of study varies according to discipline, each with unique teaching paradigms, styles of discourse and epistemologies (Becher & Trowler, 2001). Given the interactive and inquiry-based focus of online communities of inquiry, different disciplines may result in unique patterns of relationships among presences. This may also be true of gender. Not only is there a gender imbalance in favor of women in online learning, the perceived benefits of participation differ across gender (Kramarae, 2007). Women have been found to describe the online experience as socially richer than do men (Rovai & Baker, 2005). Such differences may result in a difference in social presence, an element central to learning in an online community of inquiry.

Based on the research associated with the CoI model, the following research questions were the focus of this study:

1. Will the CoI survey instrument result in an interpretable factor structure of teaching, social and cognitive presences?
2. Will teaching and social presence be perceived to positively influence cognitive presence?
3. Will teaching presence be perceived to positively influence social presence?
4. Will gender and program design be associated with each of the three presences?

### 3. Methodology

This study used the CoI Survey Instrument (Arbaugh et al., 2008; Swan et al., 2008) to gather data using an online survey. The instrument was developed collaboratively based on previous CoI research. It was tested using 287 student responses from four institutions in the United States and Canada. It has been conceptually and empirically validated and holds a Cronbach's Alpha reliability of .84 (Arbaugh et al., 2008). The 34 items of the CoI survey (see Table 1) were randomized to distribute questions relating to each of the three presences to minimize response-set error. An ordinal five-point scale was used to elicit responses. The survey administration platform is a well known online survey tool that participants accessed with a URL provided via e-mail after consents were signed. Gender and program variables were also measured.

Two programs and 14 different courses were chosen for use in this study. To remove within-program or subject bias from responses, two programs and multiple courses were sampled. One program is a social science Master's Degree in Interdisciplinary Study (MAIS). The other program is a Master's Degree in Education with a concentration in Distance Education. Both programs were offered on a learning platform with asynchronous communication. Courses ranged across multiple subject areas including philosophy, research methods and educational technology. This variation of courses was included to randomize any possible subject-matter effects that might influence results. All courses were delivered using a combination of print and electronic media and online conferencing. The online conferencing component provided the opportunity for student engagement and group interaction. Required conference participation was used for

assessment in some courses while it remained a voluntary activity in others.

There were 205 completed questionnaires that reflected a 54.8% response rate. Of those that reported, 73.2 were female respondents (22 did not report gender). Exploratory factor analysis using the Principal Components Extraction method with an oblimin rotation was used to extract three factors. An oblimin rotation was used in consideration of the theoretical interdependence of the presences. The cutoff to identify significant loadings on each factor was 0.35.

LISREL v. 8.72 was used to assess the multivariate relationships among teaching presence, social presence, cognitive presence, gender and program design. Structural equation modeling (SEM) was used to test the hypothesized relationships. Latent variables are represented with ovals and measured variables are presented with rectangles. In many cases, a sample size of about 200 is adequate for small to medium models (Tabachnick & Fidell, p. 659). The results of the factor analysis and the outcomes of the path analysis are presented in the next section.

### 4. Findings

#### 4.1. Factor analysis

Exploratory factor analysis using an oblimin rotation was used to extract three factors. A three factor solution provided clean loadings and interpretability in terms of the theoretical framework (see Table 1). All of the CoI items loaded significantly ( $>.35$ ) as expected across the three presences. Loadings under .35 are not listed in Table 1. There were no double loadings.

**Table 1**  
Community of inquiry survey and factor loadings.

Question	Teaching presence	Cognitive presence	Social presence
Q7. The instructor clearly communicated important course goals.	0.829		
Q15. The instructor clearly communicated important course topics.	0.803		
Q33. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	0.740		
Q24. The instructor provided clear instructions on how to participate in course learning activities.	0.722		
Q20. The instructor helped keep the course participants on task in a way that helped me to learn.	0.705		
Q9. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	0.697		
Q14. The instructor encouraged course participants to explore new concepts in this course.	0.689		
Q22. The instructor helped to keep course participants engaged and participating in productive dialogue.	0.685		
Q10. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	0.651		
Q2. Instructor actions reinforced the development of a sense of community among course participants.	0.645		
Q29. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	0.645		
Q8 The instructor provided feedback in a timely fashion.	0.557		
Q5. The instructor clearly communicated important due dates/time frames for learning activities.	0.525		
Q3. I felt motivated to explore content related questions.		0.825	
Q28. Problems posed increased my interest in course issues.		0.791	
Q4. Course activities piqued my curiosity.		0.755	
Q30. I can apply the knowledge created in this course to my work or other non-class related activities.		0.689	
Q18. Learning activities helped me construct explanations/solutions.		0.655	
Q16. Combining new information helped me answer questions raised in course activities.		0.654	
Q17. Brainstorming and finding relevant information helped me resolve content related questions.		0.597	
Q12. Reflection on course content and discussions helped me understand fundamental concepts in this class.		0.590	
Q32. I have developed solutions to course problems that can be applied in practice.		0.587	
Q13. Online discussions were valuable in helping me appreciate different perspectives.		0.559	
Q1. I can describe ways to test and apply the knowledge created in this course.		0.534	
Q21. I utilized a variety of information sources to explore problems posed in this course.		0.398	
Q26. I felt comfortable conversing through the online medium.			0.789
Q31. I felt comfortable participating in the course discussions.			0.781
Q23. The instructor helped keep the course participants on task in a way that helped me to learn.			0.758
Q11. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.			0.620
Q19. I felt that my point of view was acknowledged by other course participants.			0.613
Q25. Getting to know other course participants gave me a sense of belonging in the course.			0.576
Q27. Online or web-based communication is an excellent medium for social interaction.			0.562
Q34. Online discussions help me to develop a sense of collaboration.			0.509
Q6. I was able to form distinct impressions of some course participants.			0.423
Eigenvalue	13.08	3.06	2.09
Percent of variance	38.47	9.01	6.12
Reliability	0.93	0.91	0.87

4.2. Structural equation modeling

Consistent with the CoI framework, the structural equation model did confirm the hypothesized relationships among the three presences (see Fig. 1). Student perceptions of teaching presence predicted a significant direct effect on perceptions of cognitive presence. In addition, perceptions of teaching presence were significantly associated with social presence. The indirect or mediating effect of social presence on cognitive presence was also confirmed. On the other hand, the predicted effect of gender on each of the presences was not confirmed. However, there was a significant direct effect of program on cognitive presence. In particular, the MAIS program had a significant effect on student perceptions of cognitive presence.

Fit indices were: GFI of the SEM is 0.69, AGFI of the SEM is 0.64 and RMR is 0.10. These indices would suggest a moderate fitting model consistent with the sample size.

5. Discussion

The first goal of this study was to determine an interpretable factor structure for the Community of Inquiry framework as measured by the CoI Survey. All the CoI Survey questions loaded cleanly on the hypothesized factors thus confirming the validity of the theoretical structure of the survey and providing the data to assess the hypothesized relationships among the three presences. The confirmed validity and usefulness of the CoI Survey to conduct large scale quantitative studies need to be emphasized. In this regard, a recent

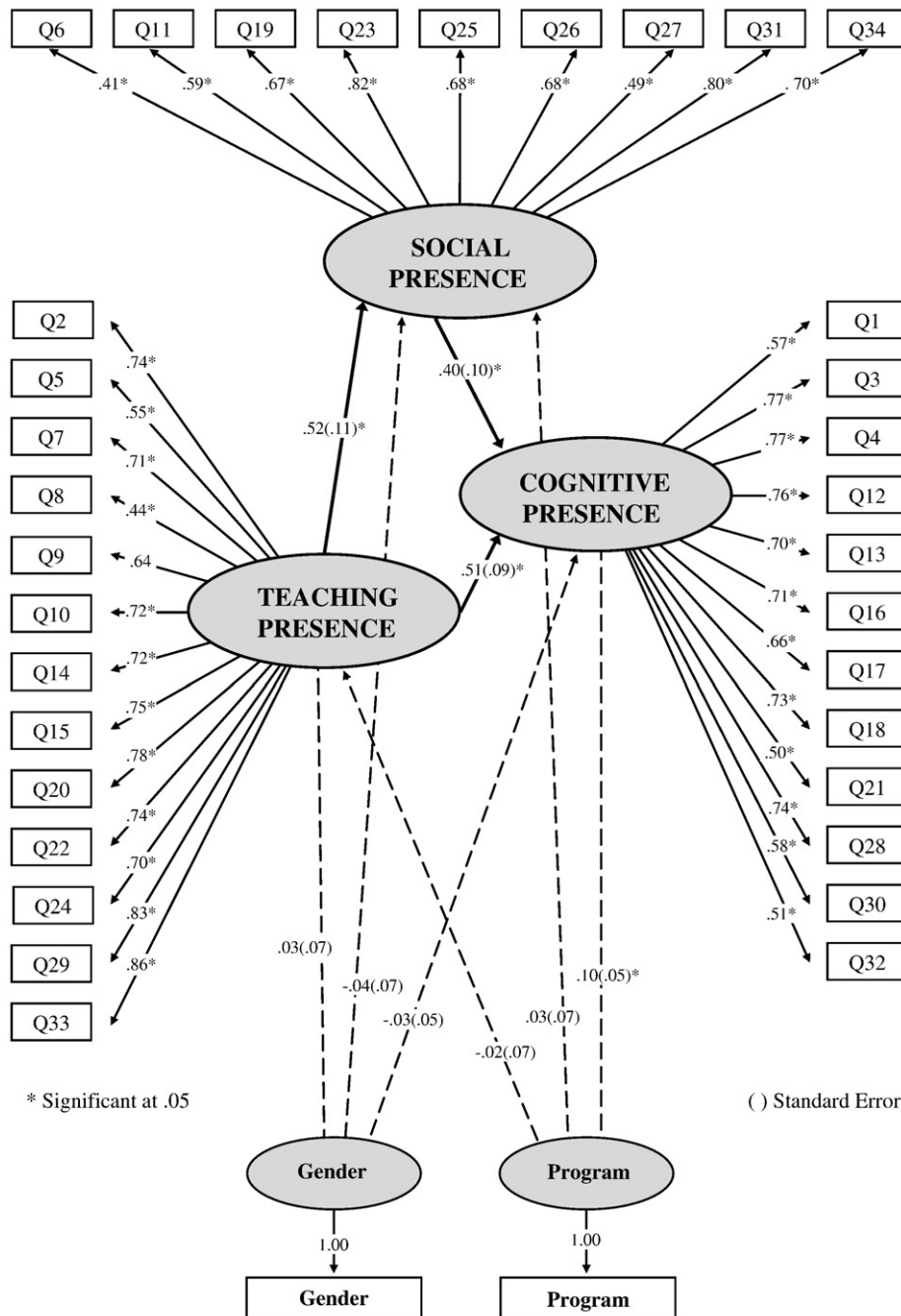


Fig. 1. Model of the relationships among teaching, cognitive and social presence.

large scale study of online business courses using a version of the Col Survey also provided “strong empirical support for the framework” (Arbaugh, 2008, Abstract, line 3). The same study concluded that: “The fact that elements of a relatively new theoretical framework [i.e., Col] not only could be reliably measured, but uniquely account for 54% of the variance in student perceived learning is noteworthy” (Arbaugh, 2008, Discussion Section, line 1). A similar large scale study reviewed several theoretical models that could provide a guide for studying and designing online learning across the disciplines and “concluded that the epistemic engagement approach, which foregrounds the role of learners as collaborative knowledge builders, is more fully articulated and extended through the Community of Inquiry Model (Col)” (Shea & Bidjerano, 2009). Using more than 2000 online learners, Shea and Bidjerano (2009) found that the items of the Col instrument cohere into interpretable constructs congruent with the Col presences. Shea and Bidjerano found 63% of the variance was explained by the three factors.

The findings of the structural equation modeling reported in this paper provide support for the theoretical predictions of the Col framework, in that teaching presence would appear to be core to establishing and maintaining social and cognitive presence. The findings have provided insights into the dynamic relationships among the presences. Consistent with the framework and previous research, there is evidence that the three presences are interconnected and influence each other in the hypothesized manner. That is, it was shown through student perceptions that teaching presence directly influences the perception of social and cognitive presence. Perceptions of social presence also significantly predict perceptions of cognitive presence. Therefore, social presence must be seen as a mediating variable between teaching and cognitive presence. These results are consistent with the findings of a similar study conducted by Shea and Bidjerano (2009) who reported a good fitting model with the benefit of a sample size greater than 2000. It reinforces the central role of teaching presence to establishing and sustaining an online learning environment and realizing intended learning outcomes.

The evidence supporting the central role of teaching presence in online learning experiences is growing (Arbaugh, 2005; Pawan, Paulus, Yalcin, & Chang, 2003; Schrire, 2004; Swan & Shih, 2005; Wu & Hiltz, 2004). Garrison and Cleveland-Innes (2005) demonstrated the association between teaching presence and cognitive presence when they found that teaching presence in the form of structure (i.e., design) and leadership (i.e., facilitation and direction) was crucial for deep and meaningful approaches to learning. Similarly, Meyer (2003) suggested that more directive faculty participation may be needed to achieve higher-order thinking. Finally, Shea, Li, and Pickett (2006) found a link between teaching presence and establishing a sense of learning community. These results point to the key role of teaching presence in establishing and sustaining a community of inquiry as suggested by the framework.

Establishing causal relationships among the presences supports the hypothesized mechanism that teaching presence is essential in establishing a sense of social presence by engendering an atmosphere of trust, open communication and group cohesion. This sets the stage for purposeful and collaborative learning processes and activities as indicated by the perceived relationship between social and cognitive presence. In this sense, social presence is a mediating factor that provides context for the educational process. The focus then moves to the direct causal relationship between teaching presence and cognitive presence. The assumption is that students are assigned engaging tasks requiring solutions for them to move through the phases of practical inquiry. Once engaged, teaching presence is hypothesized and perceived to have a significant influence in facilitating and directing student learning activities. This perceived relationship has been shown in previous research to be crucial to reach resolution and achieve student perceptions of a successful learning experience.

Only the relationship between program and cognitive presence was statistically significant. The program with a statistically significant association with cognitive presence was the academic program with courses in the humanities and social sciences. These courses require more debate, critique, and theory generation. The professional program in education requires some of this cognitive activity but includes courses where professional knowledge and skill must be acquired; as such, higher-order cognitive demands may be less than in the interdisciplinary program.

Given documented differences between gender in the experience of online learning (Rovai & Baker, 2005), it was reasonable to believe that engagement in an online community of inquiry could vary across gender. There is reasonable evidence to suggest that gender has an effect on the experience of online learning. For example, “multiple responsibilities, insufficient interaction with faculty, technology, and coursework ranked highest as barriers to women's persistence” (Müller, 2008, p. 1) in online environments. According to Kramarae (2007), educational effectiveness in the online environment is of benefit to women in particular, who find the online experience socially richer and more beneficial (Rovai & Baker, 2005). It is possible that the no differences across gender reported here is an artifact of the individualization available in an online Col. Further exploration is required concerning this relationship.

Further research is also called for in exploring the dynamic relationships among the presences across disciplines and institutions. Moreover, each of the presences represent complex concepts consisting of sub-elements (i.e., categories) that need further study to confirm the existence of these categories and explore the dynamic relationships of specific categories across the presences. For example, can the constituting categories of teaching presence (i.e., design, facilitation, direction) be confirmed and then used to explore the relationship of teaching presence categories to specific categories of social and cognitive presence. More specifically, questions such as the following could be the focus of future studies: “Is perception of teaching presence associated with establishing open and purposeful communication in social presence?” and, “Is direct instruction in teaching presence associated with integration or resolution in cognitive presence?”.

## 6. Conclusion

The evidence is growing that the Community of Inquiry framework is a useful theoretical tool to understand the complexities of the causal relationships among teaching, social and cognitive presences. The framework has provided the theoretical foundation for the development of an empirical survey instrument that opens the possibilities for conducting a wide range of studies that were not possible using qualitative methodologies, such as transcript analysis alone. The results reported here and those of Shea and Bidjerano (2009) confirm the central role that teaching presence plays and provides important insights into how best to integrate the constituting elements (i.e., presences) of an online community of inquiry. Clearly, the importance of teaching presence in creating and sustaining social and cognitive presence in online learning environments would seem to be clear.

This study raises any number of important directions for future research. To further understand the causal relationships among the three presences, one area of study suggested here is to better understand the mediating role of social presence between teaching and cognitive presence. To accomplish this, perhaps the most promising approach would be to explore the dimensionality and dynamics within the presences. For example, we need to better understand the dimensionality and order of importance (i.e., dynamics) of each of the categories of social presence across the duration of a course of studies in order to fully appreciate its complex relationship with the roles of teaching presence and the phases of cognitive presence. Suggested questions might be: Is establishing

open communication and group cohesion of greater priority than developing interpersonal relationships for perceived cognitive presence? What is the dimensionality of teaching presence and how do these categories shape social presence?

An important finding here was that it was perceived that the course did have a significant effect on cognitive presence. This raises questions such as: What effects do different courses (disciplines) have on perceived cognitive presence and learning outcomes? Is this apparent causal effect less to do with discipline and more to do with teaching presence influences? That is, are there disciplinary differences or does teaching presence through design, facilitation and direction account for apparent course or disciplinary differences? Large scale studies can also be used to explore gender differences across disciplines and presences. The growing number of studies validating the Col Survey gives credence to its value and usefulness in large scale studies where these relationships can be explored with rigor.

## References

- Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks*, 12(3), 3–22.
- Allen, I. E., & Seaman, J. (2008). Staying the course: Online education in the United States Boston, Sloan Consortium: Babson Survey Research Group Retrieved February 11, 2009 from [http://www.sloan-c.org/publications/survey/pdf/staying\\_the\\_course.pdf](http://www.sloan-c.org/publications/survey/pdf/staying_the_course.pdf)
- Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks*, 5(2) Retrieved December 10, 2004 from [http://www.aln.org/publications/jaln/v5n2/v5n2\\_anderson.asp](http://www.aln.org/publications/jaln/v5n2/v5n2_anderson.asp)
- Arbaugh, J. B. (2005). Is there an optimal design for on-line MBA courses? *The Internet and Higher Education*, 4(2), 135–149.
- Arbaugh, J. B. (2008). Does the community of inquiry framework predict outcomes in online MBA courses? *The International Review of Research in Open and Distance Learning*, 9(2) Retrieved September 9, 2008 from <http://www.irrodl.org/index.php/irrodl/article/view/490/1045>
- Arbaugh, J. B., Cleveland-Innes, M., Diaz, S., Garrison, D. R., Ice, P., Richardson, J., et al. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *Internet and Higher Education*, 11, 133–136.
- Becher, T., & Trowler, P. (2001). *Academic tribes and territories: Intellectual enquiry and the culture of disciplines*, 2nd ed. Philadelphia, PA: Open University Press.
- Dede, C. (2008). Cyberinfrastructure and the evolution of higher education Boulder, Colorado: EDUCAUSE Center for Applied Research Retrieved November 19 from [http://net.educause.edu/ir/library/pdf/ecar\\_so/erb/ERB0818.pdf](http://net.educause.edu/ir/library/pdf/ecar_so/erb/ERB0818.pdf)
- Garrison, D. R. (2009). Communities of inquiry in online learning. In P. L. Rogers et al. (Eds.), *Encyclopedia of distance learning* (pp. 352–355), 2nd ed. Hershey, PA: IGI Global.
- Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice*. London: Routledge/Falmer.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105.
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence and computer conferencing in distance education. *American Journal of Distance Education*, 15(1), 7–23.
- Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *Internet and Higher Education*, 10(3), 157–172.
- Garrison, D. R., & Archer, W. (2000). *A transactional perspective on teaching-learning: A framework for adult and higher education*. Oxford, UK: Pergamon.
- Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education*, 19(3), 133–148.
- Garrison, D. R., Cleveland-Innes, M., Koole, M., & Kappelman, J. (2006). Revisiting methodological issues in the analysis of transcripts: Negotiated coding and reliability. *The Internet and Higher Education*, 9(1), 1–8.
- Hannafin, M. J., & Kim, M. C. (2003). In search of a future: A critical analysis of research on web-based teaching and learning. *Instructional Science*, 31, 347–351.
- Kramarae, C. (2007). Gender matters in online learning. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 169–180), 2nd ed. London: Lawrence Erlbaum Associates, Publishers.
- Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks*, 7(3), 55–65.
- Müller, T. (2008). Persistence of women in online degree-completion programs. *International Review of Research in Open and Distance Learning*, 9(2) Retrieved October 31, 2008 from <http://www.irrodl.org/index.php/irrodl/article/view/455/1069>
- Pawan, F., Paulus, T. M., Yalcin, S., & Chang, C. (2003). Online learning: Patterns of engagement and interaction among in-service teachers. *Language Learning & Technology*, 7(3), 119–140.
- Rovai, A., & Baker, J. (2005). Gender differences in online learning: Sense of community, perceived learning and interpersonal interactions. *The Quarterly Review of Distance Education*, 6(1), 31–44.
- Schrire, S. (2004). Interaction and cognition in asynchronous computer conferencing. *Instructional Science*, 32, 475–502.
- Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster “epistemic engagement” and “cognitive presence” in online education. *Computers and Education*, 52(3), 543–553.
- Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *Internet and Higher Education*, 9(3), 175–190.
- Shea, P., Li, C., Swan, K., & Pickett, A. (2005). Developing learning community in online asynchronous college courses: The role of teaching presence. *Journal of Asynchronous Learning Networks*, 9(4) Retrieved May 1, 2008 from [http://www.sloan-c.org/publications/jaln/v9n4/v9n4\\_shea.asp](http://www.sloan-c.org/publications/jaln/v9n4/v9n4_shea.asp)
- Swan, K., Garrison, D. R., & Richardson, J. (2009). A constructivist approach to online learning: The community of inquiry framework. In C. R. Payne (Ed.), *Information technology and constructivism in higher education: Progressive learning frameworks* (pp. 43–57). Hershey, PA: IGI Global.
- Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D. R., Cleveland-Innes, M., et al. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-Mentor*, 2(24), 1–12 Retrieved September 9, 2008 from [http://www.e-mentor.edu.pl/e\\_index.php?number=24&all=1](http://www.e-mentor.edu.pl/e_index.php?number=24&all=1)
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks*, 9, 115–136.
- Wu, D., & Hiltz, S. R. (2004). Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Networks*, 8(2), 139–152.