Learning Presence as a Moderator of Cognitive Presence in the Community of Inquiry Model

Abstract

This study of over 2000 US college students examines the Community of Inquiry framework (CoI) in its capacity to describe and explain differences in learning outcomes in hybrid and fully online learning environments. We hypothesize that the CoI model's theoretical constructs of *presence* reflect educational effectiveness in a variety of environments, and that online learner self-regulation, a construct that we label "learning presence" moderates relationships of the other components within the CoI model. Consistent with previous research (e.g., Means, Toyama, Murphy, Bakia & Jones, 2009; Shea & Bidjerano, 2011) we found evidence that students in online and blended courses rank the modalities differently with regard to quality of *teaching*, *social*, and *cognitive* presence. Differences in help seeking behavior, an important component of self-regulated learning, were found as well. In addition, results suggest teaching presence and social presence have a differential effect on cognitive presence, depending upon learner's online self-regulatory cognitions and behaviors, i.e. their learning presence. These results also suggest a compensation effect in which greater self regulation is required to attain cognitive presence in the absence of sufficient teaching and social presence. Recommendations for future research and practice are included.

Cognitive Presence in The community of Inquiry Model as a Function of Self-regulated Learning

Between the fall 2008 and fall 2009 academic years more than one million new college students in the United States took an online course for the first time. Adding this number of students to online education in a single year, an increase of more than 20%, represents a milestone of sorts. The addition of these new learners is the largest single-year numerical increase since such data have been collected, bringing the total number of online students to more than 5.5 million (Allen & Seaman, 2010). The current growth rate among online students is more than ten times the growth rate in higher education generally, which saw an increase of less than 2% overall. The data suggest that online education continues to grow phenomenally with about 30% of all US college students taking at least one online course (Allen & Seaman, 2010). Other research suggests that this growth is likely to continue and that we may see as many as 50% of college students in online courses by 2014 (Christensen, Horn, Caldera & Soares, 2011). In addition to the millions of students in fully online courses, we are now seeing growth in the numbers of students enrolled in blended or hybrid courses in which part of the instruction is carried out online with a reduced portion remaining in the classroom. Some forecast (Watson, 2008) that this sector will grow even faster than fully online education, especially in pre-college settings. The present study seeks to understand the experiences of these many millions of students, and the millions more predicted to follow them, from both conceptual and empirical perspectives.

Given the ongoing growth of online and blended education, it is crucial that we gain insights into successful learners engaged in these modalities and begin to develop a profile of how people learn online. We know that online learning is similar to and yet distinct from

classroom learning. Clearly the absence of the dynamic of face-to-face interaction represents a change and we know that for most students online education is carried out in an asynchronous internet-based format. The US Department of Education reports, for example, that more than 11,200 college level programs have been designed for delivery fully at a distance and that 98% of these use asynchronous internet-based technologies to some extent (Parsad & Lewis, 2008). There is a longstanding belief that distance education requires a greater degree of self-directedness and self-reliance and it seems probable that learners in asynchronous, largely text-based online courses face challenges requiring considerable persistence and determination. This belief is supported by data that has implications for the continued expansion of online learning. For example in a recent national study of online education (Allan & Seaman, 2010) a majority of institutions in the US reported that online learning requires more discipline on the part of the student and that this represents a barrier to continued growth of online education. The issues of online student discipline, self-directedness, and self-reliance are important factors and in this paper we will look at possible distinctions confronting fully online learners and learner who enroll in blended courses. If we are to understand how people learn online, how it may be improved, and how and whether it should continue to grow in the now prevailing method (asynchronous, internet based) it is important to frame these issues within a model that allows for more coherent description and explanation. We posit that two existing theories provide this framing, the Community of Inquiry (CoI) model and self-regulated learning (SRL) theory.

The community of inquiry framework

The Community of Inquiry model outlines the behaviors and processes required to enable knowledge construction in asynchronous online environments through the development of

various forms of "presence". The CoI framework discusses three forms of presence: teaching-, social-, and cognitive presence (Garrison, Anderson, & Archer, 2001). The model articulates these conceptual components considered foundational to successful knowledge building in collaborative online environments. The framework theorizes online learning as a result of collaborative work among active participants in learning communities characterized by instructional orchestration suitable to the online environments (teaching presence) and a supportive mutually respectful online setting (social presence). The teaching presence construct describes online instructional skills such as organization, design, discourse facilitation, and direct instruction (Anderson, Rourke, Garrison, & Archer, 2001; Garrison & Arbaugh, 2007) and articulates the specific behaviors likely to result in a productive community of inquiry (e.g., Shea, Li, Swan, & Pickett, 2005). Social presence reflects online discourse that promotes positive affect, interaction, and cohesion (Rourke, Anderson, Garrison, & Archer, 1999) and supports a collegial, collaborative environment. The model also references cognitive presence, a multivariate measure of significant learning that results from the cyclical process of practical inquiry within such a community of learners. The specific form of interaction within the cognitive presence construct thus reflects a pragmatic view of learning (Dewey, 1933; Lipmann, 2003; Pierce, 1955). However the model as a whole can be seen to articulate the knowledge construction features of Larreamendy-Joerns and Leinhardt's (2006) "epistemic engagement" model with teaching presence serving the overarching instructional function and social presence supporting productive participation.

In a recent review of the research on CoI, Garrison and Arbaugh (2007) concluded that there was a need for more quantitatively-oriented studies, more cross-disciplinary studies, and opportunities for identifying factors that moderate or extend the relationship between the

framework's components and course outcomes. The study presented here attempts to build on these recommendations with a quantitative approach to an analysis of thousands of students studying across many different disciplines. Seeking to add to the literature on CoI in the context of the most recent, rigorous, and comprehensive review of online learning (Means, et. al, 2009), results presented here extend the framework's components with an additional focus on learners and their differential capacity to self-regulate in online and blended settings.

Self-regulated learning

Despite the increasing interest in the application of the CoI framework as an overarching conceptual model explaining the nature of asynchronous distance learning, with some exceptions (Shea & Bidjerano, 2010; Shea et al., in press) very few studies have taken into account individual-level determinants, that can play an equally important role in students' perceptions of cognitive engagement and gains. The notion that individual difference characteristics interact with instructional environment in intricate ways to produce specific learning outcomes is not new. The aptitude-treatment interaction framework, described by Cronbach and Snow (1977), suggests that "one size does not fit all" for the effectiveness of any instructional method or strategy depends largely on the individual attributes of the learner. Neither instruction in isolation, nor learners' characteristics by themselves predict learning, rather the combination of the two results in optimal learning outcomes (Snow, 1989). Although the ATI framework has been originally developed to explain the complex interplay between instruction, referred as to treatment, and student ability, it is currently agreed upon that the paradigm can be extended to include a broad range of interactions between individual traits (intelligence, learning style, personality, motivation, effort, self-efficacy, meta-cognition, self-regulation) and the quality of

learning environment (teacher, teaching style, instructional methods, strategies, social milieu, instructional mediums) with their effect on learning and educational outcomes.

Of the aforementioned person-level characteristics, individual differences in self-regulated learning have emerged as a powerful explanatory mechanism of the relationship between instruction and educational outcome. Hence, the second conceptual framework that may provide guidance into the experience of online learners is the SRL theory. Several social-cognitive models of SRL have been proposed and extensively studied in research (Zimmerman, 2001). Despite the subtle nuances in definitions and operationalization of the construct, there is a consensus in the literature that self-regulation is a cyclical, recursive process that encompasses goal setting, planning, executing actions, monitoring, self-reflection and self-assessment. Self-regulated learners set proximal attainable goals based on refined self-knowledge and analysis of the complexity of the learning task; structure their own learning environment in ways conducive to learning; chose appropriate learning strategies, constantly monitor the progress made towards the task, and evaluate the extent to which goals have been achieved (Zimmerman, 2000; Pintrich, 2000). Therefore, SRL is necessarily a multidimensional construct that "involves cognitive, affective, motivational and behavioral components that provide the individual with the capacity to adjust his or her actions and goals to achieve the desired results in light of changing environmental conditions" (Zeidner, Boekaerts, & Pintrich, 2000, p. 751). SRL is therefore more than what has been conventionally referred to as volition, self-discipline or self-directedness. Metacognition or knowledge about oneself as a learner (Boekaerts, 1995), motivation and self-efficacy beliefs (Schunk& Zimmerman, 1998), awareness and use of appropriate learning strategies that optimize performance (Garcia & Pintrich, 1994; Pintrich, Smith, Garcia, &

McKeache, 1993; Pressley, Beard El-Dinary, Wharton-Mcdonald, & Brown,1998) are all important components of SRL.

Researchers have consistently demonstrated the beneficial effects of self-regulatory behaviors on students' academic performance in traditional classrooms (Pintrich et. al., 1993; Winne, 2005; Zimmerman, 1998; Zimmerman, 2008). Given the relatively recent advent and uniqueness of online education, the research of the role of learner self-regulation in online courses is only in its inception. However, because learning in virtual environments removes well-known conventions of direct student-teacher contact and immediacy that is familiar in the face-to-face format, the ability of learners to engage in SRL behaviors is construed as a crucial factor for success online (Barnard, Lan, To, Paton, Lai, 2009).

Findings from the few studies that have examined aspects of SRL (i.e., self-efficacy, strategy use, effort and persistence) in online courses mirror what has been known about the factors and processes operating in the context of the traditional classroom. Learners' performance in a distance education course is facilitated to a great extent by the level of confidence in their skills to acquire course specific content and technology skills, use of their time wisely (Gibson, 1998; Lynch &Dembo, 2004; Wang & Newlin, 2002), and ability to set specific learning goals geared towards mastery (Curry, Haderlie, & Ku, 1999; Schrum and Hong, 2002). Online learners who are better able to manage their study time effectively, structure their learning environment, and seek assistance when faced with setbacks are more likely to be successful as well (Hsu, Ching, Mathews & Carr-Chellman, 2009; Puzziferro,2008; Wang & Newlin, 2002). Self-regulated learners tend to have more positive perceptions of online courses (Howland & Moore, 2002) and report higher satisfaction with the latter if they engage in cognitive learning strategies such as rehearsal, and elaboration (Puzzifierro, 2008). In addition,

student achievement in online courses depends on learners' perceptions of course communication and collaboration partly because of the affordances for self-regulatory learning behaviors (Barnard, Paton, & Lan, 2008).

More recently, in an attempt to incorporate self-efficacy and effort regulation, both important aspects of self-regulated learning, in a more comprehensive model combining elements of the CoI and SRL frameworks, Shea and Bidjerano (2010) suggested that SRL represents an important mediator of the links between teaching presence, social presence, and cognitive presence. Capitalizing upon the idea that CoI cannot be considered apart from SRL, in another mixed-methods study, Shea and colleagues (in press) reported that online students, monitor their time and cognitive strategies, regulate their study environment, and exercise control over their interactions with technology, peers, and faculty to maximize learning.

Even though we have gained significant insight about the learners' SRL as a critical factor in both traditional and online learning, our literature review suggests that a common denominator of previous research is its exclusive attention to linear prediction models in which SRL contributes either singularly or incrementally to cognitive, affective or behavioral outcomes [Of all of the reviewed work, only one study (e.g., McManus, 2000) has explored the role of SRL as a potential moderator of the link between treatment and outcome.] Although useful, such additive models often do not reflect the nature and complexities of the individual-environment interactions. Guided by the understanding that person-environment interactions are omnipresent (Snow, 1989), we sought to delineate the impact of SRL as a potential modifying variable that shapes how learners respond to teaching and social aspects of online instruction, as defined by the CoI framework.

Scope of the study

Recent meta-analytic research has indicated a small but positive effect of medium of instruction (blended vs. fully online) on indices of learning with blended instruction producing more favorable results on learning outcomes compared to fully online instruction (Means et al., 2009). We suggest that one way to explain these findings is through the Community of Inquiry Model (CoI), which depicts online learning though the three interrelated concepts of cognitive presence, teaching presence and social presence. In addition, it has been suggested recently that learners' characteristics play a role as well (Shea & Bidjerano, 2010). More specifically, student self- and co-regulated learning is likely related to cognitive outcomes over and above instructional and social predictors of learning. The aim of this study is to follow recommendations from previous reviews (Garrison & Arbaugh, 2007) and expand on previous research on the effect of medium of instruction online (Means, et. al, 2009; Hwang & Arbaugh, 2009;) by providing a more refined look at the intricate interdependence of processes (cognitive presence, social presence and teaching presence) and online student self-regulation, a construct that has been portrayed in past research as "learning presence" (Shea & Bidjerano, 2010). The chosen methodological approach in the current investigation is in response to arguments to consider quantitative approaches (Garrison & Arbaugh, 2007) and individual level traits in conjunction with other more global characteristics pertaining to the instructional environment. We were guided by the following research questions in which Learning Presence serves as an indicator of online self regulated learning (online SRL):

1. Do students in blended/ hybrid courses and fully online courses differ with respect to perceptions of presence and online SRL?

2. Does online SRL impact the relationships between Cognitive Presence and Teaching Presence, and Cognitive Presence and Social Presence differ when controlling for course format (blended/hybrid) and prior experience with online learning?

3. Does online SRL moderate relationships between Cognitive Presence, Teaching Presence and Social Presence?

Method

Participants

Participants in the study were 2,010 college students representing 38 institutions of higher education that are members of a common online learning network. The institutions in the network are from the same State university system, share the same learning management system, have a common faculty development processes, share student support services, and utilize the same mechanisms for faculty support and instructional design. The majority of the students from these institutions (76%) were female. Fifty-eight percent (58%) of the participants were between 18 and 30 years old. In terms of academic level, 29% were college freshmen, 29% were sophomores, 12% were juniors, 14% were seniors and 16% were graduate students. A large proportion of the students were either employed full time (32%) or part time (29%). Approximately two-thirds (64%) were full time students. Twenty-six percent (26%) were in blended/ hybrid courses.

Instruments

*Community of Inquiry (CoI).*The CoI measure, developed by a collaborative team of researchers (Arbaugh, et.al., 2008; Shea & Bidjerano, 2008; Swan et. al., 2008), captures the three broad dimensions of presence, as defined by the Community of Inquiry model. Each dimension is assessed by a set of Likert type items (i.e., 9 for Social Presence, 12 for Cognitive

Presence and 13 for Teaching Presence). Responses were provided on a 5 point-scale ranging from 1 – "Strongly disagree" to 5 "Strongly agree". A sixth response option "I choose not to answer this question" was also included. Previous studies (e.g., Garrison & Cleveland-Innes, 2010; Shea & Bidjerano, 2008, 2010) on the factorial validity of the scale have established that CoI indeed measures the three intended theoretical constructs of presence.

To replicate previous findings, we conducted an initial exploratory factor analysis (principal axis factoring) with oblique (Direct Oblimin, Delta = 0) rotation on the correlation matrix. The Kaiser rule of eigenvalues greater than one (EV > 1) pointed to the presence of four factors. However, both the scree test and results from parallel analysis (Turner, 1998) indicated that three factors should be retained. Factor analysis with number of factors constrained to three, yielded 71.07 % of variance explained prior to rotation and 68.33% of variance explained postrotation. The factor pattern coefficients, the percent of variance explained by each factor, and the estimates of internal consistency are given in Table 1. As seen, the internal consistency estimates of the three factors were above .90. Mean subscale scores were calculated for each participant and used in subsequent analyses.

Insert Table 1 about here

Online Self-Regulated Learning Questionnaire (OSRL). We used the OSRL, created by Lan, Bremer, Stevens & Mullen (2004) and Barnard et al. (2008), to asses students' SRL skills. The questionnaire has been previously validated for use in both hybrid and fully online course delivery environments (Barnard et al., 2009). The original questionnaire consists of 24 items

with a 5-point Likert scale, encored by 1 (Strongly Disagree) and 5 (Strongly Agree). Studies examining the factorial validity of the scale have established that the items on the scale assess six self-regulatory learning behaviors, namely, Environmental Structuring, Goal Setting, Time Management, Help Seeking, Task Strategies, and Self-Evaluation. The scale produces a total score as well as six subscale scores. The reliability of the subscale scores has ranged from .67 to .90 in previous studies (Barnard et al. 2009). For the purposes of this study, several modifications to the original questionnaire were made. We excluded two items because of conceptual ambiguity. In addition, several items were rephrased to better correspond to the idiosyncrasies of the online course delivery systems at our research site.

Following the stated modifications, we reevaluated the factor structure and reliability of the instrument by the means of exploratory factor analysis (principal axes factoring) with an oblique – Direct Oblimin (Delta = 0) rotation. Decision about the number of factors to be retained was made based on Kaiser's rule of EV > 1 and examination of the resulting scree plot. The results revealed that, regardless of medium of delivery (blended or fully online), the relationships among the items included in the scale can be best explained by three factors: Goal Setting, Strategic Learning and Help Seeking. The three factors explained 62.81% of the variance postrotation. Three subscales scores were created by summing up the responses on the items with highest factor pattern coefficients for each factor and dividing the sum by the number of items. A total score on all scale items was calculated as well. The factor pattern coefficients, the percent variance explained for each factor postrotation and the Cronbach Alpha coefficients of the three subscales are presented in Table 2.

Insert Table 2 about here

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Procedure

The survey was administered online through Vovici ® at the end of the Spring 2010 semester. Students were asked to respond to the survey questions in terms of one of the courses they have completed in Spring, 2010. Participation was voluntary and students were assured that the information supplied by them would remain confidential. A three-wave data collection protocol was followed, that is, the initial invitation to complete the survey was followed by two additional reminders sent to the non-respondents over the span of four weeks.

Results

Preliminary analysis

The study integrates CoI and SRL therefore we deemed it appropriate to conduct exploratory factor analysis as a preliminary step to rule out the possibility of conceptual overlap between the two theoretical frameworks. In an exploratory factor analysis, we used all items assessing both CoI and SRL frameworks to ensure that the measured observed variables belong to the intended theoretical constructs.

Rather than reducing the number of variables into a fewer interpretable components, the interest was in analyzing the common variance among the items on the survey to identify latent factors. Therefore, common factor analysis (principal axis factoring) with the correlation matrix as an input was pursued. In addition, oblique rotation (Direct Oblimin with Delta =0) was selected because it requires the estimation of more parameters resulting in a better data fit (Henson & Roberts, 2006). The Kaiser's rule of eigenvalues greater than one (EV >1), the scree test and parallel analysis were employed as criteria to determine the maximum number of factors

to be retained. Both the EV>1 rule and the scree test indicated that when all items from the survey are analyzed simultaneously, the fewest possible factors explaining the most variance of the observed variables is six. The extracted factors explained 70.54% of the total variance in the measured variables prior to rotation. The factor level variances explained after rotation were as follows: 16.37% for Factor I; 10.99% for Factor II; 12.83% for Factor III, 6.93% for Factor IV, 17.82% for Factor V, and 5.11% for Factor IV. In sum, the preliminary analysis was consistent with the previously obtained results when the scales were considered in isolation and supported the notion that the subscales identified in the two frameworks identify distinct latent variables.

Differences between course formats

In seeking to understand Means et. al (2009) conclusions regarding advantages of blended learning compared to online learning we queried as to whether students in blended courses and fully online courses differ with respect to perception of presence and SRL. The differences between blended and fully online students were examined by the means of six one-way analysis of covariance (ANCOVA) with course format (blended vs. fully online) as a fixed factor and the six constructs (i.e., Teaching Presence, Cognitive Presence, Social Presence, Goal Setting, Strategic Learning, and Help Seeking) as dependent variables in each separate analysis. Albeit limited, there is evidence of a dramatic change in learner attitudes toward various aspects of online learning from their first and second experiences (Arbaugh, 2004). To account for a possible confounding of amount of previous exposure to online learning, we included experience with online learning as a covariate in all six analyses. Experience with online learning was measured by a single item on a 5-point Likert type scale. The assumptions of ANCOVA (e.g., homogeneity of variance, linear relationships between dependent variables and covariates, and lack of interaction between factors and covariates) were met.

It was found that controlling for the effect of prior experience, course format contributes to differences in perceptions of Teaching Presence [$F(1,1889)=15.30$, $p<.001$)], Cognitive Presence, [$F(1, 1835)=7.89$, $p<.01$], and Social Presence [$F(1, 1846)=17.10$, $p<.001$]. More specifically, students in blended courses tended to provide higher ratings of Teaching Presence, Social Presence, and Cognitive Presence than their counterparts in fully online courses. Furthermore, with respect to SRL, results indicated that compared to their counterparts in fully online courses, students in blended courses reported engaging in help seeking behaviors at higher rates, $F(1, 11832) = 21.98$, $p<.001$. The effects of method of course delivery on Strategic Learning [$F(1, 1807) = 1.31$, $p>.05$] and Goal directed learning [$F(1, 1841) = 1.18$, $p>.05$] were not statistically significant.

SRL as a moderator within the CoI framework

We examined the strength of the relationships between Cognitive Presence and Teaching Presence, and Cognitive Presence and Social Presence differ as a function of SRL, controlling for course format and prior experience with online learning.Zero-order correlations between each pair of variables was computed separately for each course format. The CoI constructs showed small but statistically positive significant correlations with the total SRL scores, regardless of course format.The differences in the magnitude of the correlation coefficients between blended and fully online course format were tested by the means of Fisher's r-to-z transformations. The correlation between Cognitive Presence and SRL for blended students [$r(455)=.23$, $p<.001$] was statistically different from the correlation between the same two constructs for fully online students [$r(1260)=.34$, $p<.001$], $z = 2.38$, $p<.05$. SRL was more strongly related to cognitive presence for students in fully online courses. These results suggest that controlling for course format is warranted.

In addition, since perceptions of and attitudes towards online education are likely to change with incremental exposure to the previously unfamiliar mediums, we controlled for prior learner experience with online medium of instruction.

Insert Table 3 about here

In a series of regression analyses, we tested the interaction between Teaching Presence and SRL as well as between Social presence and SRL. The results are shown in Table 4. As expected, with no other variables in the regression equation, students with more experience with online education and students in blended courses scored higher on Cognitive Presence, $F(2, 1880) = 14.26$, $p<.001$, $R^2 =.02$ (Model 1). The differences in Teaching and Social Presence between the two course formats, however, accounted for the variation in Cognitive Presence, $F(4, 1768) = 1058.43$, $p<.001$, $R^2= .71$ (Model 2). Controlling for course format, experience, Teaching Presence, and Social presence, SRL remained a viable predictor of student Cognitive Presence, $F(5, 1643)=811.96$, $p<.001$, $R^2=.71$ (Model 3). Further moderation analyses (Model 5: $F(5, 1663)=548.10$, $p<.001$, $R^2= .62$ and Model 7: $F(5, 1664)= 448.85$, $R^2= .58$) indicated that the strength of the effects of Teaching and Social Presence on Cognitive Presence are not constant across different subgroups of learners as defined by their self-regulated leaning. Interestingly, learners in fully online environments rank cognitive presence higher when SRL is also higher compared to learners in blended classes. In addition, we conducted simple slope tests to determine whether there is a significant relationship with Cognitive Presence for each subset of interaction effects. The results revealed that there were significant relationships for those above and below the mean of SRL ($p<.001$). The interaction effects are illustrated in Figures 1

and 2. As shown, as Teaching presence (Figure 1) and Social presence (Figure 2) progressively increase, so does student Cognitive Presence for all subgroups of learners as defined by their SRL patterns. Also, better SRL is reflected in higher Cognitive Presence across different manifestations of Teaching and Social presence. In the context of high Teaching and Social Presence, however, learning does not appear to be dependent upon differences in self-regulatory behaviors. In other words, high teaching and social presence are necessarily associated with higher Cognitive Presence, despite of variations in SRL.

Insert Table 4 and Figures 1 and 2 about here

Discussion

By adopting the CoI model, we explored differences in student perceptions of presence and SRL in blended and fully online courses. In addition, the study examined the degree to which the links between CoI constructs (i.e., cognitive presence and teaching presence, and cognitive presence and social presence) vary as a result of differences in SRL.

The effect of course delivery format

The observation that blended course formats produce somewhat superior outcomes (Means et. al, 2009) may be explained by the higher quality of teaching, social, and cognitive dimensions of the community of inquiry present in such environments. The findings from this study are consistent with previous research (e.g., Akyol, Garrison & Ozden, 2009; Shea & Bidjerano, 2011), which has indicated that students in blended courses report higher levels of teaching, social, and cognitive presence compared to their counterparts in fully online courses. This is an important finding suggesting that the face-to-face components contribute to the

salience of instructional, social, and cognitive dimensions of blended courses, creating a more effective community of inquiry. As argued by Akyol and colleagues (2009), blended course formats offer distinct advantages as they require less time to develop group cohesion, facilitate the attainment of higher levels of inquiry, and as a result of the availability of multiple forms of communication contribute to a greater satisfaction among students. Future research is needed to better understand this phenomenon and to provide guidance as to how fully online environments may be better designed to replicate the superior sense of presence reported in blended courses.

Differences in aspects of student SRL were noted as well. While students in both environments are equally volitional, strategic, and goal directed, students in blended courses tend to report greater inclination to seek help and assistance from peers and faculty. In other words, help seeking behavior appears more prevalent when students are afforded opportunities for face-to-face interaction. Help seeking behavior is a viable behavioral and strategic component of SRL as evidenced by studies conducted in the traditional face-to-face classroom environment (Pintrich et al., 1993). Our findings reinforce the notion and help seeking behaviors should be considered as equally important in other non-conventional course delivery formats.

These findings have important implications for practice and research. Future research should attempt to address and explain the differences in learners' perceptions; that is, the concrete features of the blended environments that prompt such perceptions, attitudes and feelings should become a central focus of such research. If learners in blended environments feel that help seeking is easier, more comfortable, or simply more convenient than in fully online courses, instructional designers should begin to explore alternative course design structures that may facilitate and encourage the use of this strategy.

SRL as a moderator

In addition to delineating differences in perceptions of presence and SRL, the current investigation offers insight into the complexity of the person-environment interactions within both fully online and blended learning environments. Such interactions are presumably ubiquitous (Snow, 1989); nevertheless, seldom have they been within the scope of empirical research of distance education. McManus's (2000) work, which has shown that the learning outcomes associated with mode of presentation of information depend upon student level of self-regulatory skills, represents a fine exception. Moreover, of the studies that have looked at the relationship between presences and dimensions of SRL (e.g., Shea & Bidjerano, 2010; Akyol & Garrison, 2011), the focus has been on describing or identifying the incremental value of the latter in explaining perceptions of cognitive gains and learning outcomes. Previous research has overlooked the possibility that rather than being an explanatory variable, learners' self-regulation can be treated as a modifying mechanism.

We identified SRL as an important moderator of the association between student rankings of the quality of teaching, social and cognitive presence. If teaching presence is sufficiently manifest, cognitive presence measures are high, regardless of self-regulatory traits. However, in the absence of satisfactory teaching presence, measures of significant learning reflected in the cognitive presence factor are contingent upon student ability to self-regulate their learning. In this sense, it can be assumed that SRL could be potentially evoked in certain situations to compensate for a lack of adequate teaching presence in both fully online and blended courses.

It is interesting to note also that the same pattern was uncovered with regards to the link between social presence and cognitive presence conditional upon SRL. Having above average academic self-regulation may bring about the same cognitive benefits as having deficiencies in terms of self-regulation as long as the online or blended learning environment afford ample

opportunities for students to communicate comfortably via the online medium and feel connected and socially supported by their peers and instructors. In other words, under conditions of high social presence, the cognitive benefits for varying degrees of self-regulation are virtually the same. This is an important finding and one which warrants additional articulation regarding the nature of social presence and why it would likely correlate with better cognitive presence.

Recall that social presence reflects students comfort with interacting in the online medium and rankings of the ability to interact effectively online. This includes learner rankings of their ability to get to know others, form distinct impressions of classmates, participate in web-based communication and interact comfortably (including comfort with disagreeing), as well as feeling acknowledged by others through these interactions. If we consider recent models of learning that focus on the importance of learner interaction we may better understand why social presence is closely associated with significant metrics of learning reflected in the cognitive presence construct. In their meta-analytic review of interaction types for example, Bernard and his colleagues (2009) found that interaction was the most important variable distinguishing the effectiveness of online instruction relative to classroom instruction. Zhao and his colleagues (2005) came to similar conclusions in attempting to understand when online learning makes a difference in learning effectiveness. In attempting to explain the power of interaction Chi (2009) posited a model in which learning activity types are classified in an increasingly powerful hierarchy from passive to active to constructive, and finally to interactive. Given that social presence is a proxy measure for online student interaction, and given that so much recent research highlights the importance of such interaction it is less surprising to find that social presence correlates strongly with cognitive presence.

Chi (2009) explains that interaction involves co-construction of knowledge and enhances understanding by allowing learners to do things like build upon each other's contributions, defend and argue positions, challenge and criticize each other on the same concepts or points, and ask and answer each other's questions. Chi argues that such interaction is constructive in nature because learners are generating knowledge that goes beyond the information that would typically be provided in learning materials. The cognitive benefits of such interaction include that a partner's contributions can provide additional information, new perspectives, corrective feedback, reminders, or a new line of reasoning which can enhance learning through added guidance, hints, and or scaffolds that either enrich knowledge or support additional inferencing.

The social presence construct is foundational for online interaction. When students rank social presence as low, they are indicating that they were unable to interact effectively online. In the absence of interaction, a powerful activity supporting joint knowledge construction, it is not surprising that learners report more limited cognitive presence. We suggest here that ability to engage in SRL is even more important to the attainment of cognitive presence when both blended and fully online learning environments are perceived as mediums *not* conducive to such interaction. These results suggest that learners need to compensate in the absence of effective interaction through better self regulation to activate other means of learning. We conclude that social cognitive models of online learner self-regulation are therefore compatible with and better reflect the dynamics of learning environments in which the element of face-to-face interaction are removed. Additional research that investigates the hypothesis that social presence is the CoI's proxy measure for interaction, and that such interaction functions according to Chi's taxonomy is warranted.

In view of the small effect sizes found, however, one should be cautious to infer that in environments where teaching presence and social presence are entirely absent, learners can acquire cognitive presence by themselves. Teaching presence and social presence remain key predictors of learners' ability to attain cognitive presence. Still, we should be cognizant of the fact that the degree to which the latter are achievable is conditional upon prior individual difference characteristics. Our findings may have particularly relevant implications for online admission policies. Given the expected variability in teaching quality in such online programs as well as anticipated sense of social disconnect for some students, selection criteria for entry in such programs should be extended to assess that the candidates have attained the prerequisite levels of self-regulatory maturity.

This investigation opens a window for new lines of inquiry of the underlying processes within the online classroom. Nevertheless, our findings should be interpreted as preliminary and with certain limitations kept in mind. First, our sample consisted of predominantly female community college students. Earlier research has indicated that there are both qualitative and quantitative differences in SRL between male and female students (Andrade & Boulay, 2001; Bidjerano, 2005; Yukselturk & Bulut, 2009). Such possible gender effects should further be taken into account in attempts for replication with more diverse samples of participants. Second, aspects of SRL such as self-efficacy and goal setting have been found to be context and task specific (Pajares, 1996). Future work should address whether contextual variables such as type of course, content area, course duration, delivery platform, to name a few, are important in the development of community of inquiry (Akyol et al, 2009). Last but not least, this study gathered data through student self-report. The study of SRL within online and blended learning environment could benefit tremendously from the implementation of new more qualitatively

oriented research paradigms that go beyond the reliance on traditional survey instruments (Zimmerman, 2008).

In conclusion, this investigation sets the stage for deeper exploration of the complex relationships within a variety of learning environments that would allow the advancement of more ecologically valid conceptual models. Theoretical models integrating learners' characteristics as a modifying variable may prove to be more fully articulated descriptions of the dynamics within both blended and fully online environments. In the predominantly asynchronous format, now in common use in higher education, the capacity to self-regulate is quite likely an important contributor to successful online education. The findings from this study underscore the importance of quality of teaching presence and social presence, but also the fact that rankings of cognitive gains are likely to depend on the characteristics the learner bring to the learning environment when quality of teaching or the quality of social interaction are low or inadequate. We conclude that online learner self regulation, a concept we label "learning presence", reflects these important characteristics.

Table 1: *Results from Exploratory Factor Analysis (Principal Axis Factoring) with Oblimin rotations on the CoI instrument*

Item	Factor			h^2
	1	2	3	
The instructor communicated course topics	*.85*	-.03	-.02	.72
The instructor communicated course goals	*.81*	-.01	-.03	.68
The instructor provided clear instructions	*.83*	.07	.08	.66
The instructor communicated due dates	*.72*	.03	.02	.52
The instructor helped students learn	*.91*	-.03	-.01	.80
The instructor helped students clarify their thinking	*.94*	-.00	.02	.85
The instructor kept students engaged & participating	*.89*	.08	.07	.79
The instructor kept students on task	*.92*	.04	.04	.83
The instructor encouraged students to explore new ideas	*.80*	.04	-.04	.74
The instructor established a sense of course community	*.85*	.13	.07	.78
The instructor helped focus discussion on issues that aided student learning	*.74*	-.08	-.16	.67
The instructor gave feedback that helped students	*.78*	-.08	-.16	.74
The instructor provided feedback in a timely fashion	*.84*	-.07	-.12	.78
Getting to know others gave students a sense of belonging in the course	.15	*.50*	-.14	.51
Students formed distinct impressions of course participants	.09	*.49*	-.16	.47
Students found online or web-based communication an excellent medium for social interaction	.06	*.61*	-.05	.48
Students felt comfortable conversing online	.00	*.80*	-.01	.64
Students felt comfortable participating in discussions	.01	*.83*	-.02	.73
Students felt comfortable interacting with course participants	-.02	*.94*	.08	.76
Students felt comfortable disagreeing with others	-.03	*.82*	-.00	.66
Students felt their points of view were acknowledged by others	.00	*.79*	-.05	.68
Online discussions helped students develop a sense of collaboration	.03	*.83*	-.01	.72
Problems posed increased interest in course issues	-.04	.12	*-.69*	.57
Course activities piqued curiosity	.02	-.01	*-.84*	.72
Students felt motivated to explore content related topics	.01	.00	*-.85*	.74
Students utilized a variety of resources during the course	-.04	.03	*-.73*	.53
Students brainstormed & found relevant information to aid them in resolving questions	-.02	.07	*-.75*	.62
Online discussions helped students appreciate different perspectives	.01	*.42*	-.39	.59
Combining new information helped students answer questions	.03	.08	*-.77*	.72
Learning activities helped students create solutions	.11	.01	*-.77*	.74
Reflection on course content & discussions helped students understand fundamental concepts	.10	.04	*-.76*	.75
Students can describe ways to test & apply their new knowledge	.04	-.06	*-.86*	.71
Students developed solutions to course problems that can be applied in practice	-.01	-.02	*-.86*	.71
Students can apply knowledge created in their courses to work or other non-class related activities	.03	-.02	*-.81*	.67
% of variance	56.42	8.10	3.81	
Cronbach Alpha	.97	.93	.96	

Note. Factor I: Teaching Presence; Factor II: Social Presence; Factor III: Cognitive Presence.Coefficients greater than |.40| are italicized. Percent of explained variance after rotation

is given. The eigenvalue of the fourth, unretained factor was 1.03. h^2 is the communality coefficient.

Table 2: *Results from Exploratory Factor Analysis (Principal Axis Factoring) with Oblimin rotations on the Online Self-regulated learning Questionnaire (OSRL)*

Item	Factor			h^2
	I	II	III	
I set standards for my assignments in online courses.	*.82*	-.03	.01	.64
I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	*.80*	-.00	-.04	.68
I keep a high standard for my learning in my online courses.	*.92*	-.00	.05	.78
I set goals to help me manage studying time for my online courses.	*.81*	.01	-.12	.81
I don't compromise the quality of my work because it is online.	*.73*	-.00	-.02	.56
I find a comfortable place to study for my online course.	*.81*	.05	-.05	.74
I know where I can study most efficiently for online courses.	*.88*	.07	.04	.76
I choose a time with few distractions for studying for my online courses.	*.77*	.08	-.06	.72
I am persistent in getting help from my online instructor when I need it.	*.42*	.18	-.23	.50
I take thorough notes for my online courses.	.10	.06	-*.62*	.54
I read aloud instructional materials posted online to fight against distractions.	-.10	.25	-*.43*	.30
I prepare my questions before joining in online discussion.	.16	.01	-*.61*	.54
I work extra problems or do additional readings in my online courses beyond the assigned ones to master the course content.	-.11	.05	-*.81*	.58
I allocate extra studying time for my online courses because I know it is time-demanding.	.01	-.08	-*.87*	.70
I try to schedule time every day or every week to study for my online courses, and I observe the schedule.	.31	-.07	-*.61*	.70
Although we don't have to attend daily classes I try to distribute my studying consistently across days in a way that gives me enough time to be successful in my online classes.	.35	-.09	-*.58*	.69
I reflect on my learning in online courses to examine my understanding of what I have learned.	.30	.14	-*.48*	.67
I ask myself a lot of questions about the course material when studying for an online course.	.13	.13	-*.59*	.60
I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	.10	*.61*	-.11	.53
I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.	.07	*.73*	-.05	.62
If needed, I try to meet my classmates face-to-face.	-.06	*.78*	.06	.53
I interact with my classmates to help me understand how I am doing in my online classes.	.10	*.76*	-.02	.65
% of variance	51.97	8.50	2.89	
Cronbach Alpha	.91	.84	.91	

Note. Factor I: Goal Setting; Factor II: Help Seeking; Factor III: Strategic Learning. Coefficients greater than |.40| are italicized. Percent of explained variance after rotation is given. The eigenvalue of the fourth, unretained factor was .78. h^2 is the communality coefficient.

Table 3.*Correlation Matrix.*

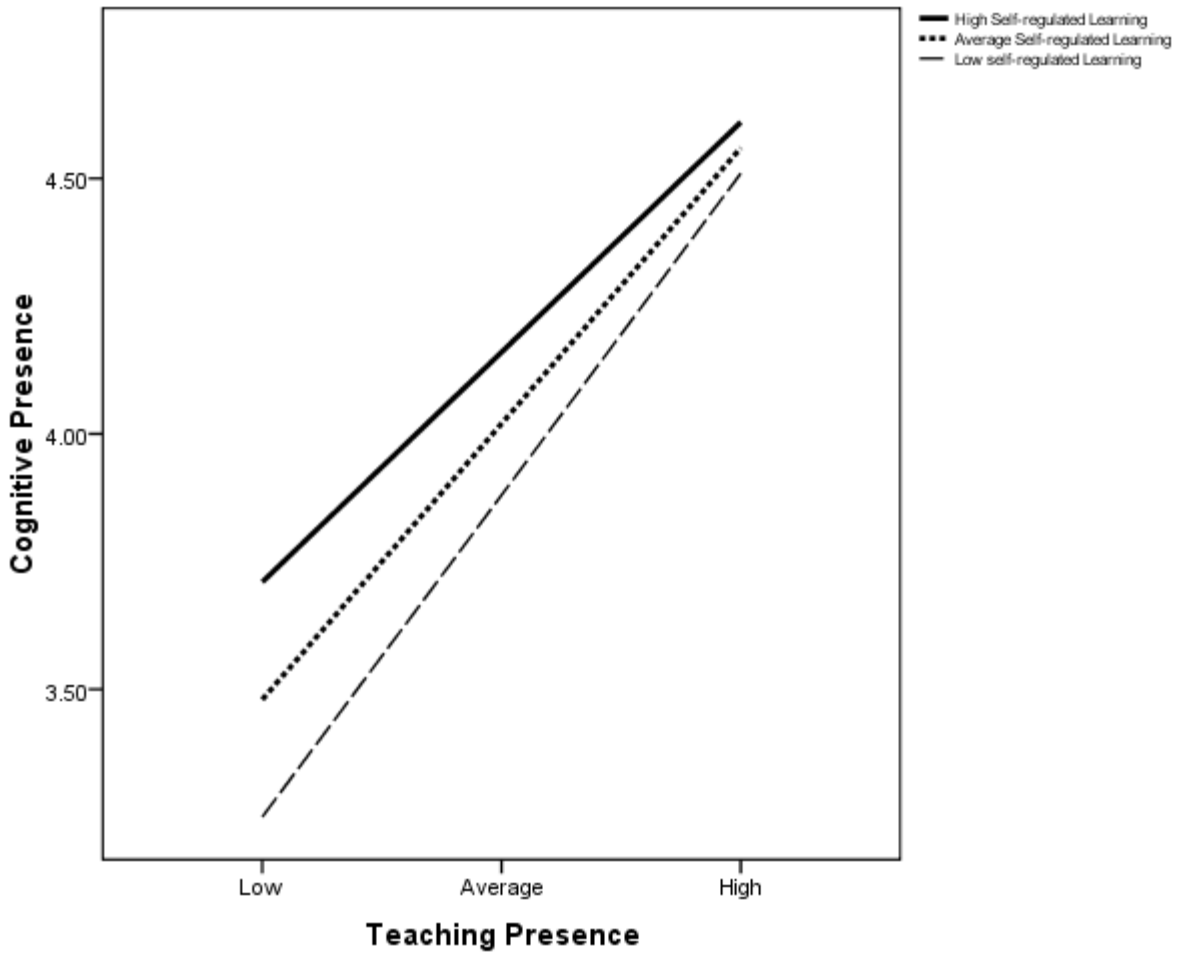
Variable	Teaching Presence	Cognitive presence	Social Presence	Self-regulated Learning
Teaching Presence	---	.72**[*]	.60**	.13*
Cognitive Presence	.76**	----	.77**	.23**
Social Presence	.61**	.74**	----	.23**
Self-Regulated Learning	.22**	.36**	.31**	----

Note. The correlations for the sample of students in blended courses are given above the diagonal; *p<.01, **p<.001

Table 4.*Multiple Linear Regression Models of the Relationship between Cognitive Presence and Teaching Presence as a function of Self-regulated Learning*

Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Intercept	4.18*	.57*	.42*	.87*	-.97*	1.04*	.37*
Course Format	-.15*	.00	.00	-.01	.00	-.05	-.04
Prior Experience	.05*	.01	.01	.03*	.02*	.00	-.02
Teaching Presence		.41*	.41*	.63*	1.05**		
Social Presence		.44*	.41*			.70*	.85*
Self- Regulated Learning			.07*	.15*	.68*	.10*	.29*
Teaching Presence x Self-Regulated Learning					-.12*		
Social Presence x Self-Regulated Learning							-.05*
Model R^2	.02	.71	.71	.61	.62	.57	.58

Note. * p <.001.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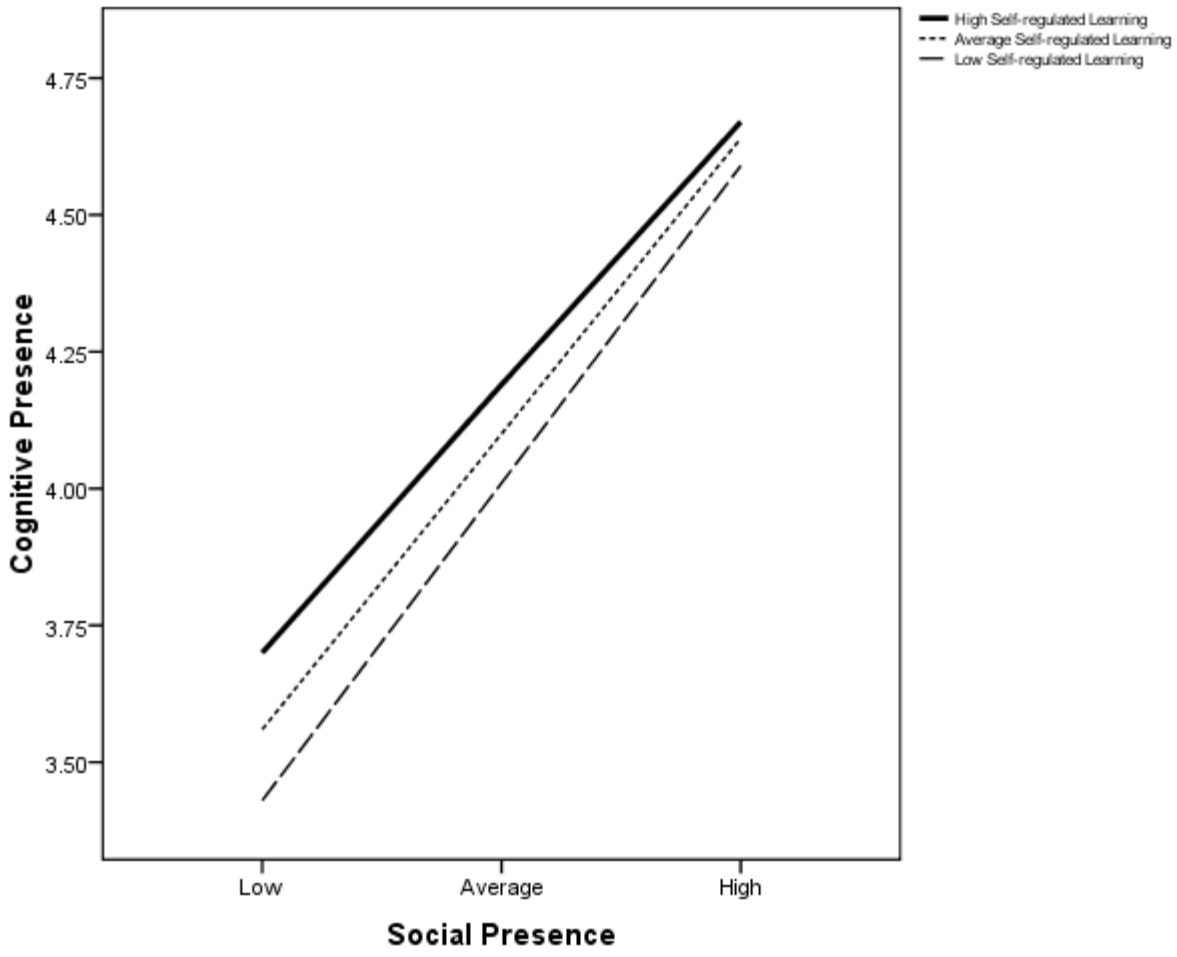
Average Self-regulated Learning
Low self-regulated Learning
4.50
4.00
3.50
Cognitive Presence
Low
Average
High
Teaching Presence


High Self-regulated Learning
Average Self-regulated Learning
Low Self-regulated Learning
4.75
4.50
4.25
4.00
3.75
3.50
Cognitive Presence
Low
Average
High
Social Presence

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