2018

Measuring Presence: A Review of Research Using the Community of Inquiry Instrument

Ana E. Redstone
Old Dominion University, aredston@odu.edu

Jill E. Stefaniak

Tian Luo
Old Dominion University, tluo4work@gmail.com

Original Publication Citation

Redstone, A. E., Stefaniak, J. E., & Luo, T. (2018). Measuring presence: A review of research using the community of inquiry instrument. *The Quarterly Review of Distance Education, 19*(2), 27-36.

MEASURING PRESENCE
A Review of Research
Using the Community of Inquiry Instrument

Ana E. Redstone
Old Dominion University

Jill E. Stefaniak
University of Georgia

Tian Luo
Old Dominion University

This systematic review provides a summary of studies on teaching, social, and cognitive presences in the community of inquiry (CoI) model using the CoI instrument in a higher education setting since its development in 2008 by Arbaugh et al. A total of 24 peer-reviewed studies on the CoI instrument from 2008–2017 were selected and analyzed explore the types of research on the instrument in higher education settings have been published, ways the instrument has been used for learning and teaching, and the implications the instrument poses for online instructors and instructional designers. It is organized into 4 themes: testing the instrument for validity and reliability, measuring CoI presence in different environments, examining causal relationships among the elements, and exploring potential revisions to the model.

INTRODUCTION

Garrison, Anderson, and Archer (2000) published "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Education," in which they described a community of inquiry framework and its elements: teaching presence, social presence, and cognitive presence. In creating this process-oriented framework, their goal was to "define, describe and measure the elements of a collaborative and worthwhile educational experience" (Bangert, 2009; Garrison, Anderson, & Archer, 2010). The authors presented the community of inquiry (CoI) framework as a model for measuring and incorporating strategies to improve learning and teaching in online and blended environments. Since then, the framework has been used and adapted by researchers worldwide. It was developed as a combination of John Dewey's writings on community and inquiry, higher education theories of learning, research on computer conferencing, and ideas from the fields of communication and linguistics (Arbaugh et al., 2008). The focus of Garrison et al. (2000) was on online and blended text-based learning environments, which were nascent then and have since expanded dramat-

• **Jill Stefaniak**, University of Georgia, 221 Rivers Crossing, 850 College Station Road, Athens, GA 30602. Telephone: (706) 542-1682. E-mail: jill.stefaniak@uga.edu

The Quarterly Review of Distance Education, Volume 19(2), 2018, pp. 27–36 ISSN 1528-3518

ically with the increasing popularity and ubiquity of online learning.

Early research using the CoI framework involved analyzing discussion board transcripts to identify elements of the framework, and it was exploratory and descriptive by nature. This kind of research was limiting, however, and in 2008 Garrison and his colleagues developed and refined a sound instrument to expand the opportunities for quantitative research (Arbaugh et al., 2008). The CoI instrument has undergone many iterations, and currently consists of 34 Likert-type scale items corresponding to the three previously identified elements of the framework along their sub-elements. Since its development, many studies have been conducted using the CoI instrument, but there has been no examination of how the instrument is being used and what its uses reveal. This paper explores the findings and discussions that have emerged from studies using the CoI instrument.

METHODS

In locating studies to use in this review, we first searched the university's electronic database using search terms including the subject *community of inquiry* and *survey* (n = 287). From these results, we then narrowed only peer-reviewed studies from journal articles (n = 107). To exclude studies that had been conducted before the development of the CoI instrument, we narrowed the date range from 2008 through 2017 (n = 99). Additional exclusions were studies using surveys or instruments other than the CoI instrument and those in contexts outside of higher education. Finally, we searched Google Scholar to ensure we had included all relevant articles. The 24 remaining articles were then sorted chronologically and placed in a matrix that included authors, dates of publication, research methods, purposes of study, environments, participant information, and the finding and suggestions of each study.

The final step in preparing this review involved identifying common themes in the studies. By reviewing notes and rereading each article, we identified four themes: testing the CoI instrument for validity and reliability, measuring CoI presence in different environments, examining causal relationships among the elements, and exploring potential revisions to the framework. Readers may note that one study is included in the discussion of several themes.

RESULTS AND DISCUSSION

The Validity of the CoI Instrument

During and soon after the development of the CoI instrument, researchers conducted studies to measure its validity and reliability (see Table 1). In the seminal study that introduced the CoI instrument, Arbaugh et al. (2008) distributed the instrument to 287 graduate students in online and blended classes. They found construct validity of all items, reflecting the teaching, cognitive, and social presences in their 34-item survey. They also found two sub elements in teaching presence: design and organization and facilitation and direct instruction and encouraged refinements as the elements of the instrument were studied. The authors noted that the instrument may be useful for determining the impact of strategies and technologies in courses and as a course and program assessment tool. They encouraged future researchers to use the instrument to measure for comparing courses and implementing technologies in them.

The next year, in 2009, Shea and Bidjerano conducted a large-scale study using the CoI instrument across several universities in fully online courses. Their study showed the instrument to be valid and that social and teaching presence contribute significantly to teaching. Additional studies by Swan et al. (2008), Bangert (2009), Diaz et al. (2010), Archibald, Traver, Volchok, Bidjerano, & Shea (2013), Kozan and Richardson (2014), and Horzum and Uyanik (2015) confirm the validity, reli-

TABLE 1
Testing the CoI Instrument (n = 8)

Environment	*Method*	*# of Part*	*Study*
OL, BL	Quantitative	287	Arbaugh et al. (2008)
OL	Quantitative	287	Swan et al. (2008)
OL, BL	Quantitative	173	Bangert (2009)
OL	Quantitative	2,159	Shea and Bidjerano (2009)
OL	Quantitative	412	Díaz, Swan, Ice, and Kupczynski (2010)
OL, F2F	Quantitative	189	Archibald (2010)
BL	Quantitative	444	Traver, Volchok, Bidjerano, and Shea (2014)
OL	Quantitative	178	Kozan and Richardson (2014)
OL		1,499	Horzum and Uyanik (2015)

ability, and high correlation among the elements. Researchers also found the importance of social presence and teaching presence in developing cognitive presence (Archibald, 2010; Shea & Bidjerano, 2009).

Measuring CoI Presence in Different Environments

Following the call by Arbaugh et al. (2008) to use the CoI instrument as a way to compare different courses, some studies examined the elements in different settings or with different populations, as seen in Table 2. Researchers compared the CoI presences in online and blended courses using the instrument (Akyol, Garrison, & Ozden, 2009a, 2009b; Arbaugh, Bangert, & Cleveland-Innes, 2010) and pointed out the importance of instructional design to developing CoI presences in any environment. A number of researchers found that blended or hybrid environments are superior to online environments in developing one or more presences (Akyol et al., 2009a, 2009b; Shea & Bidjerano, 2012; Traver et al., 2014). To this end, some researchers recommended incorporating synchronous, face-to-face activities into fully online courses (Akyol et al., 2009b; Mills et al., 2016).

In addition to different environments, several researchers examined the perceived CoI presences in different types of courses. Nagel and Kotzé (2010) examined a large online course and found that the design of the course to promote student engagement and activity was the biggest determinant in providing students with quality learning and increasing perceptions of CoI; when designed correctly, a large class was not inferior to a smaller class. Similarly, when examining CoI presences in an open online course, Saadatmand, Uhlin, Hedberg, Abjornsson, and Kvarnstrom (2017) found high perceptions of all presences due to the design of a highly interactive learning environment. The research on subject-matter effect conducted by Arbaugh et al. (2010) and a study on blended classrooms by Wicks, Craft, Mason, Gritter, and Bolding (2015) also suggest that the constructivist nature of the CoI framework may not align as well with teacher-centered pure disciplines. However, Moreira, Ferreira, and Almeida (2013) compared CoI presences in public universities and private polytechnic schools and found that students in the more teacher-centered polytechnic classes had higher perceived levels of presences. Akyol, Ice, Garrison, and Mitchell (2010) examined objectivist and constructivist learning disciplines and found no difference in CoI perceptions. Rather, they found that the youngest and oldest groups of learners could benefit most from course design and self-monitoring strategies.

TABLE 2
Measuring CoI Presence in Different Environments (n = 8)

Environment	*Method*	*N*	*Study*
OL, BL	Mixed methods	15	Akyol et al. (2009a)
OL, BL	Mixed methods	16	Akyol et al. (2009b)
OL	Mixed methods	4,397	Akyol et al. (2010)
OL	Quantitative	10	Burgess et al. (2010)
OL	Mixed methods	64	Nagel and Kotzé (2010)
OL, BL	Quantitative	1,173	Arbaugh et al. (2010)
OL	Quantitative	605	Rubin et al. (2013)
BL	Quantitative	444	Traver et al. (2014)
OL	Mixed methods	30	Saadatmand, Uhlin, and Hedberg (2017)
BL	Mixed Methods	74	Wicks et al. (2015)
BL	Quantitative	510	Moreira, Ferreira, and Almeida (2013)

Other researchers used the instrument to examine how the use of certain technology tools affect learners' perceptions of presences. Burgess, Slate, Rojas-LeBouef, and LaPrairie (2010) examined Second Life as a learning tool and found all CoI presences there. Rubin, Fernandes, and Avgerinou (2013) examined CoI presences in two learning management systems, and found that the affordances of a communication tool and resource-locating tool in one learning management system predicted increased perceptions of CoI and levels of student satisfaction. The outcome of all of this research appears to be twofold: the CoI presences can be found in any *well-designed* course using any technology, and perceptions of CoI presences may be somewhat dependent on the affordances of learning management system tools. Based on these studies, it appears that it would be useful for instructional designers and instructors to design with the CoI presences in mind to carefully consider the how learning management system tools are used.

Examining Causal Relationships Among Elements

Researchers who explored the dynamics of the elements of CoI using the CoI instrument often had similar findings. The social, cognitive, and teaching presences of the CoI framework were found in all studies to be clearly distinguishable from each other and interrelated. Significant, positive relationships were found among the three presences (Akyol & Garrison, 2008; Garrison, Cleveland-Innes, & Fung, 2010; Kozan & Richardson, 2014a). Akyol and Garrison (2008) suggest that the context, participants, and purpose of a class influence the types and durations of CoI presences. This is later echoed in the work of Kozan and Richardson, who found that "the interdependence of the presences may change depending on the learner profile and learning context" (2014a, p. 72). Table 3 lists these studies.

Teaching Presence. Teaching presence was found to be the most critical component of the community of inquiry model, as perceptions of teaching presence predict and influence social and cognitive presences (Akyol & Garrison, 2008; Garrison et al., 2010; Mills et al., 2016; Nagel & Kotzé, 2010). Akyol and Garrison (2008) found significant positive relationships between teaching presence and cognitive presence, perceived learning, and satisfaction. In addition, they found the perception of teaching presence increased over

TABLE 3
Examining Causal Relationships Among Elements (n = 4)

	Method	*n*	*Study*
OL	Quantitative	205	(Garrison et al., 2010)
OL	Quantitative	16	(Akyol & Garrison, 2008)
OL	Quantitative	211	(Kozan & Richardson, 2014)
OL	Mixed methods	29	(Mills et al., 2016)

the length of a class they examined, potentially due to a certain teaching strategy where students took turns facilitating discussions.

Cognitive Presence. Akyol and Garrison (2008) found cognitive presence to have more influence on learning than teaching presence and to have a significant relationship with satisfaction. They found that cognitive presence remained stable over the length of a course, unlike teaching presence and social presence. Kozan and Richardson (2014a) found that cognitive presence may significantly affect the relationship between social presence and teaching presence. Two-way dynamics between cognitive presence and social presence may indicate that they reinforce each other.

Social Presence. Social presence was perhaps the least understood of the three elements in the CoI framework in these studies, though researchers did find that perceptions of social presence had a mediating role between teaching presence and cognitive presence (Garrison et al., 2010; Kozan & Richardson, 2014b). In one study, social presence had no impact on perceived learning and declined over the length of the course, but it was associated was with satisfaction (Akyol & Garrison, 2008). Recent research indicates that the definition of social presence is evolving and may need to be revised to play more of a central role in the CoI framework and instrument (Kozan & Richardson, 2014b).

Exploring Potential Revisions to the Framework

As previously mentioned, researchers have identified areas that need to be re-examined for potential changes and improvements in the CoI framework. The area that has received the most scrutiny is self-regulation. Table 4 lists studies relating to revisions to the framework. Using the CoI instrument and the previously validated Motivated Strategies for Learning Questionnaire, Shea and Bidjerano (2010) examined the relationship of students' perceptions of the CoI learning presences and their perceptions of self-efficacy and effort regulation. They found a strong correlation between self-efficacy and the CoI framework and that teaching presence and social presence in particular are significantly correlated with self-efficacy. These results led them to argue for the expansion of the teaching presence construct to include another dimension: what they call "learning presence" (Shea & Bidjerano, 2010). To further explore this area, the same authors conducted another study, this time using the CoI instrument and the previously validated Online Self-Regulated Learning Questionnaire (Shea & Bidjerano, 2012). They found that a learner's greater ability to self-regulate is important for compensating for low teaching presence and social presence.

Building on these findings, Traver et al. (2013) developed an expanded version of the CoI instrument in which they included items related to learning presence, though it is unclear where the items came from and how they were developed. However, instead of incorporating learning presence into teaching presence as Shea and Bidjerano suggested when introducing the idea, these researchers identified learning presence as a separate construct, adding it as a fourth presence in the CoI framework and instrument. Traver et al.

TABLE 4
Exploring Potential Revisions to the Framework (n = 5)

Environment	*Method*	*n*	*Study*
OL, BL	Quantitative	2,418	Shea and Bidjerano (2010)
OL	Quantitative	16	Akyol and Garrison (2011)
OL, BL	Quantitative	2,010	Shea et al. (2012)
BL	Pre-post	444	Traver et al. (2014)
OL	Quantitative	192	Garrison and Akyol, (2015)

focused on learning presence as a contextualized part of the framework and findings did not examine the single construct in depth. To explore aspects of shared and individual aspects of metacognition in relationship to the CoI framework, Garrison and Akyol developed and validated a questionnaire to be used in future studies (2015).

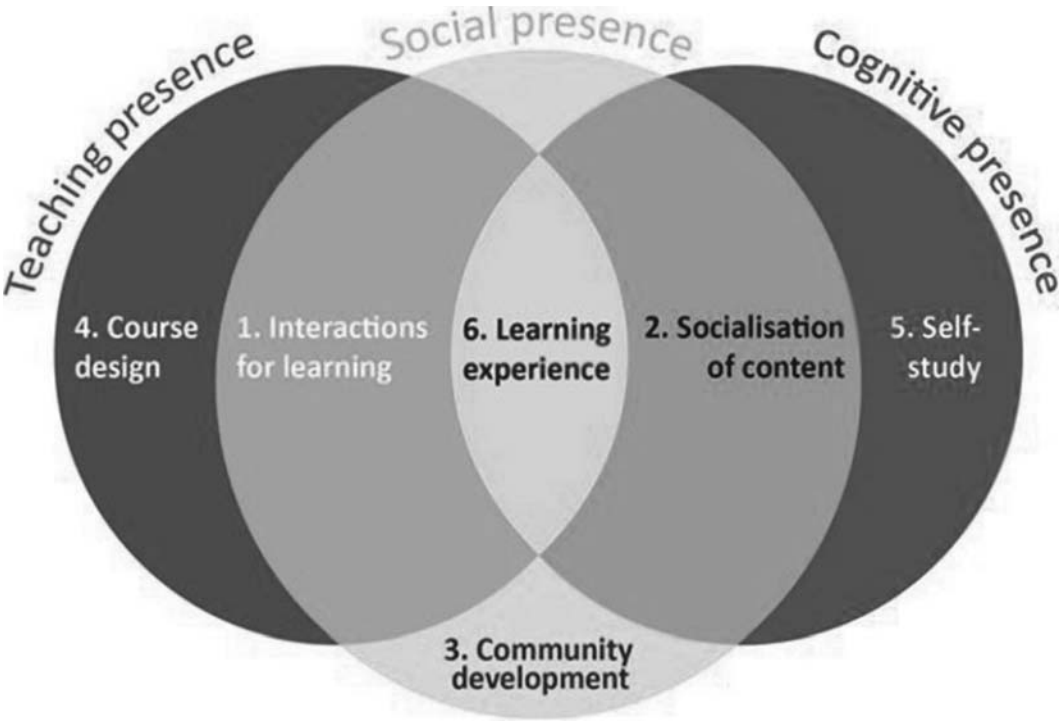
SUGGESTIONS FOR FUTURE RESEARCH

Considering Arbaugh et al.'s (2008) initial suggestion that the CoI instrument be used as a course or program assessment tool, only one study was found that used the instrument for this purpose. Swan et al. (2014) conducted a study using the Quality Matters (QM) rubric and the CoI instrument to improve core courses in an online program over several semesters. Results of this study indicate that the combined two-step approach of using the Quality Matters rubric and the CoI together to make revisions did improve learning outcomes more than using either alone. However, they noted that review and "tweaking" may still need to be done for some courses afterward. As this study stands alone in its use of the CoI instrument, it is clear that more research needs to be done on using the instrument as a tool for improving course design and learning outcomes. Bangert (2009) points out that if studies are conducted where changes are made to classes based on the CoI presences, there needs to be "consequential validity." In other words, researchers should not neglect the result of changes made to courses as a result of using the CoI instrument: whether they have improved learning or not (Bangert, 2009). Madrell, Morrison, and Watson (2017) found no relationship between graduate students' perception of the CoI presences and learning outcomes and recommend additional research in this area. Studies could be also be conducted where instructors use the CoI instrument to assess their own courses for strengths and weaknesses in the presences in order to find areas for improvement to promote learning outcomes (Díaz et al., 2010).

Almost every researcher in this review calls for additional research on the dynamics of the CoI framework elements. Many point to teacher presence and social presence as needing the most clarification. The addition of learning presence or metacognition to the framework and the CoI instrument is new and is fertile ground for additional research.

Suggestions and Implications for Practice

The reviewed studies suggested viewing the three presences in CoI framework as three interrelated and interdependent constructs rooted in collaborative constructivist learning to guide and better inform practices in online and blended learning (Amemado & Manca, 2017; Armellini & De Stefani, 2016). Armellini and De Stefani (2016) stressed the dynamic overlap between the three presences in the CoI model, foregrounding the central



Source: Amemado and Manca (2017).1

FIGURE 1
A New Version of the Community of Inquiry Framework

role of social presence serving as a booster for both teaching and cognitive presence. Armellini and De Stefani proposed a new version of the CoI framework (see Figure 1), demonstrating the interrelationship between the three presences along with different considerations and facets of an online learning environment. The interaction between social, cognitive, and teaching presences was evidenced by multiple studies (Akyol et al., 2009b; Amemado & Manca, 2017; Armellini & De Stefani, 2016; Arbaugh et al., 2008; Shea & Bidjerano, 2009). Studies also suggested using the CoI survey as an assessment tool to improve the quality and effectiveness of online course and/or programs (Arbaugh et al., 2008; Bangert, 2009).

Pertaining to cognitive presence, research suggested adding face-to-face components in the early stage of the online or blended course would aid the triggering event and exploration, therefore making the integration phase smoother and less arduous for students to achieve (Akyol et al., 2009b). Research also suggested making an effort to ease learners' comfort with collaborative online discussions, because more cognitive presence is perceived when there is greater comfort participating in the online discussions (Shea & Bidjerano, 2009). Especially in online learning environments where online discussion is the main instructional activity, gaining comfort and confidence in such discussion format is key to foster cognitive presence. The reviewed studies encouraged practitioners to provide ample opportunities for students to reflect on their own comfort levels and offer remediation tools and techniques to alleviate any discomfort and challenge with online discussion found in students' self-reflection (Akyol et al., 2009b;

Shea & Bidjerano, 2009). For example, offering pre-course orientations and extended interventions to learners who are new to the online environment will help increase students' perception of cognitive presence (Shea & Bidjerano, 2012). Additionally, instructors should be very active in facilitating and moderating online discussions and other forms of collaborative activities as it promotes a higher perception of cognitive presence (Shea & Bidjerano, 2009).

In terms of promoting teaching presence, research recommended having faculty use the CoI instrument to assess their strengths and weaknesses of their own courses to regarding all the elements of the model, as well the importance they place on each component (Akyol et al., 2009b; Díaz et al., 2010). For teachers in online courses, it is recommended that they assume the role of providing sufficient doses of direct instruction as subject matter expertise is needed in order to diagnose misconceptions in student understanding of the content (Akyol et al., 2009b). Instructors' active presence in an online course certainly aids in boosting students' perception of teaching presence. Many studies indicated that using peer-led discussion activities to improve and share teaching presence (Akyol et al., 2009b; Amemado & Manca, 2017; Armellini & De Stefani, 2016). Using peer assessments and peer review along with a given evaluation rubric and exploiting students' diverse background and expertise are likely to foster teaching presence especially in an online learning environment where a formal instructor or course facilitator is lacking (Amemado & Manca, 2017).

In order to reach a higher social presence, research suggested having small-sized classes or groups of fewer members (Akyol et al., 2009b; Driver, 2002). Research again reiterated the importance of incorporating synchronous, face-to-face elements in online courses to help improve social presence (Akyol et al., 2009b; Mills et al., 2016). Faculty and instructional designers should consider using innovative tools and technology to support the development of teaching and social presences (Shea & Bidjerano, 2009). Amemado and Manca (2017) contended that social media tools and platforms can help make learners "aware of the activities of the others and foster impression formation" (p. 26). Research also suggested assigning roles and responsibilities for online learners in that it can help improve the quality of online discussions, therefore reaching a better integration between the cognitive and social dimensions of learning (Kanuka, Liam, & Laflamme, 2007). In addition, designers should create design structures that make learners feel more comfortable in the course and more willing to ask for help (Shea & Bidjerano, 2012).

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.

Akyol, Z., & Garrison, D. R. (2011). Assessing metacognition in an online community of inquiry. *The Internet and Higher Education, 14*(3), 183–190. doi:http://dx.doi.org/10.1016/j.iheduc.2011.01.005

Akyol, Z., Garrison, D. R., & Ozden, M. Y. (2009a). Development of a community of inquiry in online and blended learning contexts. *Procedia: Social and Behavioral Sciences, 1*(1), 1834–1838. doi:http://dx.doi.org/10.1016/j.sbspro.2009.01.324

Akyol, Z., Garrison, D. R., & Ozden, M. Y. (2009b). Online and blended communities of inquiry: Exploring the developmental and perceptional differences. *International Review of Research in Open and Distance Learning, 10*(6), 65–83. doi:10.19173/irrodl.v10i6.765

Akyol, Z., Ice, P., Garrison, R., & Mitchell, R. (2010). The relationship between course socio-epistemological orientations and student perceptions of community of inquiry. *The Internet and Higher Education, 13*(1), 66–68. doi:http://dx.doi.org/10.1016/j.iheduc.2009.12.002

Amemado, D., & Manca, S. (2017). Learning from decades of online distance education: MOOCs

and the community of inquiry framework. *Journal of e-Learning and Knowledge Society, 13*(2), 21–32.

Arbaugh, J. B., Bangert, A., & Cleveland-Innes, M. (2010). Subject matter effects and the community of inquiry (CoI) framework: An exploratory study. *The Internet and Higher Education, 13*(1), 37–44. doi:http://dx.doi.org/10.1016/j.iheduc.2009.10.006

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education, 11*(3–4), 133–136. doi:https://doi.org/10.1016/j.iheduc.2008.06.003

Archibald, D. (2010). Fostering the development of cognitive presence: Initial findings using the community of inquiry Survey instrument. *Internet and Higher Education, 13*, 73–72. doi:10.1016/j.iheduc.2009.10.001

Armellini, A., & De Stefani, M. (2016). Social presence in the 21st century: An adjustment to the community of inquiry framework. *British Journal of Educational Technology, 47*(6), 1202–1216.

Bangert, A. W. (2009). Building a validity argument for the community of inquiry survey instrument. *The Internet and Higher Education, 12*(2), 104–111. doi:http://dx.doi.org/10.1016/j.iheduc.2009.06.001

Burgess, M. L., Slate, J. R., Rojas-LeBouef, A., & LaPrairie, K. (2010). Teaching and learning in Second Life: Using the community of inquiry (CoI) model to support online instruction with graduate students in instructional technology. *The Internet and Higher Education, 13*(1), 84–88. doi:http://dx.doi.org/10.1016/j.iheduc.2009.12.003

Díaz, S. R., Swan, K., Ice, P., & Kupczynski, L. (2010). Student ratings of the importance of survey items, multiplicative factor analysis, and the validity of the community of inquiry survey. *The Internet and Higher Education, 13*(1), 22–30. doi:http://dx.doi.org/10.1016/j.iheduc.2009.11.004

Driver, M. (2002). Exploring student perceptions of group interaction and class satisfaction in the web-enhanced classroom. *The Internet and Higher Education, 5*(1), 35–45.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1), 31–36. doi:10.1016/j.iheduc.2009.10.002

Garrison, D. R., & Akyol, Z. (2015). Toward the development of a metacognition construct for communities of inquiry. *The Internet and Higher Education, 24*, 66–71. doi:http://dx.doi.org/10.1016/j.iheduc.2014.10.001

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), 87–105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education, 13*(1–2), 5–9. doi:https://doi.org/10.1016/j.iheduc.2009.10.003

Horzum, M. B., & Uyanik, G. (2015). An item response theory analysis of the Community of Inquiry Scale. *International Review of Research in Open and Distance Learning, 16*(2), 206–226. doi:10.19173/irrodl.v16i2.2052

Kanuka, H., Rourke, L., & Laflamme, E. (2007). The influence of instructional methods on the quality of online discussion. *British Journal of Educational Technology, 38*(2), 260–271.

Kozan, K., & Richardson, J. C. (2014a). Interrelationships between and among social, teaching, and cognitive presence. *The Internet and Higher Education, 21*, 68–73. doi:10.1016/j.iheduc.2013.10.007

Kozan, K., & Richardson, J. C. (2014b). New exploratory and confirmatory factor analysis insights into the community of inquiry survey. *The Internet and Higher Education, 23*, 39–47. doi:http://dx.doi.org/10.1016/j.iheduc.2014.06.002

Maddrell, J. A., Morrison, G. R., & Watson, G. S. (2017). Presence and learning in a community of inquiry. *Distance Education, 38*(2), 245–258. doi:10.1080/01587919.2017.1322062

Moreira, J. A., Ferreira, A. G., & Almeida, A. C. (2013). Comparing communities of inquiry of Portuguese higher education students: One for all or one for each? *Open Praxis, 5*(2), 165–178. doi:10.5944/openpraxis.5.2.50

Mills, J., Yates, K., Harrison, H., Woods, C., Chamberlain-Salaun, J., Trueman, S., & Hitchins, M. (2016). Using a community of inquiry framework to teach a nursing and midwifery research subject: An evaluative study. *Nurse Education*

Today, 43, 34–39. doi:http://dx.doi.org/10.1016/j.nedt.2016.04.016

Nagel, L., & Kotzé, T. G. (2010). Supersizing e-learning: What a CoI survey reveals about teaching presence in a large online class. *The Internet and Higher Education, 13*(1), 45–51. doi:10.1016/j.iheduc.2009.12.001

Rubin, B., Fernandes, R., & Avgerinou, M. D. (2013). The effects of technology on the community of inquiry and satisfaction with online courses. *The Internet and Higher Education, 17*, 48–57. doi:http://dx.doi.org/10.1016/j.iheduc.2012.09.006

Saadatmand, M., Uhlin, L., Hedberg, M., Abjornsson, L., & Kvarnstrom, M. (2017). Examining learners' interaction in an open online course through the community of inquiry framework. *European Journal of Open, Distance and E-Learning, 20*(1), 61–79.

Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. *Computers & Education, 52*(3), 543–553. doi:10.1016/j.compedu.2008.10.007

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education, 55*(4), 1721–1731. doi:http://dx.doi.org/10.1016/j.compedu.2010.07.017

Shea, P., & Bidjerano, T. (2012). Learning presence as a moderator in the community of inquiry model. *Computers & Education, 59*(2), 316–326. doi:http://dx.doi.org/10.1016/j.compedu.2012.01.011

Shea, P., Hayes, S., Smith, S. U., Vickers, J., Bidjerano, T., Pickett, A., … Jian, S. (2012). Learning presence: Additional research on a new conceptual element within the community of inquiry (CoI) framework. *The Internet and Higher Education, 15*(2), 89–95. doi:http://dx.doi.org/10.1016/j.iheduc.2011.08.002

Swan, K. P., Richardson, J. C., Ice, P., Garrison, R. D., Cleveland-Innes, M., & Arbaugh, B. J. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-mentor, 2*(24), 1–12.

Swan, K., Day, S. L., Bogle, L. R., & Matthews, D. B. (2014). A collaborative, design-based approach to improving an online program. *The Internet and Higher Education, 21*, 74–81. doi:http://dx.doi.org/10.1016/j.iheduc.2013.10.006

Traver, A. E., Volchok, E., Bidjerano, T., & Shea, P. (2014). Correlating community college students' perceptions of community of inquiry presences with their completion of blended courses. *The Internet and Higher Education, 20*, 1–9. doi:http://dx.doi.org/10.1016/j.iheduc.2013.09.001

Wicks, D. A., Craft, B. B., Mason, G. N., Gritter, K., & Bolding, K. (2015). An investigation into the community of inquiry of blended classrooms by a faculty learning community. *The Internet and Higher Education, 25*(Supplement C), 53–62. doi:https://doi.org/10.1016/j.iheduc.2014.12.001