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Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments

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ABSTRACT

In this paper we examine the Community of Inquiry framework (Garrison, Anderson, & Archer, 2000) suggesting that the model may be enhanced through a fuller articulation of the roles of online learners. We present the results of a study of 3165 students in online and hybrid courses from 42 two- and four-year institutions in which we examine the relationship between learner self-efficacy measures and their ratings of the quality of their learning in virtual environments. We conclude that a positive relationship exists between elements of the CoI framework and between elements of a nascent theoretical construct that we label "learning presence". We suggest that learning presence represents elements such as self-efficacy as well as other cognitive, behavioral, and motivational constructs supportive of *online learner self-regulation*. We suggest that this focused analysis on the active roles of online learners may contribute to a more thorough account of knowledge construction in technology-mediated environments expanding the descriptive and explanatory power of the Community of Inquiry framework. Learning presence: Towards a Theory of Self-efficacy, Self-regulation, and the Development of a Communities of Inquiry in Online and Blended Learning Environments.

1. Introduction

Online education continues to grow and is playing and increasingly significant role in US higher education. Recent research indicates that more 4 million higher education learners, i.e. 25% of all college students, are enrolled in at least one online course (Allen & Seaman, 2010) This represents an increase of more than 100% from just four years ago. In addition to this rapid growth, research is beginning to emerge indicating that online education has transcended the "no significant difference" phenomena. For more than a decade the accepted wisdom has been that online education and its predecessor, "distance learning" resulted in no significant difference relative to learning outcomes achieved through classroom instruction. Reviews of the literature comparing distance education and classroom learning concluded overall the two forms were equivalent. In 2005 however, Zhao et al.'s investigated the "heterogeneity" of empirical results and began to identify the conditions under which distance and online education resulted in better outcomes (Zhao, Lei, Yan, Lai, & Tan, 2005). Perhaps the most interesting of these conditions was "publication year" with an increasing number of studies after 1998 revealing advantages for the online format. Zhao et al. concluded that this finding suggested that the two-way interaction allowed by Internet-based online applications of distance learning provided advantages that previous technological affordances had not. Zhao et al. also concluded that studies in which instructor interaction with students was medium to high resulted in better learning outcomes for online students relative to classroom learners.

These results were confirmed in 2009 by Means et al.'s in a comprehensive meta-analysis of the online education empirical literature. These researchers conducted an exhaustive search and identified 1132 studies that compared online and face-to-face conditions, and filtered through these to locate the most rigorous studies employing experimental and quasi-experimental research designs (Means, Toyama,

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Murphy, Bakia, & Jones, 2009). Applying these criteria the authors conducted an analysis of the 56 most rigorous studies of online education that they identified. Findings indicated that learners in online settings significantly outperformed their peers in traditional classrooms and provided added insights into the conditions under which this online learning advantage holds true. While the main findings of Means et al. were that blended applications in which online and face-to-face learning were combined resulted in the largest benefits, details regarding specific pedagogies that accounted for advantages of blended learning were not described. Simply combining online and face-to-face instruction is clearly not a recipe for consistently improving the performance of students in higher education. However, within the Means et al. study was a much more actionable finding. Reviewing studies that investigated elements of online learner self-regulation (e.g., Bixler 2008; Chang, 2007; Chung, Chung, & Severance, 1999; Cook, Dupras, Thompson, &. Pankratz, 2005; Crippen & Earl, 2007; Nelson, 2007; Saito & Miwa, 2007; Shen, Lee, & Tsai, 2007; Wang, Wang, Wang, & Huang, 2006) the authors concluded that all the studies converged on advantageous outcomes for providing support for "metacognitive" learning strategies including self-reflection, self-explanation, and self-monitoring. These positive findings for online learner self-regulation represent fertile ground for the development of a comprehensive explanatory model for understanding the potential benefits of online instruction, a task to which we now turn.

2. Review of literature

2.1. Communities of inquiry

A powerful perspective informing an explanatory model of technology-mediated instruction is discussed by Larreamendy-Joerns and Leinhardt (2006) and referred to as "epistemic-engagement", i.e. learner commitment to active group knowledge building. In this view the potential for online learning reflects processes of participatory practice, with designs that gradually assist learners to develop the language and skills of a disciplinary discourse community. In much the same way that historians, sociologists, and physicists must learn the language and conventions of their various intellectual enterprises, learners participating in an epistemic engagement model are inducted into the traditions of their area of study, appropriating its language and conventions through group investigation of the important questions and themes of the discipline. In this conception, online environments support knowledge construction through social interaction and negotiation of meaning largely through asynchronous communication. This dialogic pedagogical approach reflects a social constructivist epistemology (Vygotsky, 1978) in which text-based interaction serves as the means for collaborative knowledge construction. While research in this area is promising (e.g., Arbaugh, 2007; Correia & Davis, 2008; Liu, Magjuka, Bonk, & Lee, 2007; Moore, 2008; Wise, Duffy, & Padmanabhan, 2008) Larreamendy-Joerns and Leinhardt warn us that networked interaction per se is insufficient to the development of a community of active, self-regulated, and reflective learners. This is an important caveat, which has been addressed in the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000; Garrison, Anderson, & Archer, 2001), a model devoted specifically to the goal of supporting epistemic engagement.

Accommodating Larreamendy-Joerns and Leinhardt's (2006) caution about the insufficiency of interaction to promote the development of online learning communities, the CoI framework attempts to articulate the social, technological, and pedagogical processes that engender collaborative knowledge construction. It therefore represents an effort to resolve the greatest challenge to the quality of online education raised by Larreamendy-Joerns and Leinhardt in the epistemic engagement approach, dialogic pedagogy: "… successfully orchestrating a dialogue demands fairly sophisticated skills. Conversational contributions need to be simultaneously parsed according to their disciplinary value, their location within the chain of collective argumentation, their relevance to the instructional goals, and their role as indicators of the student's ongoing understanding. The outcome of this complex appraisal is a sense of the amount and quality of the guidance that specific contributions and the conversation as a whole require to support learning." (Larreamendy-Joerns & Leinhardt, p. 591)

The CoI Framework focuses on the intentional development of an online learning community with an emphasis on the processes of instructional conversations that are likely to lead to epistemic engagement. The model articulates the behaviors and processes required to nurture knowledge construction through the cultivation of various forms of "presence", among which are teaching-, social-, and cognitive presence (Garrison et al., 2001). The model outlines conceptual elements essential to successful knowledge construction in collaborative online environments. The framework theorizes online knowledge building as a result of collaborative work among active participants in learning communities characterized by instructional orchestration appropriate to the online environments (*teaching presence*) and a supportive collegial online setting (*social presence*). The teaching presence construct outlines task sets such as organization, design, discourse facilitation, and direct instruction (Anderson, Rourke, Garrison, & Archer, 2001) and articulates the specific behaviors likely to result in a productive community of inquiry (e.g., Shea, Li, Swan, & Pickett, 2005). Social presence highlights online discourse that promotes positive affect, interaction, and cohesion (Rourke, Anderson, Garrison, & Archer, 1999) that support a functional 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 "epistemic" or knowledge construction features of Larreamendy-Joerns and Leinhardt's model with teaching presence serving the over-arching instructional function and social presence supporting productive and participatory "engagement". These relationships within the model are described in more detail below.

Past factor analytic research has indicated that the model represents a coherent conceptual structure (Arbaugh, 2007; Ice et al., 2007; Shea & Bidjerano, 2008), components of which correlates with student satisfaction and learning (Shea et al., 2005; Swan & Shih, 2005). Hypothesized relationships within this conceptual structure have also been analyzed. For example, Shea and Bidjerano (2008) developed a structural equation model based on data gathered from more than 5000 online learners confirming that variance in student judgments of their own cognitive presence can be modeled from their ratings of instructor teaching presence mediated by their assessment of social presence in their online courses. Garrison, Cleveland-Innes, and Fung (2010) replicated these findings. This line of research indicated that the multivariate measure of learning represented by the cognitive presence factor could be predicted by the quality of teaching presence and social presence reported by learners in online courses. The relationship between these constructs is illustrated in Fig. 1 below.

Additional work on the CoI model (Shea, Vickers, & Hayes, 2010) suggested that past research methods may have resulted in a systematic under representation of the instructional effort involved in online education. Using quantitative content analysis these authors examined

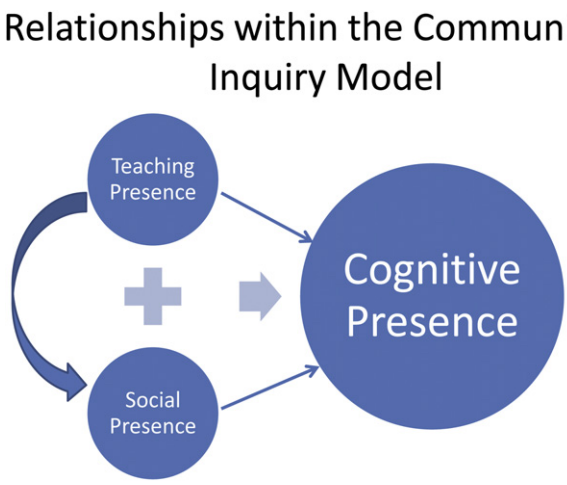

Fig. 1. Relationships between teaching, social, and cognitive presence.

course documents within and external to threaded discussion areas and concluded that the majority of teaching presence in two undergraduate online business courses occurred outside of threaded discussion areas that are not included in past investigations of the teaching presence construct (e.g., Akyol & Garrison, 2008; Anderson et al., 2001; Bliss & Lawrence, 2009; Coll, Engel, & Bustos, 2009; Pawan, Paulus, Yalcin, & Chang, 2003). This ongoing project to document all instances of teaching, social, and cognitive presence in complete online courses also resulted in identification of learner discourse that did not fit within the model, i.e. could not be reliably coded as indicators of teaching, social, or cognitive presence (Shea, 2010; Shea, Vickers, & Uzuner, 2010).

2.2. Self regulated learning

These exceptions represent interesting data for refining and enhancing the model as they suggest that learners are attempting to accomplish goals that are not accounted for within the CoI framework. This research concluded that the learners under investigation engaged in discourse on course logistics including collaborative attempts to understand instructions provided to them by the course professor. Learner discussions also included efforts to divide up tasks, manage time, and set goals in order to successfully complete group projects. As such they appeared to be indicators of *online learner self and co-regulation*, which can be viewed as the degree to which students in collaborative online educational environments are metacognitively, motivationally, and behaviorally active participants in the learning process (Winters & Azevedo, 2005). Research on self-regulated learning indicates that," it is viewed as especially important during personally directed forms of learning, such as discovery learning, self-selected reading, or seeking information from electronic sources, (but is) also deemed important in social forms of learning." (Zimmerman, 2008). Given the electronic, social, and "self-directed" nature of online learning, it seems imperative that we examine learner self- and co-regulation in online environments especially as they relate to desired outcomes such as higher levels of cognitive presence as described in the CoI framework. Accomplishing this goal requires that we examine a wide variety of issues including metacognitive, motivational, and behavioral traits and activities that are under the control of successful online learners. We suggest that this constellation of behaviors and traits may be seen as elements of a larger construct "learning presence" (Shea, 2010).

2.3. Self-efficacy

We argue here that the CoI framework represents the most concise descriptive model for understanding higher education online learning within an epistemic engagement pedagogical approach. We also recognize that there are limits to the model and that one area that might be open to improvement is the concept of the learner role. We suggest that the literature on learner self-regulation provides a strong foundation for articulating the roles of online learners. Central to any discussion of learner self-regulation is the concept of self-efficacy which emphasizes the interface between learner motivation and cognition. In brief, self-efficacy can be viewed as a subjective judgment of one's level of competence in executing certain behaviors or achieving certain outcomes in the future. Self-efficacy has been identified as the best predictor of college GPA and among the best predictors of college persistence through meta-analytic research (Robbins et al., 2004). Further, commenting on the state of the art in self-regulated learning research Winne suggested that self-regulation is contingent on positive self-efficacy beliefs, arguing that "learners must subscribe to a system of epistemological and motivational beliefs that classifies failure as an occasion to be informed, a condition that is controllable, and a stimulus to spend effort to achieve better" (Winne, 2005). This contrast of failure attribution as trait (e.g., "I'm just not good at math") versus failure as occasion to be informed ("I can control, adapt, and learn from this") is a classic view of maladaptive and adaptive self-efficacy beliefs.

Our current study is founded on a socio-cognitive perspective (Bandura, 1986) and thus follows the socio-cognitive motivational model outlined by Zimmernan and Schunk (2001) in which self-efficacy beliefs motivate learner choice to initiate and persist with self-regulation (pp. 17–20). In the current study we therefore examine the relationship between CoI constructs and elements of self efficacy in order to begin to investigate the larger theme of collaborative online learner regulation and learning presence.

The construct of self-efficacy has a relatively long history. Our understanding of self-efficacy has been framed by Bandura's social cognitive theory, in which self-efficacy has been broadly defined as individual's beliefs about their own agency or judgment of one's

"capabilities to organize and execute courses of action required to attain designated types of performance" (Bandura, 1986, p. 391). In his influential theory, Bandura identified two types of determinants of behavior, namely, *outcome expectations*, construed as beliefs about the likelihood of achieving successful outcomes and personal *efficacy expectations*, that is, beliefs about being capable of executing certain actions or behaviors. It has been argued that the latter is more potent in predicting whether learning or achievement in a particular domain could occur. Thus, self-efficacy is "concerned not with what one has but with belief in what one can do with whatever resources one can muster" (Bandura, 2007, p. 6).

According to Bandura (1986, 1997, 2007) self-efficacy is a subjective judgment of one's level of competence in executing certain behaviors or achieving certain outcomes in the future; as such they are not necessarily an accurate assessment of one's actual level of competence. Efficacy thus entails a degree of self-analysis and reflection. Learners must analyze and reflect not only on the complexity of a specific learning task, but they also are expected to make judgments about the degree to which their capability match the demands of a specific learning task as well as make self-appraisal of how successful they could be in meeting those demands. Self-efficacy beliefs about executing a particular behavior cannot be equated with ability for executing it (Bandura, 2007); thus, self-efficacy is perceived operative capability – beliefs about what one can do, rather what one has (Bandura, 2007). In this sense, self-efficacy refers to the strength of conviction of possessing the ability (having the capability) of influencing an outcome and executing the behaviors leading to a particular outcome. Self-efficacy beliefs are not always calibrated with one's actual ability (Bandura, 2007); they may overestimate or underestimate one's capability. Bandura has noted that slightly elevated efficacy can have a bigger impact on subsequent performance. Overestimating one's capabilities to produce a behavior and outcome may boost performance and give rise to motivation to persist in face of obstacles and seatback, while the opposite is true for underestimating one's capabilities, which may suppress productive goals, persistence and effort (Bandura, 2007). Thus there is an important connection between self-efficacy, effort, and subsequent performance.

It has been argued that self-efficacy beliefs are shaped by interpretation and reflection of previous experiences of successes and failures in a specific domain as well as by vicarious experiences – social comparison and interpretation of the experiences of others who have been successful or unsuccessful in performing similar tasks (Bandura, 1997). Social persuasion in terms of feedback from others represents another important source of self-efficacy information (Bandura, 1997; Schunk, 1991). Self-efficacy develops also out of interpretation of psychological and emotional states. Positive psychological and emotional states in the aftermath of successful execution of certain academic behaviors naturally lead to sense of competence and subsequently results in enhanced sense of efficacy. Negative states, such as stress and anxiety eventuate, on the other hand, in loss of sense of control, and diminished self-efficacy beliefs. Much research has indicated that self-efficacy beliefs are open to change through reflection on past experience, social comparison, and social persuasion. The capacity to shape self-efficacy in positive ways is crucial given the connection between self-efficacy beliefs, effort and performance. We suggest here that elements within the CoI framework may serve as mechanisms for supporting self-efficacy. Specifically we conjecture that effective teaching presence and positive social presence should serve as sources of social persuasion and positive affect supportive of self-efficacy.

Compelling evidence suggests that student self-efficacy is a powerful construct that may explain differences in student learning and academic achievement. Several studies in the context of the traditional classroom have found that self-efficacy is linked to indices of achievement (e.g., Pajares, 1996; Pajares & Graham, 1999; Pajares & Kranzler, 1995; Pajares & Valiante, 2001; Wigfield & Eccles, 1992; Zimmerman & Kitsantas, 2005). In these studies, self-efficacy was examined in conjunction with other factors such as general mental ability (aptitude), prior performance, self-regulation and gender in their joint contribution to subsequence achievement and performance in content areas. The mediating role of self-efficacy has been emphasized. Across the content areas of mathematics, reading and writing, content specific self-efficacy has been found to explain variance in the relationship between prior ability (aptitude) and performance.

Additional line of evidence points to a positive relationship between self-efficacy and various motivational constructs (Wigfield & Eccles, 1992). Student self-efficacy has been linked to self-regulation and use of more effective learning strategies (Bandura, 1993; Pintrich & DeGroot, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992; Zimmerman & Martinez-Pons, 1990). Students with higher self-efficacy not only set higher, more productive mastery goals (Walker & Greene, 2009), but they also choose to engage in more challenging tasks (Bandura, 1993; Bandura & Schunk, 1981). Self-efficacy beliefs have a direct bearing on occupational aspirations and career goals even more so than actual achievement in subject areas related to their future goals (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). The link between self-efficacy and anxiety is often inverse (Pajares, 1996; Pajares & Kranzler, 1995; Pajares & Valiante, 2001). Moreover, effort regulation, persistence and self-efficacy are intimately connected (Bandura & Schunk, 1981; Schunk, 1982, 1983). Bandura (1997), for example, argued that self-efficacy beliefs, mediated by emotional states, predict how much effort an individual would invest in a particular task, his/her persistence in the light of obstacles and failure, and his/her resourcefulness in dealing with unfavorable consequences (Bandura, 1997). These and other studies have suggested that self-efficacy has a substantial role in predicting student engagement, motivation and performance (Bong, 2004; Caraway, Tucker, Reinke, & Hall, 2003; Chemers, Hu, & Garcia, 2001; Choi, 2005; Smith, Sinclair, & Chapman, 2001; Vrugt, Oort, & Zeeberg, 2002). Because self-efficacy is essential to describing and explaining active and successful learners, we posit that this construct is crucial to the development of a theoretical framework for online education where, in the absence of conventional classroom structure, learner agency may be even more important. We posit a positive relationship between effective teaching presence, supportive social presence, better self-efficacy and thus better ratings of cognitive presence.

2.4. Hypotheses

Consistent with theory and previous research, we posited that both teaching presence and social presence would affect student ratings of cognitive presence. In line with the self-efficacy research, we anticipated that student self-efficacy would predict effort regulation, which in turn would be reflected in more favorable perceptions of cognitive presence. We also suggest that teaching and social presence can have an effect on self-efficacy. We believe that self-efficacy may act as a partial mediator of the links between teaching presence, social presence and cognitive presence, explaining, in part, the relationship between the CoI constructs.

In addition to the hypotheses listed above, we queried as to whether medium of instruction (blended vs. fully online) moderates the relationship between self-efficacy, effort, and CoI constructs.

Table 1
Correlation among the study variables ($N = 2418$).

	(1)	(2)	(3)	(4)	(5)
(1) Effort regulation	–	.60**	.29**	.41**	.26**
(2) Self-efficacy	.55**	–	.43**	.57**	.49**
(3) Social Presence	.27**	.41**	–	.78**	.69**
(4) Cognitive Presence	.34**	.54**	.75**	–	.79**
(5) Teaching Presence	.19**	.44**	.67**	.79**	–

Note. The correlations for the online courses are given below the diagonal line.

2.5. Participants

The participants in the study were a random sample of 3165 students from 42 two- and four-year institutions in New York State. A large number of the initial participants failed to complete items beyond demographic data or chose not to answer a majority of items and subsequently had to be removed from the sample. The majority of the participants (78%) were female students. While all age groups were represented in the sample, the majority of the participants (45%) were between 18 and 25 years of age. Approximately half of the participants (49%) were full time students. Full time employment status was reported by 39% of the participants with the rest being either employed part time (31%) or unemployed (26%). The sample consisted predominantly of students with limited online learning experience as only one-fifth (22%) indicated that they had taken more than 5 online courses. Except for a small fraction of students (3%), all students intended to complete a college degree or a certificate program.

2.6. Instruments

2.6.1. Community of inquiry (CoI)

The CoI instrument, (Arbaugh et al., 2008; Shea & Bidjerano, 2008; Swan et al., 2008) was used to assess students' perceptions of the quality of their online learning experiences. The instrument consisted of 34 items, responses to which were provided on a 5-point Likert type scale ranging from 1-Strongly Disagree to 5-Strongly Agree. Previous studies (e.g., Garrison et al., 2010; Shea & Bidjerano, 2008), aimed at validating the measure, have found that the variance among the items is best explained by three overarching traits, that is, teaching presence, cognitive presence, and social presence. The number of items comprising each factor are 13 (for teaching presence), 12 (for cognitive presence), and 9 (for social presence). The Chronbach's Alphas of the three subscales, based on the current sample were .95, .92, and .93, respectively. Sample items from the CoI instrument are included in the appendix. Items are grouped by theoretical construct here, but were randomized to avoid a response set in the actual survey.

2.6.2. Self-efficacy and effort regulation

The self-efficacy and effort regulation scales from the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1993) were used to assess students' perceptions of their own efficacy and effort. Student self-efficacy was measured by eight items, whereas effort regulation was assessed by four items. Effort regulation is conceptually close to volition; it is operationally defined as persistence and an ability to deal with failures and setbacks in the process of completing learning related tasks. Sample items from each scale include: "I'm certain I can understand the most difficult material presented in the readings for this course" [Self-efficacy] and "Even when course materials are dull and uninteresting, I manage to keep working until I finish" [Effort regulation]. Responses to the items on both scales were provided on a 7-point Likert scale anchored by 1 (not at all true of me) and 7 (very true of me). For each scale, a total score was produced by averaging the numeric values of the individual responses on the items making up that scale. Previous research has indicated that the two scales have predictive validity, showing positive correlations with students' GPA and SAT scores, as well as reliability estimates within acceptable ranges (Pintrich et al., 1993). The internal consistency (Chronbach Alpha) of the self-efficacy and effort regulation scales for the present sample were .95 and .75, respectively.

To replicate findings from previous research regarding the factorial validity of all five scales used, we conducted a confirmatory factor analysis in Amos 17.1. The results from maximum likelihood estimation using sample covariance matrix as input indicated that the

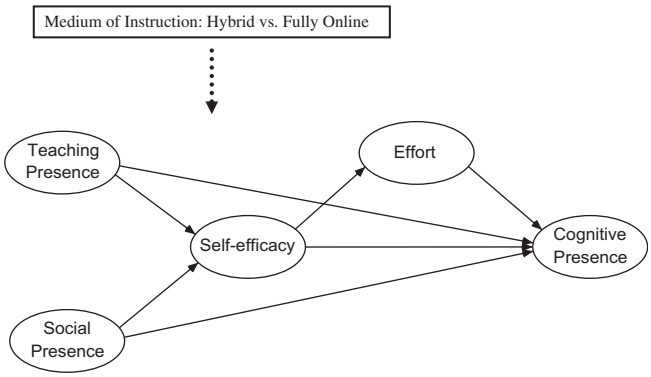

Fig. 2. Hypothesized model in which self-efficacy and effort are components of the larger construct of learner presence.

Table 2
Unstandardized and standardized regression coefficients by medium of instruction.

Path	Blended			Fully online		
	b	S.E.	*B*	*b*	S.E.	*B*
Social presence to self-efficacy	.19	.08	.13*	.32	.05	.24**
Teaching presence to self-efficacy	.27	.03	.42**A	.13	.02	.22**A
Self-efficacy to effort	.15	.01	.62**	.15	.01	.59**
Self-efficacy to cognitive presence	.09	.02	.11**	.09	.01	.12**
Social Presence to cognitive presence	.43	.03	.39**	.38	.02	.36**
Teaching presence to cognitive presence	.23	.02	.47**	.23	.01	.48**
Effort to cognitive presence	.22	.08	.07*	.30	.05	.10**
Social presence to effort	.01	.01	.03	.04	.01	.11**

Note. *$p < .05$, **$p < .001$; coefficients with common Arabic superscripts are significantly different $p < .05$.

assumption for the presence of the five hypothetical latent variables holds, χ^2 (1065) = 10 760.28, $p < .001$, GFI = .91, NFI = .91, TLI = .91, SRMR = .04, RMSEA = .05, p-close fit <.001. Despite the significant chi-square, both RMSEA of .05 and SRMR of <.05 are consistent with Hu and Bentler's (1999) cutoff model fit criteria providing empirical support for a reasonable factor structure. Mean scores for each participant on the five subscales were calculated for the purpose of subsequent analyses.

2.7. Procedure

The survey was administered online through the Vovici ® online survey software at the end of the fall semester of 2009. As an incentive for participation, students were offered an opportunity to participate in a drawing for a $50 gift certificate.

3. Results

The data were examined for univariate and multivariate outliers through procedures in SPSS 17.1. After excluding the cases with missing values, the resulting sample size was 2418. The study hypotheses and research question were addressed simultaneously by performing multi-group path analysis in Amos 17. Prior to testing the path analytic model, depicted in Fig. 1, the zero-order correlations among the constructs of interest by medium of instruction were estimated. As seen in Table 1, the CoI constructs correlated strongly with each other, regardless of medium of instruction. Self-efficacy showed moderate positive correlations with the CoI constructs for both blended and fully online students. The correlations between effort regulation and the CoI constructs were somewhat lower.

In addition, we conducted five independent samples *t*-tests with medium of instruction as grouping variable and effort regulation, self-efficacy, social presence, cognitive presence, and teaching presence as dependent variables. Bonferroni adjustment for inflated Type I error was made (.05/5 = .01), that is, a *t* test was declared significant only if the associated p-level exceeded the specified value of .01. Differences between the two media of instruction were found for teaching presence. The results revealed that compared to students in fully online courses, the students in blended courses rated their respective instructors' presence much higher, t (2,416) = 2.77, $p < .001$.

On the structural level, the proposed model included direct effects of social presence and teaching presence on cognitive presence, mediated by self-efficacy. In addition, self-efficacy was predicted to have a direct effect on perception of cognitive presence, partly explained by effort regulation. To test if the proposed model would apply equally well to the subsamples of blended and fully online students, a multi-group analysis was pursued. In addition, multi-group comparison of the magnitude of the path coefficients was conducted in order to evaluate whether medium of instruction would moderate the relationships among the variables of interest. The fit of the model in Fig. 2 was evaluated using the sample covariance matrix as input and maximum likelihood estimation. A multiple group analysis was carried out by using each sample (blended vs. fully online) as a separate group. The overall model fit statistics were as follows:,χ^2 (4) = 37.43, p = .002, NFI = .99, RFI = .97, IFI = .99, TLI = .98, CFI = .99, GFI = .99, RMSEA = .05, p-close fit = n.s. Inspection of standardized residual covariances indicated that the model could be substantially improved by adding a direct effect from social presence to effort regulation. As expected, a link between the latter, produced a model with excellent fit, χ^2 (2) = 2.62, p = .27, RMSEA = .01, p-close fit = n.s. Table 2 contains the parameter estimates for each group. The results from the Sobel test (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2004) of the significance of the indirect effects are presented in Table 3. As seen, all indirect mediation effects were statistically different from zero. For the blended students, social presence and teaching presence explained 27% of the variance in self-efficacy. All variables in the model accounted for 78% of the variance in cognitive presence. For the fully online students, the variance explained in self-efficacy and cognitive presence by their predictors was 17% and 76%, respectively.

The magnitude of the path coefficients for the two samples was compared in an attempt to identify possible interaction effects between medium of instruction and the constructs. The test of coefficient equivalence for the two groups used a nested chi–square test comparing the fit of the model when the target path for the two groups was constrained to be equal in the two groups versus a model with no such

Table 3
Results from significance testing of indirect effects.

Indirect Effect	Blended			Fully online		
	Critical ratio	St. error	*p*	Critical ratio	St. error	*p*
Teaching presence on cognitive presence via self-efficacy	3.47	.006	<.001	4.5	.002	<.001
Social presence on cognitive presence via self-efficacy	2.08	.007	.037	4.69	.006	<.001
Efficacy on cognitive presence via effort	2.61	.012	.009	5.54	.008	<.001
Social presence on cognitive presence via effort	2.59	.036	.009	3.70	.003	<.001

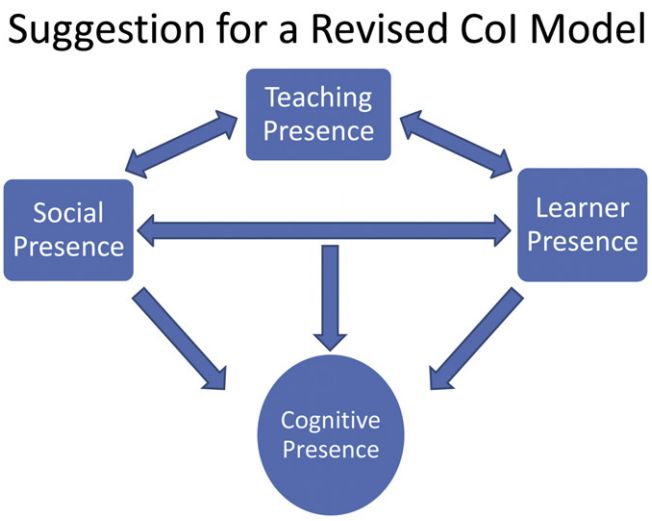

Fig. 3. Revised community of inquiry model including "learner presence".

a constraint. A significant nested chi-square test indicates that equality of regression coefficients cannot be assumed. The significant group differences, as a result of the application of this procedure, are indicated in Table 2. All but one of the eight path coefficients were statistically identical in magnitude for the two samples. The nested chi-square statistics were as follows: social presence to efficacy ($\Delta\chi^2(1) = 2.1$, $p > .05$), efficacy to effort ($\Delta\chi^2(1) = .8$, $p > .05$), efficacy to cognitive presence ($\Delta\chi^2(1) = .8$, $p > .05$), social presence to cognitive presence ($\Delta\chi^2(1) = 1.8$, $p > .05$), teaching presence to cognitive presence ($\Delta\chi^2(1) = .00$, $p > .05$), social presence to effort ($\Delta\chi^2(1) = 3.73$, $p > .05$), and effort to cognitive presence ($\Delta\chi^2(1) = .7$, $p > .05$). The variation in the magnitude of the association between teaching presence and efficacy ($\Delta\chi^2(1) = 11.3$, $p < .05$) indicated that medium of instruction moderates the relationship between teaching presence and self-efficacy. For students in blended courses, in which instructors and learners had some face-to-face contact, the relationship between student perception of teaching presence on their sense of efficacy is much stronger.

4. Conclusion

Gaining knowledge about the reasons for learning and achievement of online students has attracted a great deal of attention among both researchers and practitioners. Understanding the factors that have an influence on the success of online education has significant implications for designing productive online communities.

The results confirmed that a strong correlation exists between constructs within the CoI framework and self-efficacy. As we conjectured, teaching presence and social presence are significantly correlated with student self-efficacy. While teaching presence and social presence are important factors in their own right, the extent to which students believe that they achieve significant learning and the effort they expend depends partly on their sense of efficacy. We further suggest that self-efficacy is just one component of the larger construct of online learner self-regulation (*learning presence*) and that these constructs contribute to our understanding of successful online learning.

Based on these results, we believe that the CoI framework may need additional emphasis on the roles of strategic learners in online environments. While the current study is just a beginning, we feel that learner self-regulation can serve as the basis for a new form of "presence" within the model, one that we describe as learning presence. Based on the results reported here, we conclude that self-efficacy and attendant effort may be viewed as elements within the larger construct of learning presence. While the current study is limited to questions of self-efficacy and effort we hypothesize that an expanded view of learning presence within the CoI framework might also include other dimensions indicative of whether online learners are metacognitively, motivationally, and behaviorally active participants in their own learning processes. We further suggest that learning presence should be associated with teaching and social presence currently represented within the CoI framework. Results from the current study suggest that self-efficacy and effort are dynamically associated with teaching and social presence. Future research on an expanded conception of the CoI framework could benefit enormously from incorporating learner's motivational and individual difference characteristics into a more comprehensive community of inquiry model, similar to the one depicted in Fig. 3.

In addition, the relationship between teaching presence and self-efficacy is stronger for students in blended learning environments. This result provides support for the assumption that the absence of traditional and familiar classroom conventions may result in additional uncertainty for fully online students. An argument can be made for the need to pay more attention to supporting the relationship between teaching presence and self-efficacy in fully online environments. We further suggest that support for self-efficacy and related forms of learner self-regulation, what we refer to here as learning presence, can be accomplished via an expanded teaching presence construct, one which acknowledges that successful online students are metacognitively, motivationally, and behaviorally active participants in their own learning processes. We further suggest that this self awareness can be supported in weaker students to an even greater extent through an expanded notion of teaching presence that intentionally articulates and fosters self reflection and awareness of processes important to learning such as self-efficacy. The study provided additional support about the potency of such motivational constructs in explaining student perceptions of learning in the online environment. Both self-efficacy and effort regulation can be seen as indispensible for success across a variety of learning contexts and work settings. Taken together, these two learner's characteristics help explain why online students may develop more favorable perceptions of and beliefs about their cognitive presence and learning in the context of the blended virtual classroom.

The current study opens doors for new lines of research. Clearly, there's a need for greater understanding of the role of motivational and self-regulatory factors that may shape each individual student's experiences in the online learning environment. We suggest that these metacognitive, motivational, and behavioral traits of active online students can be understood as learning presence. We conclude that additional research investigating online learner self-efficacy and the broader construct of online learner self-regulation is needed.

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Appendix A. Sample items from the community of inquiry instrument.

Teaching presence

12) Design & organization

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
1. The instructor clearly communicated important course topics.	❍	❍	❍	❍	❍	❍
2. The instructor clearly communicated important course goals.	❍	❍	❍	❍	❍	❍
3. The instructor provided clear instructions on how to participate in course learning activities.	❍	❍	❍	❍	❍	❍
4. The instructor clearly communicated important due dates/time frames for learning activities.	❍	❍	❍	❍	❍	❍

13) Facilitation

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	❍	❍	❍	❍	❍	❍
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	❍	❍	❍	❍	❍	❍
7. The instructor helped to keep course participants engaged and participating in productive dialogue.	❍	❍	❍	❍	❍	❍
8. The instructor helped keep the course participants on task in a way that helped me to learn.	❍	❍	❍	❍	❍	❍
9. The instructor encouraged course participants to explore new concepts in this course.	❍	❍	❍	❍	❍	❍
10. Instructor actions reinforced the development of a sense of community among course participants.	❍	❍	❍	❍	❍	❍

14) Direct instruction

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
11. My instructor provided useful illustrations that helped make the course content more understandable to me.	❍	❍	❍	❍	❍	❍
12. My instructor presented helpful examples that allowed me to better understand the content of the course.	❍	❍	❍	❍	❍	❍
13. My instructor provided clarifying explanations or other feedback that allowed me to better understand the content of the course.	❍	❍	❍	❍	❍	❍

Social presence

15) Affective expression

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
14. Getting to know other course participants gave me a sense of belonging in the course.	❍	❍	❍	❍	❍	❍
15. I was able to form distinct impressions of some course participants.	❍	❍	❍	❍	❍	❍
16. Online or web-based communication is an excellent medium for social interaction.	❍	❍	❍	❍	❍	❍

16) Open communication

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
17. I felt comfortable conversing through the online medium.	❍	❍	❍	❍	❍	❍
18. I felt comfortable participating in the course discussions.	❍	❍	❍	❍	❍	❍
19. I felt comfortable interacting with other course participants.	❍	❍	❍	❍	❍	❍

17) Group cohesion

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	❍	❍	❍	❍	❍	❍
21. I felt that my point of view was acknowledged by other course participants.	❍	❍	❍	❍	❍	❍
22. Online discussions help me to develop a sense of collaboration.	❍	❍	❍	❍	❍	❍

Cognitive presence

18) Triggering event

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
23. Problems posed increased my interest in course issues.	❍	❍	❍	❍	❍	❍
24. Course activities piqued my curiosity.	❍	❍	❍	❍	❍	❍
25. I felt motivated to explore content related questions.	❍	❍	❍	❍	❍	❍

19) Exploration

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
26. I utilized a variety of information sources to explore problems posed in this course.	❍	❍	❍	❍	❍	❍
27. Brainstorming and finding relevant information helped me resolve content related questions.	❍	❍	❍	❍	❍	❍
28. Online discussions were valuable in helping me appreciate different perspectives.	❍	❍	❍	❍	❍	❍

20) Integration

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
29. Combining new information helped me answer questions raised in course activities.	❍	❍	❍	❍	❍	❍
30. Learning activities helped me construct explanations/solutions.	❍	❍	❍	❍	❍	❍
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.	❍	❍	❍	❍	❍	❍

21) Resolution

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I choose not to answer this question
32. I can describe ways to test and apply the knowledge created in this course.	❍	❍	❍	❍	❍	❍
33. I have developed solutions to course problems that can be applied in practice.	❍	❍	❍	❍	❍	❍
34. I can apply the knowledge created in this course to my work or other non-class related activities.	❍	❍	❍	❍	❍	❍

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