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Understanding Distinctions in Learning in Hybrid, and Online Environments: An Empirical Investigation of the Community of Inquiry Framework

Abstract

This study of 723 college students seeks to assess the adequacy of the Community of Inquiry framework (CoI) for describing and explaining differences in learning outcomes in hybrid and fully online learning environments. Hypothesizing that the CoI model's theoretical constructs of *presence* reflect educational effectiveness in a variety of environments, this paper seeks evidence of whether students in varying learning environments are likely to rank them differently with regard to *teaching*, *social*, and *cognitive* presence. The study utilizes factor-, hierarchical-regression-, and path analyses to determine the validity of the CoI constructs as well as to characterize the nature of relationships between them. Results suggest that the model is coherent and accounts for the small but significant differences recently reported in the literature regarding the superiority of hybrid environments relative to fully online environments (Means, Toyama, Murphy, Bakia & Jones, 2009). Recommendations for future research and practice are included.

Understanding Distinctions in Learning in Hybrid and Online Environments: An empirical Investigation of the Community of Inquiry Framework

Online learning is exhibiting significant growth and acceptance in US higher education and now represents a sizable percentage of all instruction for American college students. Current estimates suggest that more than 5.5 million students are studying in fully online environments in higher education in the US (Allen & Seaman, 2010). These figures indicate that nearly 30% of such students are enrolled in at least one fully online course. Recent research indicates that the learning outcomes for online students are equal (Abrami et al., 2004; Allen, Bourhis, Burrell, & Mabry, 2002; Cavanaugh, Gillan, Kromey, Hess, & Blomeyer, 2004; Tallent-Runnels et al., 2006; Zhao, Lei, Yan, Lai, & Tan, 2005) or superior to (Allen & Seaman 2010; Means, Toyama, Murphy, Bakia & Jones, 2009) to those of students in traditional classrooms. Moreover, this line of research indicates that students in hybrid environments (those that blend online and face-to face instructional settings) outperform both classroom and fully online students (Means et. al, 2009, p. ix). However, a lack of conceptual understanding currently exists with regard to how and why hybrid-online instruction might support superior outcomes. This paper seeks to examine these questions from conceptual and empirical perspectives.

Hybrid vs. fully online environments: The role of interaction

Hybrid and fully online environments differ along numerous dimensions. In hybrid courses learners have opportunities for significant face-to-face interaction with their instructor and other students whereas in fully online courses this typically does not occur. In this study hybrid courses replaced classroom time with online activities. In both classroom and blended environments interaction is deemed to be significant. For example Bernard and his colleagues (2009) conducted meta-analytic research of interaction in online education and concluded that interaction of all kinds is beneficial in terms of both learning outcomes and satisfaction, but that student-student and student-content interactions had stronger effects on achievement than student-teacher interactions. Given the importance of interaction on achievement it is clear that course that promote such interaction offer advantages in terms of potential learning over those that do not. Understanding how it is that interaction supports learning requires conceptual framing. We turn to that task below.

Interaction and the Community of Inquiry model

In their comprehensive review of the research on impacts of interaction treatments on learning in distance education, Bernard and his colleagues (2009) concluded that "it is likely that we can expect noticeable improvements in all forms of interaction that involve collaboration, discussion, and feedback" (p. 1266). A theoretical framework that anticipates and explains these empirical findings can be found in the Community of Inquiry model (Garrison, Anderson & Archer, 2001). The CoI framework is based on a model of critical thinking and practical inquiry. The authors of the model conjecture that online learning occurs through collaboration of students and their instructor and is characterized as three highly integrated elements that contribute to a successful online learning community: *social presence* (SP), *teaching presence* (TP), and *cognitive presence* (CP). The CoI framework conceptualizes online knowledge building as a result of joint effort among members in learning communities characterized by instructional orchestration appropriate to the online environments (TP) and a supportive and collaborative online setting (SP). The teaching presence construct delineates task sets such as organization, design, discourse facilitation, and direct instruction (Anderson, Rourke, Garrison, & Archer,

2001) and identifies the specific behaviors likely to create a productive community of inquiry (e.g. Shea, Li, Swan, Pickett, 2005). Instructor teaching presence is hypothesized to be an indicator of online instructional quality. Empirical research has supported this view with evidence indicating strong correlations between the quality of teaching presence and student satisfaction and learning (Bangert, 2008; Picciano, 2002; Shea, Pickett, & Pelz, 2003). Social presence is manifested in online discourse that promotes positive affect, interaction, and cohesion (Rourke, Anderson, Garrison, & Archer, 2001). Several studies (e.g., Shea & Bidjerano, 2008, 2009) have demonstrated that social presence could act as an important mediator of the relationship between students' perceptions of teaching presence and their evaluation of learning. Cognitive presence is construed as the significant learning processes that result from the practical inquiry cycle (Garrison, Anderson, & Archer, 2001). Cognitive presence is characterized in the CoI model by learner engagement starting with a triggering event, proceeding through exploration, integration and resolution. Cognitive presence can be viewed as a multivariate measure of critical and creative thinking that results from the cyclical process of practical inquiry within a community of learners. The specific form of interaction within the cognitive presence construct thus reflects a pragmatic inquiry-based view of learning (Dewey, 1933; Lipmann, 2003, Pierce, 1955).

Kuhn (1977) argued that determining the superiority of one theory over another was a matter of weighing competing values including accuracy, consistency, scope, simplicity and fruitfulness. In this paper, we examine the degree to which the CoI model represents an advantageous theoretical framework for understanding online and hybrid learning based on these criteria. In a related sense Greeno (2006) argued that theoretical progress can be made in a number of ways, ranging from improvements that add to the scope of phenomena that a theory explains to improvements that increase the accuracy with which the theory accounts for phenomena it already explains. In this paper, we also seek to validate the CoI model and to use it to account for recently discovered phenomenon, i.e., research results indicating that students in hybrid instructional settings outperform their classroom and fully online counterparts (Means et. al., 2009). We are especially interested in understanding the accuracy and consistency with which the theoretical constructs of "presence" can be employed to account for these recent findings. We suggest that instructional modalities (online and hybrid) may result in varying levels of teaching and social presence and that these differences should be evident in student assessments of teaching, social and cognitive presence in these varying modalities. We discuss some of these constructs in more detail below.

We conjecture that results will indicate that the quality of teaching presence is an indicator of differences between learners in online and hybrid environments with students in hybrid courses more favorably disposed to their instructor teaching presence behaviors. Additionally, we hypothesize that results will support those found by Shea and Bidjerano (2009) that the quality of teaching presence and measures of social presence will more clearly predict variance in learner ratings of the multivariate measure of learning processes reflected in the cognitive presence construct than other variables such as online experience, age, gender, or full-time versus part-time enrollment status.

Scope of the study

While a number of researchers have suggested that hybrid-online environments are likely to lead to better satisfaction and learning among students in higher education (e.g., Lindsay, 2004; Voci, & Young, 2001; Welker & Beradino, 2006), these claims have not been tested within the context of a theoretical framework. In this paper, we examine survey data from more

than 700 college students studying in either online or hybrid environments in a private college in the northeastern United States. As the degree of interactivity within courses has been established in the empirical literature as one of the essential characteristics of productive learning environments, we examined the effect of interactivity on student perceptions of quality in online courses. To begin to develop a theory-based explanation of research findings that hybrid instruction leads to superior outcomes, we utilize the Community of Inquiry instrument as a metric to account for variance in student evaluations of instructional quality and their own learning.

The purpose of the study is threefold. The *first* objective is to determine the direct impact of environment (hybrid vs. fully online) on the CoI constructs. We sought to delineate the net effect of environment (hybrid vs. online) by controlling for attributes and status characteristics that are likely to be related to the theoretical constructs of interest. Given the recent results from quantitative reviews of the literature (e.g. Means, et. al, 2009) indicating that hybrid environments may lead to better learning outcomes, this kind of analysis seems crucial. We considered it likely that variables such as age and gender would have an impact on a student's ratings of elements of the CoI constructs of interest in the study. For example, previous research on the relationship between age and social isolation (Cattan, White, Bond, & Learmouth, 2005; Yeh,. & Sing, 2004) has found higher levels of social isolation with increases in age, thus suggesting possible variations in sense of social presence by age. Other distinctions have been found in regard to gender (Bostock & Lizhi 2005; Goldstein & Sadhana, 2004; Shumaker & Hill,1991; Vandervoort, 2000) with females, in general, less socially isolated than males, suggesting possible variations in scores for social presence by gender. It has also been suggested that age may be an important variable in predicting student comfort in online environments with students from the "net generation" more accustomed to working and socializing online (see Brown, 2002; Oblinger & Oblinger, 2005; Prensky, 2005). We also consider it likely that academic level (undergraduate vs. graduate) track distinctions in student age and therefore included that variable in the analysis. Further, it has been concluded that student "commitment to degree" is the best indicator of student persistence and success in college education (Horn & Neville, 2006). Variables such as student workload status (part time vs. full time), student employment status (part time, full time, not employed) have been used as proxies for commitment to degree suggesting that full time students without other commitments, such as work, are more likely to be "degree committed". We therefore included these in the analysis conducted here. Finally, previous research (e.g., Shea, Fredericksen, Pickett, Pelz, & Swan, 2001) indicates that greater experience with online learning is correlated with satisfaction in online education and thus might have an influence on student responses to theoretical constructs of interest in this study.

Second, espousing the idea that the interactivity embedded into the course design could play a substantial role in students' perceptions, we queried as to whether the level of interactivity within online courses has a direct bearing on students' rating of teaching, cognitive and social presence. We sought to understand how levels of interaction would impact student ratings of the CoI constructs of "presence".

Finally, consistent with previous research on the interrelatedness of the CoI constructs (e.g., Shea & Bidjerano, 2008, 2009), we further conjecture that the quality of instructor teaching presence functions as the instructional orchestration leading to a social environment conducive to online learning predicting the quality of learners' ratings of cognitive presence.

Method

Participants

Participants in this study included 723 college students participating in a program of online and blended courses in the 2008-2009 academic year in a private college in the Northeastern United States. More than half of the study participants were male (57%). Approximately one third of the sample (37%) consisted of graduate students. The majority of the participants were full time students (56%) between 18 and 30 years of age (62%). Full time employment status was indicated by 47% of the respondents. For 18% of the participants, English was their second language. In addition, 36% of the participants reported a significant online experience.

Instruments

The Community of Inquiry (CoI). The CoL, part of the 52-item survey, was developed and validated through a collaboration of a team of researchers investigating online education through the CoI lens (Arbaugh, et.al., 2007; Shea & Bidjerano, 2008; Swan et. al., 2007). The instrument consisted of 42 items reflecting indicators of instructional presence in the CoI model. Items are summarized in table 1 below. As can be seen, fifteen items correspond to teaching presence and twelve items reflect the cognitive presence construct. As noted above teaching presence can be seen as instructional orchestration while cognitive presence is meant to capture the cyclical process of inquiry within the CoI model. Components of cognitive presence include triggering events, exploration, integration and resolution/application. The remaining items correspond to components of the social presence construct in which learners are asked to rate their perceptions of the online medium and their experiences in it to connect with other participants in the course.

Responses were provided on a 5-point Likert type scale, ranging from 1- "strongly agree" to 5 –"strongly disagree". Results from previous factor analyses have suggested that the variance among the items in the instrument could be explained by either three (Shea & Bidjerano, 2009) or four factors (Shea & Bidjerano, 2008), depending on the amount of modifications made in terms of item content and format. Since factor solutions are expected to vary to some extent across samples and versions, we performed principal axis factoring with Oblimin rotations on the 42 items reflecting the presence constructs in the survey. Five factors with eigenvalues greater than one emerged. While all teaching presence and cognitive presence items' loadings were consistent with those found in previous studies (e.g., Shea & Bidjerano, 2008, 2009), the social presence items collapsed into three distinct factors. These three factors were labeled tentatively: "Open Communication with Instructor"(CI), "Affective communication"(AC), and "Open Communication with Students"(CS). The results from the factor analysis are presented in Table 1.

Interaction. We collected objective data throughout the semesters to assess the degree of interaction within each course. The level of interaction was determined by the sum of indicators of student and instructor participation (e.g., total online discussion messages in the large-and small-group areas, total news announcements, total calendar events posted, total comments left in grade book, and total feedback left in the dropbox), divided by the number of students plus one (to take into account the teacher). The courses were classified into low-interaction and high interaction by the means of median split based on the derived metric of interaction. The collected objective data was triangulated with a survey, asking both students and instructors to evaluate the level of interaction within each course. This analysis confirmed that students did report higher levels of interaction in courses in which there were more overall postings and activity as described above. While we recognize that these are imperfect measures, given the meta-analytic

synthesis (e.g. Bernard et. al., 2009) indicating the importance of interaction on learning we were particularly interested to understand the impact of objectively measured interaction levels on the theoretical constructs reflective on online learning in this study.

Procedure

Students were asked to complete a 52-item survey using an online form that allowed for monitoring of response rates. The survey (described below) had to be completed in terms of the course (hybrid or fully online) currently taken. All faculty teaching in this program undergo the same training, have access to a common helpdesk, and utilize the same learning management system. All faculty members teaching in the program are assigned to an instructional designer, who provides one-to-one consultations in online and blended course design, development, delivery, and assessment. In addition, the instructional designer coordinates all CMS training, library support, and media development support for their faculty. The instructional design team offers a regular series of seminars, workshops, multi-week online training courses, web-based tutorials, and learning communities specifically intended for online and blended faculty. Not surprisingly, the majority of online and blended courses at the college include at least one large-group (whole-class) asynchronous discussion activity per week, and many include an online small-group (team) discussion component. These discussions are designed to foster inquiry and critical thinking, and accordingly constitute a significant portion (20-40%) of the final grade. Instructors communicate with their students by posting announcements, facilitating discussion threads and/or web-conferences, and commenting on and grading work.

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The survey was administered through Vovici ®. An initial invitation and three follow-up communications were sent via email. The final response rate was approximately 42%.

Insert Table 1 about here

Results

The effect of type of instruction. To determine the effect of type of instruction (online vs. hybrid) on learner assessments of the five constructs (TP, CP, AC, CI, and CS) we performed five separate hierarchical multiple regressions. In all regressions, we controlled for the following prior student characteristics: gender, age, academic level (undergraduate vs. graduate), student workload status (part-time vs. full time), student employment status (part time vs. full time), and experience with online learning. The results are presented in Table 2. Controlling for prior characteristics, type of instruction (hybrid versus online) had a small, but significant positive effect on student ratings of TP [F (8, 537) = 5.03, p<.001, $\Delta R^2 = .02$], CP [F (8, 537) = 5.73, p<.001, $\Delta R^2 = .01$], AC [F (8, 537) = 5.36, p<.001, $\Delta R^2 = .01$], and CI [F (8, 537) = 4.61, p<.001, $\Delta R^2 = .01$].

It is interesting to note that in all five regressions performed, the effect of age was statistically significant, suggesting that older students produced higher ratings on the constructs of TP, CP, AC, CI, and CS. The effects of experience with online courses and academic level varied across regression analyses. In general, graduate students tended to show higher standing on the constructs of TP, CP and AC, not taking into account the type of courses they were enrolled in. The effect of academic level on CP remained consistent even when type of course

(online vs. hybrid) was used as a predictor of CP. In addition, despite the impact of type of course, students with more educational experiences in online environment rated their affective communication and open communication with other students significantly more favorably as compared to those with less online experience.

Insert Table 2 about here

The effect of interaction within fully online courses. The effect of interaction was examined in one-way MANOVA with interactivity level (low vs. high) as independent variable and the five CoI constructs as dependent variables. The results revealed that, overall, interaction contributes to the model beyond statistical chance, Hotelling's Trace = .06, F (5, 528) =5.70, η^2 = .05. Multivariate tests of significance further indicated that interaction levels have an effect on Affective Communication [F (1, 354) =15.77, η^2 = .03], Open Communication/ Students [F (1, 534) =12.55, η^2 = .02, and Open Communication/ Instructor [F (1, 534) =4.47, η^2 = .01]. The effects of interaction on ratings of Teaching Presence [F (1, 534) =1.42] and Cognitive Presence [F (1, 534) =.71] were not significant.

Results from path analyses. Prior research has suggested that SP variables could play an important role in students' perceptions of their learning in online contexts (e.g., Shea & Bidjerano, 2008; 2009). It has been found that SP explains a significant proportion of the relationship between prior characteristics, student perceptions of TP and CP.. To cross-validate the model suggested by Shea and Bidjerano (2008) in relation to medium of instruction (hybrid vs. fully online), we developed three path analytic models. In each model, one of the SP constructs (AC, CI and CS) was hypothesized as a partial mediator between student ratings of teaching presence and perceptions of their own cognitive presence. In all three models, depicted in Figures 1 through 3, we used the contextual variable of online vs. hybrid environment and student prior characteristics (age, academic level and experience in online experience) as distal predictors of CP. The fit indices for the three models were as follows: χ^2 (8) = 40.66, p<.001, CFI=.98, GFI=.97, TLI=.92, NFI =.97, SRMR=.04, RMSEA=.08 [Model 1: Affective Communication]; χ^2 (8) = 55.31, p<.001, CFI=.97, GFI=.96, TLI=.96, NFI= .96 SRMR=.04, RMSEA=.08 [Model 2: Open communication/ Students]; χ^2 (8) = 37.51, p<.001, CFI=.98, GFI=.98, NFI=.98, TLI=.94, SRMR=.04, RMSEA=.08 [Model 3: Open Communication/ Instructor]. The unstandardized and standardized (given in parentheses) regression coefficients are displayed on the figures. In all three models, environment (hybrid vs. online) and age predicted ratings of TP beyond statistical chance. The construct of TP was a complete mediator of the relationship between age and the SP constructs as well as between environment and the SP constructs. The variance explained in CP in Models 1 (with AC as a partial mediator), 2 (with CS as a partial mediator), and 3 (with CI as a partial mediator) was 70.9%, 71.6%, and 71.2% respectively. Significant, but small proportion of these variances (approximately 4% in each of the models) was attributable to age and type of course (online vs. hybrid).

Insert Figures 1, 2 and 3 about here

Discussion

In attempting to understand how and why hybrid instruction might lead to superior learning among students in higher education we conducted a study utilizing the Community of

Inquiry instrument. There are several results warranting commentary here. In brief, we utilized factor analysis to demonstrate that the items in the instrument applied in this study cohere as interpretable factors reflecting the intended theoretical constructs. Using these factors as criteria in a series of hierarchical multiple regressions, we found that despite prior status characteristics (e.g., gender, age, experience, educational level and workload), students in hybrid courses tend to rate their instructors teaching presence behaviors significantly higher, to perceive their own learning as better, as well as to feel more affectively and socially connected to their peers. Moreover, it was established that interaction levels within online courses significantly contributes to learners' perceptions of social presences (e.g., affective communication, open communication among students, and open communication with the instructor).Finally, consistent with previous research, our analyses provided supporting evidence that social interactions across learning environments are an important mediator of the link between ratings of teaching behaviors and student ratings of their own learning outcomes.

It is worth focusing on the elements of cognitive presence included in this study. Given that the students in these courses were enrolled in many different courses across a variety of disciplines it is necessary to define learning outcomes that are desirable across a range of topics. In this study we took as foundational the model of critical thinking and inquiry reflected in Dewey's work (1933); items included in the study reflect the cyclical process of inquiry distinctive to the CoI Model. Critical thinking outcomes that students are asked to rate include their understanding of fundamental concepts, abilities to test and apply new knowledge, capacity to develop solutions to course problems in practice and the ability to apply knowledge beyond the class. These indicators of critical thinking can be seen as desirable in many higher education settings.

Medium of instruction as a predictor of teaching, cognitive and social presence.

It should be noted that student assessment of their own cognitive presence, a multivariate factor reflecting the quality of learning in the CoI model suggests that students in hybrid courses rate their instructors teaching presence behaviors more highly. These findings are interesting in light of the result indicating that the quality of instructors' teaching presence behaviors is a significant predictor of social and cognitive presence scores. From a theoretical standpoint this correlation helps explains the small yet significant differences suggesting that students in hybrid courses outperform their online and classroom counterparts (Means et. al, 2009). Reflecting the CoI framework students in hybrid courses reported better levels of instructional design, facilitation of productive discourse, and direct instruction – the components of the teaching presence construct. These students also had more positive perceptions about the social setting in which they participated as reflected in two of three social presence constructs in the model. Affective communication, open communication among students, and open communication with instructor are important mediators of the relationship between teaching presence and ratings of instructional contexts (online vs. blended) and ratings of critical thinking reflected in the cognitive presence construct. This result supports past research which has indicated that ratings of cognitive presence can be modeled on the quality teaching and social presence in fully online education settings (Shea & Bidjerano, 2009) and we found similar results among students in hybrid environments.

The role of interaction within fully online environments

In the current study we examined interaction as a variable of interest in predicting student ratings of the quality of the processes (teaching and social presence) and the outcome (cognitive presence) that were the objects of our research. We found that students in courses with higher levels of interaction rated social presence more favorably. While Bernard and his colleagues (2009) did not speculate on the connection between social forms of interaction and achievement, we conclude that a) affective communication, b) open communication among students, and c) open communication with the instructor (collectively defined here as social presence) are important mediators between instructional quality (teaching presence) and student ratings of the quality of learning outcomes (cognitive presence). The majority of the variance in ratings of cognitive presence can be explained by the direct effects of teaching presence and by the mediated effect of teaching presence through social presence on cognitive presence. In other words the quality of the instructional process (teaching presence) appears to facilitate meaningful learning (cognitive presence) directly, through an unmediated effect, and to enhance learning indirectly, by supporting a supportive social online milieu (social presence) in which students feel affectively cohesive and connected. One of the contributions of this study, therefore, is to provide evidence as to why the social aspects of the online learning environment are important to consider. The feelings of connectedness and positive affect reflected in the social presence construct are predictive, in part, of meaningful learning as defined in the cognitive presence construct. Students in courses with higher levels of interaction reported more social presence than in course with lower levels of interaction. Given that social presence is predicted by teaching presence, and that student ratings of instructional design as defined by the CoI model are part of this prediction, we can concluded that a portion of the variance in social presence is due to the design of the course. This design element that accounts for variance in ratings of social presence includes whether the instructor clearly communicated course topics, course goals, time frames and due dates, and how to complete course learning activities successfully. Where students agree more strongly that an instructor is doing these task well, they also report better levels of social presence. In looking at the prediction of cognitive presence we see that the model represents both indirect and direct predictive paths between instructional design quality, (as represented by teaching presence) and both social and cognitive presence ratings.

From a practical standpoint these results indicate that the CoI framework can be construed as a touchstone for aspects of instructional design in both fully online and hybrid learning environments. Results demonstrating that the majority of variance in learner ratings of their own cognitive presence is accounted for by variance in teaching and social presence suggests that faculty and instructional designers should consider focusing efforts on these aspects of instructional design. Providing students with clear course goals, topics, due dates, timely feedback and assisting them to collaborate in effective ways with their classmates allows them to develop productive interactions both with content and other students, which in turn advances joint knowledge construction. Confirming results from Means et. al (2009) it appears from these results that students in hybrid courses rate forms of presence more highly then those in fully online courses. However these findings do not necessarily indicate that instruction in fully online environments cannot be designed more effectively. We believe that these results suggest that a focus on the instructional and social processes reflected in the CoI framework holds promise as a mechanism to improve learning in multiple environments. .

References

Abrami, Bernard, M., P., Lou, Y. Borokhovski, E., Wade, A., Wozney, L., Wallet, P., Fiset, M., & Euang, B. (2004).How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3) pp 379-439.

Allen, E. & Seaman, J. (2010). *Class Differences: Online education in the United States 2010.* Needham, MA: Sloan Consortium.

Allen, M., Bourhis, J., Burrell, N., & Mabry, E. (2002). Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. *American Journal of Distance Education*, *16*(2), 83–97.

Anderson, T., L. Rourke, Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context, *Journal of Asynchronous Learning Networks 5* (2), 1-17.

Arbaugh, J.B., Cleveland-Innes, M., Diaz, S.R., Garrison, D.R., Ice, P., Richardson, & 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.

Bernard, R., Abrami, P., Borokhovski, E., Wade, C., Tamim, R., Surkes, M., & Bethel, E. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, *79*(3), 1243-1289.

Bostock, S., & Lizhi W (2005). Gender in students' online discussions*. Innovations in Education and Teaching International*, *42*(1), 73–86.

Brown, J. S. (2002). Growing up digital. *United States Distance Learning Journal*, *16*(2).

Cattan, M., White, M., Bond, J., & Learmouth, A. (2005). Preventing social isolation and loneliness among older people: A systematic review of health promotion interventions. *Ageing and Society*, *25*(1), 41–50.

Dewey, J. (1933). *How we think. A restatement of the relation of reflective thinking to the educative process.* Boston, MA: D. C. Heath.

Cavanaugh, C., Gillan, K., Kromey, J. Hess, M., & Blomeyer, R. (2004). *The Effects of Distance Education on K–12 Student Outcomes: A Meta-Analysis*. North Central Regional Educational Laboratory.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *The American Journal of Distance Education, 15*(1), 7–23.

Goldstein, J ., &. Sadhana, P. (2004). The brink of change: Gender in technology-rich collaborative learning environments. *Journal of Science Education and Technology, 13*(4), 505–523.

Greeno, J. (2006). Theoretical and practical advances through research on learning. In J. Green, G. Camilli, P. Elmore (Eds.), *Handbook of complementary methods on education research* (pp. 795-822). Mahwah, NJ: Lawrence Erlbaum Associates.

Horn, L., & Nevill, S. (2006). *Profile of Undergraduates in U.S. Postsecondary Education Institutions: 2003–04: With a Special Analysis of Community College Students (NCES 2006-184*). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Kuhn, T. (1977). *The essential tension: Selected studies in scientific tradition and change.* Chicago: University of Chicago Press.

Lindsay, E. B. (2004). The best of both worlds: Teaching a hybrid course. *Academic Exchange Quarterly 8*(4), 16-20.

Lipmann, M. (2003). *Thinking in Education*. New York: Cambridge University Press.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, D.C.: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development.

Oblinger, D., & Oblinger, J. (2005). Educating the net generation. *EDUCAUSE.* Retrieved November 22, 2009 from http://www.educause.edu/ir/library/pdf/pub7101.pdf

Pierce, C. S. (1955). The fixation of belief. In J. Buchler (Ed.), Philosophical writings of Pierce. New York: Dover, pp-5-22.

Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous, text-based computer conferencing. *Journal of Distance Education*, *14*(3), 51-70.

Shumaker, S., & Hill D. (1991). Gender differences in social support and physical health. *Health Psychology, 10*(2) 102–111.

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., & Bidjerano, T. (2008). Measures of quality in online education: An investigation of the community of inquiry model and the net generation. *Journal of Educational Computing Research*, *39* (4), 339-361.

Shea, P., Fredericksen, E., Pickett, A., Pelz, W., and Swan, K. (2001) Measures of learning effectiveness in the SUNY Learning Network. In J. Bourne and J. Moore, (Eds), Online Education: Proceedings of the 2000 Sloan Summer Workshop on Asynchronous Learning Networks. Volume 2 in the Sloan-C series, (pp. 31-54). Needham, MA: Sloan-C Press, 2001.

Shea, P., Li, C. S., Swan, K., & Pickett, A. (2005). Developing learning community in online asynchronous college courses: The role of teaching presence. *The Journal of Asynchronous Learning Networks, 9*(4), 59-82.

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

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X.. (2006). Teaching courses online: A review of the research. *Review of Educational Research*, *76* (1), 93-135.

Vandervoort, D. (2000). Social isolation and gender. *Current Psychology*, *19*(3), 229–223.

Voci, E., & Young, K. (2001). Blended learning working in a leadership development program. *Industrial and Commercial Training*, *33*(5), 157-161.

Welker, J., & Beradino, L. (2006). Blended Learning: Understanding the middle ground between traditional classroom and fully online instruction. *Journal of Educational Technology Systems*, *34*(1), 33-55.

Yeh, S. J., & K. L. Sing (2004). Living alone, social support and feeling lonely among the elderly. *Social Behavior and Personality: An International Journal, 32*(2), 129–139.

Zhao, Y., Lei, J., Yan, B., Lai, C., & Tan, H.S.(2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record*, *107*(8), 1836–1884.

Table 1. *Results from Factor Analysis*

Item	*Factors*				
	TP	CS	CP	CI	AC
The instructor communicated course topics	**.87**	.07	-.06	.09	-.05
The instructor communicated course goals	**.90**	.06	-.01	.09	-.03
The instructor provided clear instructions	**.86**	.10	.02	.10	-.10
The instructor communicated due dates	**.76**	.13	-.04	.14	-.13
The instructor helped students learn	**.83**	-.04	-.01	-.10	.08
The instructor helped students clarify their thinking	**.86**	-.02	-.01	-.06	.06
The instructor kept students engaged & participating	**.87**	-.04	.03	-.02	.11
The instructor kept students on task	**.90**	-.03	.04	-.08	.07
The instructor encouraged students to explore new ideas	**.73**	-.03	-.13	-.04	.06
The instructor established a sense of course community	**.79**	.03	.03	-.06	.15
The instructor helped focus discussion on issues that aided student learning	**.59**	-.05	-.21	-.10	.02
The instructor gave feedback that helped students	**.67**	-.08	-.17	-.13	.00
The instructor provided feedback in a timely fashion	**.71**	-.04	-.12	-.16	-.01
My instructor provided feedback to the class during the discussions or other activities to help us learn.	**.77**	-.07	-.02	-.18	.00
My instructor asked for feedback on how this course could be improved.	**.53**	.03	-.01	-.18	.12
Getting to know others gave students a sense of belonging in the course	.20	.09	-.17	.03	**.63**
Students formed distinct impressions of course participants	.16	.18	-.09	-.01	**.59**
Students found online or web-based communication an excellent medium for social interaction	.00	.32	-.12	-.03	**.47**
Students felt comfortable conversing online	.02	**.82**	-.04	-.02	.03
Students felt comfortable participating in discussions	.07	**.87**	-.03	-.01	-.02
Students felt comfortable interacting with course participants	.09	**.84**	-.02	.02	.03
Students felt comfortable disagreeing with others	-.07	**.52**	-.05	-.27	.18
Students felt their points of view were acknowledged by others	-.02	**.47**	-.11	-.21	.22
Online discussions helped students develop a sense of collaboration	.01	**.40**	-.08	-.20	.34
Getting to know the instructor gave me a sense of belonging in the course.	.27	.09	-.10	**-.54**	.09
I was able to form a distinct impression of the course instructor.	.18	.13	-.10	**-.51**	.10
I was able to identify with the thoughts and feelings of the instructor during the course.	.26	.12	-.08	**-.55**	.09
I felt comfortable interacting with the instructor of the course.	.20	.20	-.26	**-.47**	-.11
I felt comfortable disagreeing with the instructor of the course while still maintaining a sense of trust.	.06	.20	-.16	**-.58**	-.01

I felt that my point of view was acknowledged by the course instructor.	.20	.17	-.24	**-.51**	-.07
Problems posed increased interest in course issues	.04	-.02	**-.69**	-.16	.01
Course activities piqued curiosity	.01	-.06	**-.79**	-.12	.01
Students felt motivated to explore content related topics	.06	-.07	**-.78**	-.09	.03
Students utilized a variety of resources during the course	-.04	-.06	**-.83**	.07	.13
Students brainstormed & found relevant information to aid them in resolving questions	-.03	-.06	**-.76**	.01	.19
Online discussions helped students appreciate different perspectives	.09	.21	**-.41**	.00	.28
Combining new information helped students answer questions	.10	.09	**-.65**	-.10	.08
Learning activities helped students create solutions	.08	.05	**-.72**	-.06	.05
Reflection on course content & discussions helped students understand fundamental concepts	.11	.09	**-.72**	-.04	-.03
Students can describe ways to test & apply their new knowledge	.00	.10	**-.86**	.03	-.11
Students developed solutions to course problems that can be applied in practice	.03	.09	**-.83**	.06	-.09
Students can apply knowledge created in their courses to work or other non-class related activities	.06	.10	**-.82**	.05	-.11
Eigenvalue	24.83	3.02	1.64	1.20	1.01
Percent of Variance	59.10	7.19	3.91	2.87	2.41
Explained					
Chronbach's Alpha	**.97**	**.92**	**.96**	**.95**	**.87**

Note. TP: Teaching Presence, CS: Open communication/ students, CP: Cognitive Presence, CI: Open communication/ Instructor, AC: Affective Communication.

Table 2. *Summary of Hierarchical Regression Analysis for Variables Predicting Teaching Presence, Cognitive Presence, Affective communication, Open Communication/ Instructor, and Open Communication/ Students.*

Predictors	*Teaching Presence (TP)*			*Cognitive Presence (CP)*			*Affective Communication (AC)*			*Open Communication/ Instructor (CI)*			*Open Communication/ Students (CS)*		
Step 1	*B*	SE B	β	*B*	SE B	B	*B*	SE B	B	*B*	SE B	B	*B*	SE B	B
Gender	.06	.07	.03	.01	.06	.01	.02	.08	.01	.03	.07	.02	.02	.06	.01
Age	.09	.02	.25**	.09	.02	.28**	.09	.02	.23**	.09	.02	.24**	.05	.02	.17*
Academic level	.16	.07	.10*	.19	.06	.13*	.16	.08	.09*	.18	.07	.11	.02	.06	.02
Student workload	-.35	.18	-.22	-.23	.16	-.17	-.25	.20	-.14	-.29	.19	-.18	-.22	.15	-.17
Employment	-.03	.06	-.03	-.00	.05	-.00	.01	.07	.01	-.02	.06	-.02	.08	.05	.10
Registration status	-.06	.19	-.04	-.07	.16	-.05	-.19	.20	-.11	-.09	.19	-.05	-.04	.15	-.03
Online exp.	.02	.02	.04	.03	.02	.06	.08	.03	.15*	.03	.02	.06	.05	.02	.12*
	R^2 = .05, p<.001			R^2 = .07, p<.001			R^2 = .07, p<.001			R^2 = .05, p<.001			R^2 = .04, p<.001		
Step 2															
Gender	.06	.07	.04	.02	.06	.01	.03	.07	.02	.04	.07	.02	.02	.06	.01
Age	.09	.02	.25**	.09	.02	.29**	.09	.02	.23**	.09	.02	.24**	.05	.02	.17*
Academic level	.07	.08	.04	.13	.07	.09*	.09	.08	.05	.10	.08	.06	.00	.06	.00
Student workload	-.31	.18	-.19	-.21	.16	-.15	-.22	.20	-.12	-.25	.18	-.16	-.21	.15	-.16
Employment	-.02	.06	-.02	.00	.05	.00	.01	.07	.01	-.01	.06	-.01	.08	.05	.10
Registration status	-.04	.18	-.02	-.05	.16	-.04	-.17	.20	-.10	-.06	.19	-.04	-.04	.15	-.03
Online exp.	.03	.02	.07	.03	.02	.08	.09	.03	.17**	.04	.02	.08	.05	.02	.12*
Online vs. hybrid	.38	.12	.15**	.27	.10	.12*	.31	.13	.11*	.35	.12	.14*	.10	.10	.05
	R^2 = .07, p<.001			R^2 = .08, p<.001			R^2 = .08, p<.001			R^2 = .06, p<.001			R^2 = .05, p<.001		

Note. * p<.05, ** *p*<.001

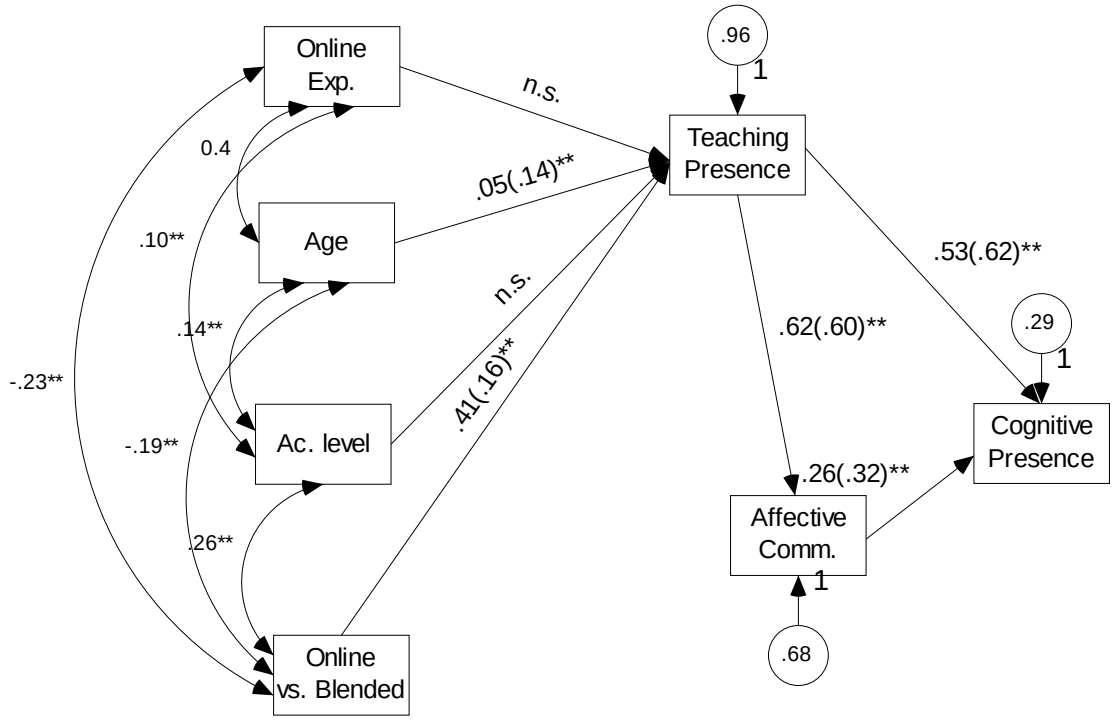

Figure 1. A model of the relationship between Teaching Presence and Cognitive Presence with Affective Communication as a partial mediator.

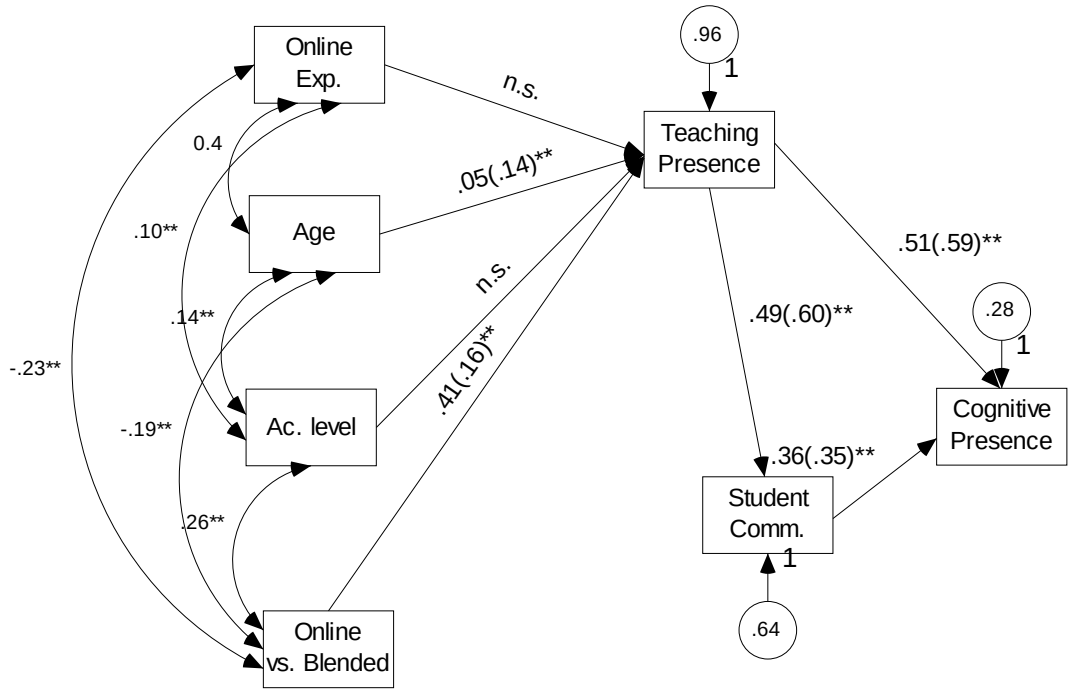

Figure 2. A model of the relationship between Teaching Presence and Cognitive Presence with Open Communication with students as a partial mediator.

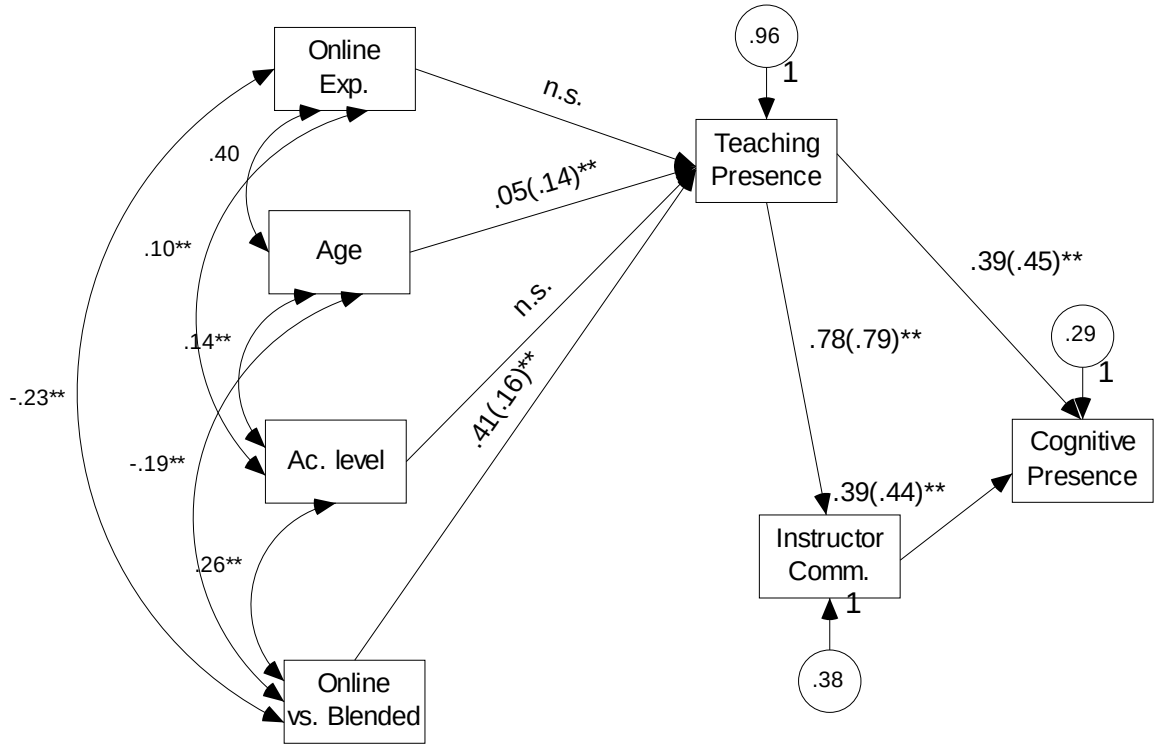

Figure 3. A model of the relationship between Teaching Presence and Cognitive Presence with Open Communication with Instructor as a partial mediator.