Teaching, Cognitive And Social Presence: A Framework To Understand Complexities In Online Learning

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Abstract

In the community of Inquiry (CoI) framework the causal relationship of three presences is tested and explored. Prior literature extensively evaluates the practice and research of online learning using the CoI framework. The present study adapted the scale for the measurement of CoI framework to evaluate the causal association between social, teaching, and cognitive presence. Empirical findings indicate the social and teaching presence influence the cognitive presence and social presence significantly and positively influence the teaching and social presence. The findings affirms that the teaching presence sustain and establish community of inquiry. The dynamic association among the latent constructs across the institutions and disciplines.

Keywords— Teaching presence, social presence, cognitive presence, online learning, and education.

INTRODUCTION

Online learning or education theories are important for evaluating online higher education (Kozan & Richardson, 2014a). In this regard, Boston, Diaz, Gibson, Ice, Richardson, & Swan (2009) claimed that the Community of Inquiry (CoI) framework (Garrison, 2011, 2013; Garrison & Akyol, 2013a, b; Garrison & Arbaugh, 2007) may serve formative evaluation attempts focusing on the quality of online education and learner retention. Focusing primarily on the learning process (Akyol et al., 2009; Swan Garrison, & Richardson, 2009), the CoI framework builds on teaching, social, and cognitive presence, and suggests that the presences be at a certain level to encourage learning. Teaching presence is "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes." (Anderson, Rourke, Garrison, and Archer, 2001, p. 5). Further, according to Garrison (2009), social presence is "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of project their individual personalities" (p. 352). Finally, cognitive presence refers to extracting meaning from a learning experience by continuously reflecting and communicating (Garrison, Anderson, & Archer, 2000, 2001).

It is argued here that to advance our understanding of online learning in higher education, a coherent theoretical framework must guide investigations into the research and practice of web-based online teaching and learning. Despite the fragmentation of research in online learning, there is growing interest and optimism around its potential. Moreover, in terms of a driving pedagogical concept, a consensus concerning the importance and congruence between online learning and collaborative constructivist approaches to teaching and learning has emerged. One promising theoretical perspective based on collaborative constructivist principles is the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000).

The CoI framework assumes strong interconnections among the three presences the validity of which has been addressed before (e.g., Kozan, 2016). After all, it is assumed that educational or learning experiences occur in the common area or intersection shared by the presences (e.g., Arbaugh et al., 2008). Likewise, according to Diaz, Swan, Ice, and Kupczynski (2010), the CoI framework has a strong tendency to position "learning processes in the interaction of all three presences" (p. 23). Despite the relative lack of relevant research highlighted earlier (e.g., Garrison &Arbaugh, 2007), all these suggest that the interrelationships between and among the presences are worth investigation in order to fully understand how they affect learning experiences. Specifically, more insights gained into these interrelationships may inform us more about the nature of the CoI framework that is dynamic and process-focused depending on the learners and learning context (Kozan& Richardson, 2014a). Experimental application of theory would enhance and let us make the most out of theoretical insights (Kozan& Richardson, 2014a). Consequently, going beyond a one-model research design, the present study aims at furthering our understanding of the causal interrelationships between and among the presences by statistically comparing different possible models of these interrelationships.

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

The first step in this quest is to establish construct coherence by assessing the interpretability of the factor structure of the Community of Inquiry survey instrument used to measure learner perceptions of teaching, cognitive and social presence. The second step is to assess whether perceptions of teaching and social presence predict cognitive presence as hypothesized by the framework. The next section describes the dynamics of the framework and reviews the validating research.

CONCEPTUAL FRAMEWORK

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

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

understood. The premise is that the nature of such an environment will support purposeful inquiry and meaningful collaboration.

OPERATIONALIZATION

Cognitive presence is grounded in Dewey's (1938/1991) theory of inquiry and critical thinking and is described as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000, p.89). Cognitive presence is thus operationalized as a practical inquiry involving a systemic progression of cognition from triggering event, exploration, and integration to resolution. Teaching presence refers to the design of the materials and processes, facilitation of critical discourse, and direction of discipline-specific instruction. Therefore, teaching presence, according to Anderson et al. (2001), begins before the course commences since the teacher plans and prepares the course, and it is maintained throughout the course as the teacher facilitates the interactions and collaborations. It thus describes an overarching responsibility to orchestrate the many dimensions of the inquiry process so that students accumulate personally and academically relevant learning (Garrison &Arbaugh, 2007). The third – most re-conceptualized – element of the CoI framework is social presence, that is defined as "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of project their individual personalities" (Garrison, 2009).

While evidence has grown as to the structure of each of the presences, there is a distinct lack of confirming research with regard to the causal relationships among the presences. Theoretically, the CoI framework suggests that teaching presence directly influences the creation and sustainability of social and cognitive presence. Moreover, there is growing evidence that teaching presence is a significant determinate of student satisfaction, perceived

learning, and sense of community (Akyol & Garrison, 2008; Arbaugh, 2008; Shea, Li, Swan, & Pickett, 2005). What needs to be empirically demonstrated is that teaching presence significantly influences social and cognitive presence. The question has also been asked, whether social presence is really a necessary precursor of cognitive presence (Swan et al., 2008). To this end, Shea and Bidjerano (2009) have provided initial insights into these causal relationships. The goal now is to provide confirmation and deeper understanding of them. There is a growing knowledge base associated with research that has utilized the CoI framework to study various aspects of online and blended learning environments. Several recent articles have attempted to review the salient work that has used or tested the framework (Arbaugh, 2008; Garrison &Arbaugh, 2007; Swan, Garrison, & Richardson, 2009). In these reviews and an article discussing methodological issues associated with the CoI framework (Garrison, Cleveland-Innes, Koole, & Kappelman, 2006), the need to turn from descriptive to more predictive quantitative studies that can address the interaction effects of the presences and large scale crossdisciplinary studies has been identified.

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

The present study explores the relationships among the CoI presences and examines potential influence of program of study and student gender on them. Program of study varies according to discipline, each with unique teaching paradigms, styles of discourse and epistemologies (Becher

&Trowler, 2001). Given the interactive and inquiry-based focus of online communities of inquiry, different patterns of relationships among presences. This may also be true of gender. Not only is there a gender imbalance in favor of women in online learning, but the perceived benefits of participation also differ across gender (Kramarae, 2007). Women have been found to describe the online experience as socially richer than do men (Rovai& Baker, 2005). Such differences may result in a difference in social presence, an element central to learning in an online community of inquiry.
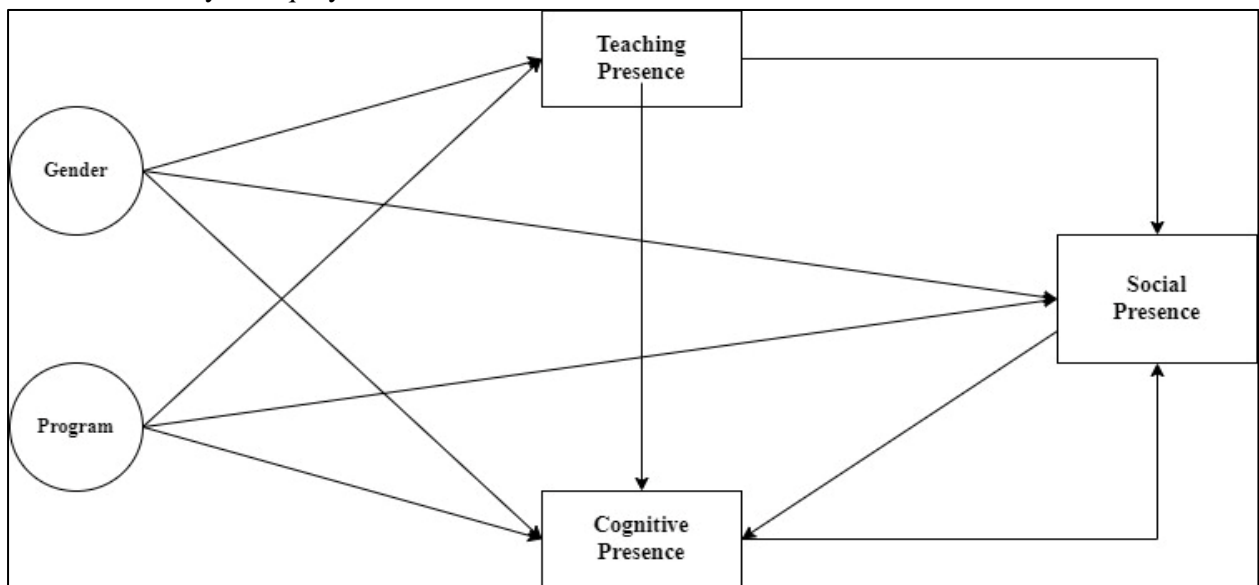
Based on the research associated with the CoI model, the following research questions were the focus of this study:

1. Will the CoI survey instrument result in an interpretable factor structure of teaching, social and cognitive presences?

2. Will teaching and social presence be perceived to positively influence cognitive presence?

3. Will teaching presence be perceived to positively influence social presence?

4. Will gender and program design be associated with each of the three presences?

Figure 1: Theoretical Framework

METHODOLOGY

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

signed. Gender and program variables were also measured.

Two programs and 14 different courses were chosen for use in this study. To remove within-program or subject bias from responses, two programs and multiple courses were sampled. One program is a social science master's degree in Interdisciplinary Study (MAIS). The other program is a master's degree in Education with a concentration in Distance Education. Both programs were offered on a learning platform with asynchronous communication. Courses ranged across multiple subject areas including philosophy, research methods and educational technology. This variation of courses was included to randomize any possible subject-matter effects that might influence results. All courses were delivered using a combination of

print and electronic media and online conferencing. The online conferencing component provided the opportunity for student engagement and group interaction. Required conference participation was used for assessment in some courses while it remained a voluntary activity in others.

RESULTS AND DISCUSSIONS

The assessment of reliability and validity of three latent constructs using the 32 items reported in table 1. The assessment of reliability and validity was assessed based on the four tools including loadings, Cronbach alpha, composite reliability, and average variance extraction. The two items do not meet the loading threshold and were not reported in table 1. The results of Cronbach alpha, composite reliability, and average variance extraction values meet the cut-off value of 0.70, 0.70, and 0.50 reported in table 1. The model fitness indices that model the value of SRMR 0.07, d_ULS is 2.411, and the value of NFI 0.910.

Table 1: Assessment of Reliability and Validity

|	Items	Loadings	Cronbach's Alpha	CR	AVE
Cognitive Presence	**CP1**	0.858	0.958	0.963	0.702
	CP2	0.846			
	CP3	0.835			
	CP4	0.869			
	CP5	0.875			
	CP6	0.818			
	CP7	0.833			
	CP8	0.829			
	CP10	0.767			
	CP11	0.824			
	CP12	0.858			
Social Presence	**SP1**	0.810	0.932	0.944	0.680
	SP2	0.878			
	SP3	0.824			
	SP4	0.861			
	SP5	0.901			
	SP6	0.859			
	SP7	0.730			
	SP8	0.715			
Teaching Presence	**TP1**	0.810	0.966	0.970	0.749
	TP2	0.819			
	TP4	0.852			
	TP5	0.908			
	TP6	0.915			
	TP7	0.860			
	TP8	0.863			
	TP9	0.889			
	TP10	0.893			
	TP11	0.874			
	TP12	0.831			
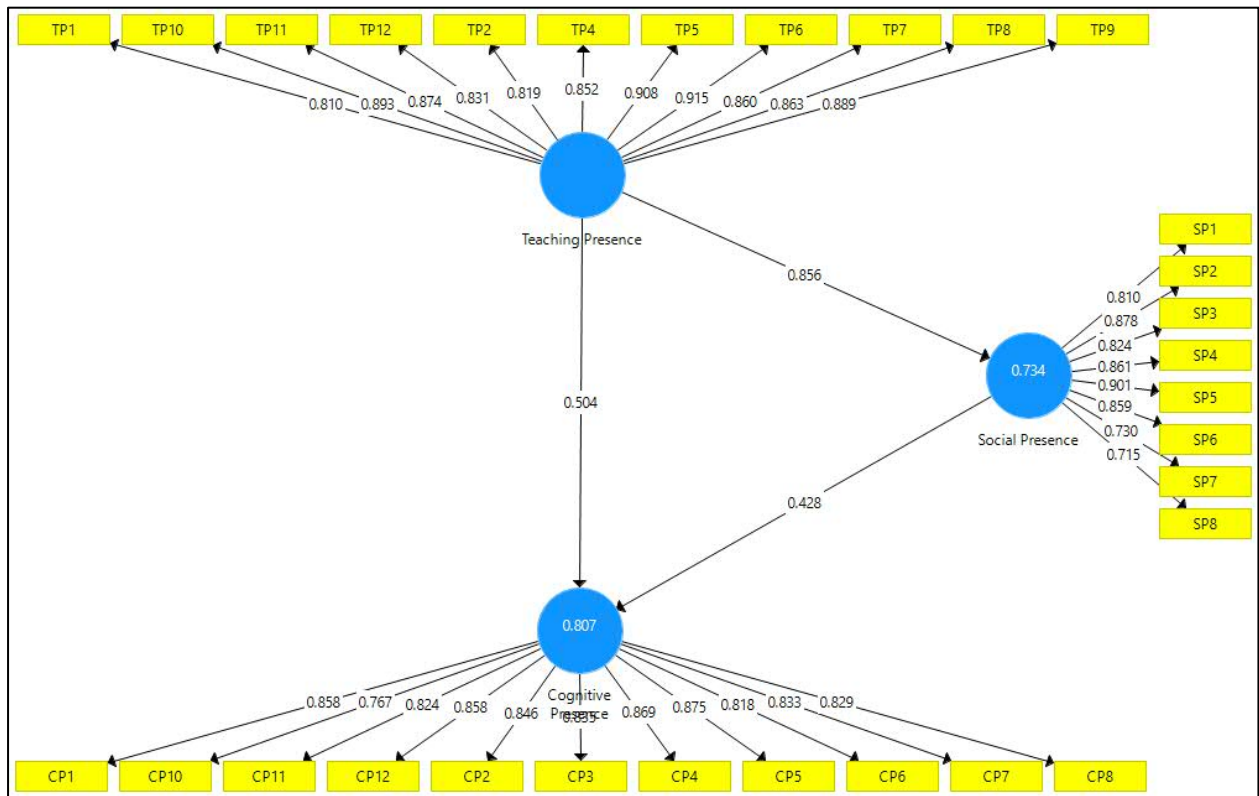
Figure 1: Assessment of Measurement Model

The assessment of measurement includes assessment of reliability and validity and assessment of discriminant validity. The table 2 assessment of discriminant validity using the HTMT technique the results indicate the that the values of discriminant validity for the respective latent constructs less than threshold value of 0.85 strict criterion and 0.90 lenient criterion.

Table 2: Assessment of Discriminant Validity

	Cognitive Presence	Social Presence	Teaching Presence
Cognitive Presence			
Social Presence	0.796		
Teaching Presence	0.700	0.599	

The results of hypothesis testing indicate that the social presence significantly and positively linked with the cognitive presence at 5 percent level of significance (β= 0.428, t= 6.883, p=

0.000). The teaching presence also affirms the significant and positive association with cognitive presence (β= 0.504, t= 7.718, p= 0.000) at 5 percent level of significance. In the last the empirical findings indicate that teaching presence significantly and positively linked with the social presence at 5 percent level of significance (β= 0.856, t= 40.198, p= 0.000). The results of empirical findings were reported in table 3.

Table 3: Testing of Hypothesis

	Coeff.	SD	T Values	P Values
Social Presence -> Cognitive Presence	0.428	0.062	6.883	**0.000**
Teaching Presence -> Cognitive Presence	0.504	0.065	7.718	**0.000**
Teaching Presence -> Social Presence	0.856	0.021	40.198	**0.000**
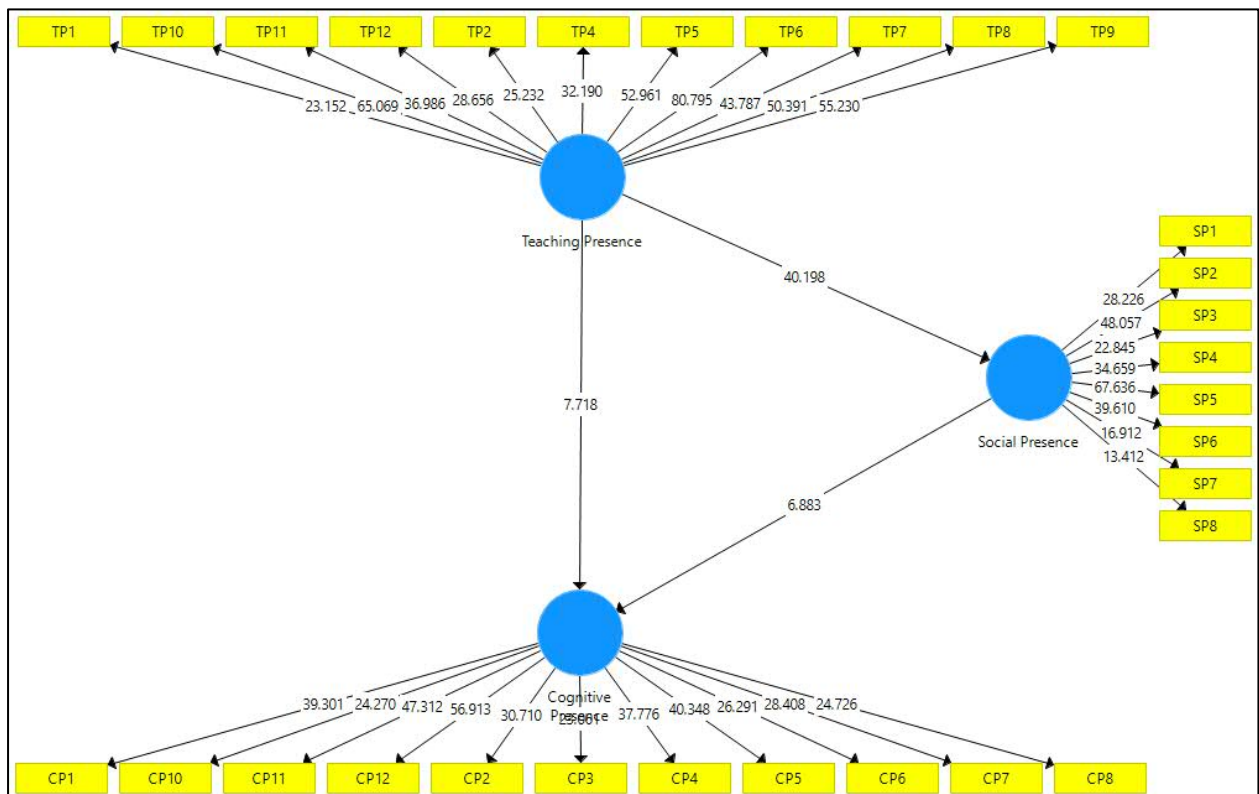
DISCUSSION

The foremost purpose of this research was to identify an explainable factor structure in relation to the CoI framework as quantified through the survey of CoI. The entire items comprised by the CoI survey cleanly loaded with respect to the proposed factors hence validating the authenticity of the survey's theoretical structure and offering insights to evaluate the proposed correlations among the aforementioned three presences. The validated authenticity and utility of the CoI instrument to execute larger scale empirical research is required to be emphasized. Thus, a novel and a bigger scale research regarding digital entrepreneurship disciplines (courses) based on a version of the CoI instrument also offered a sound empirical facilitation to the framework (Arbaugh, 2008).

It has been concluded that in reality, the factors of a comparatively novel theoretical model (e.g., CoI) not only be quantified reliably, but also exclusively account for 54% of the variance across the learners perceived learning is remarkable (Arbaugh, 2008, Discussion Section, line 1). Likewise, a considerable literature has discussed a plenty of theoretical frameworks that could offer a benchmark for examining and establishing digital learning and education across various disciplines and inferred that an engagement method, which foregrounds the learner's role as a builders of collaborative knowledge, is more likely to articulate and enlarge on the basis of CoI model (Shea & Bidjerano, 2009). Drawing from the more than 2000 digital learners, the study conducted by Shea & Bidjerano (2009) evident that the CoI instrument's items stick together into an interpretable variables matching with the presences of CoI. Thus, they are evident that 65% of the variance has been predicted by the three CoI model.

Drawing from the obtained SEM findings in this study, we may argue that the results offer facilitation to the theoretical anticipations of the CoI model, in that the factor of teaching presence would be the focal predictor of developing and sustaining rest of the two presences (cognitive and social presence). The results have offered knowledge about the sound connections among the aforementioned presences. In line with the past studies, we may argue that the all three presences are interrelated and manipulate each

other within a proposed framework. Thus, it has been shown via learner's viewpoints that teaching presence significantly impact the learner's perceptions regarding cognitive and social presences.

In addition, learner's viewpoints regarding social presence also influence the learner's viewpoints regarding cognitive one. Thus, more specifically, social presence should be perceived as an intervening/mediating factor between the correlation between cognitive and teaching presences. Thus, the obtained findings are also in line with the results of a similar research documented by Shea & Bidjerano (2009), who inferred that a good fitted model with the advantages of sample size exceeds from 2000. It reinforces the core significance of teaching presence to developing and maintaining a digital learning atmosphere and acknowledging intended outcomes of education and learning.

The results also validating the key impact of teaching presence on student's digital learning experiences is increasing (Arbaugh, 2005; Pawan, Paulus, Yalcin, & Chang, 2003; Schrire, 2004; Swan & Shih, 2005; Wu & Hiltz, 2004). Moreover, a considerable literature also shown the correlation between cognitive and teaching presence when they evident the presence of teaching in the leadership (e.g. direction and support) and structural from (e.g. design) were pivotal in relation to meaningfulness and detailed pedagogies towards education and learning (Garrison & Cleveland-Innes (2005). Likewise, it has been suggested by Meyer (2003) that highly directive participation by the institutional faculty may likely to be required to accomplish higher-order brainstorming. Last but not least, it has also bee evident a significant correlation between teaching presences and nurturing and cultivation of a learning community sense (Shea & Pickett (2006). Such findings are demonstrated the key contribution of teaching presence in developing and maintaining a CoI as depicted from the model.

Developing causal correlations among the entire three presences validates the proposed framework that teaching presence is imperative in developing a social presence sense by nurturing a supportive climate in terms of team cohesion, open communication and trust as well. This sets the benchmarks for meaningful and joint learning practices as depicted from the perceived correlation between cognitive and social presence. Thus, social presence is an intervening element that offers an atmosphere for the learning process. The focus then shifts towards the direct and causal correlations between cognitive and teaching presence. This assumption is that learners are required to indulge with engaging assignments needs solutions for them to go through the practical investigative phases. Once engaged, the presence of teaching is proposed and perceived to have a key impact in directing and supporting the learning activities among the learners. Such perceived correlations were also depicted in the past literature as an imperative to reach resolution and acquire learners' viewpoints about a sound and dynamic education and learning exposures.

Only the correlation between cognitive presence and programme has been empirically significant. The program with an empirically significant correlation with cognitive presence has been an academic program with social sciences and humanities' courses. Such courses entail higher level discussions, theoretical building and critique as well. In educational domain, the professional program entails few of this cognitive presence but includes courses where professional competencies and insights should be obtained; thus, higher-order cognitive requirements may be less likely to be needed in inter-disciplinary program.

It has been evident various differences between gender in relation to the learner's exposure with online education (Rovai& Baker, 2005), it was sensible to perceive that engagement with a digital CoI could fluctuate across gender. There is an appropriate evidence to hypothesize a correlation between gender and digital learning experiences. For instance, "multiple responsibilities, insufficient interaction with faculty, technology, and coursework ranked highest as barriers to women's persistence" (Müller, 2008) in digital context. In addition, it

has been asserted by Kramarae (2007) that leaning success in digital contexts is particularly more beneficial for females, who expose to the richer and meaningful digital leaning experiences (Rovai& Baker, 2005). It is likely that no variations across gender documented here is an artefact of the exclusiveness associated with the digital CoI. Further research is needed to shed lighter in this causal-and-effect relationships.

More studies are also needed to investigate the key correlations among the aforementioned three presences across various institutions and disciplines. In addition, each of the presences exhibit sophisticated ideas comprising sub-categories (e.g., elements) that required further examination to validate the subsistence of these elements and investigate the key correlations among particular elements among the presences. For instance, could the comprising elements of teaching presence (e.g., development, support and direction) be validated and subsequently used to investigate the correlation among the categories of teaching presence and particular elements of cognitive and social presences? In particular, the following question might be a centre of potential research: "Is perception of teaching presence associated with establishing open and purposeful communication in social presence?" and, "Is direct instruction in teaching presence associated with integration or resolution in cognitive presence?"

CONCLUSIONS

A considerable literature has shown that CoI model is a valuable perspective to comprehend the sophisticated and complex correlation among social, cognitive and teaching presences. The mechanism has been offered the theoretical base for the establishment of quantitative survey approach that opens the horizons for documenting a broader variety of studies that were not possible on the basis of qualitative approaches including a content analysis. The outcomes of the study conducted by Shea and Bidjerano (2009) validate the key role that teaching activity plays and offers key knowledge regarding how effectively to align the

constituting elements (e.g. presences) of a digital CoI. Thus, the significance of teaching element in developing and sustaining rest of the cognitive and social elements in a digital learning atmosphere would perceive to be clear and unambiguous.

In addition, the present research raises an array of significant guidelines and for potential researchers. To further comprehend the empirical relationship among three elements, one stream of research showed that is to better comprehend the mediating impact of social presence in the relationship between cognitive and teaching elements.

In this regard, perhaps the highly significant methodology would be to investigate the dynamics and dimensionality within the three elements (i.e, presences). For instance, first of all, it is imperative to comprehend the order of dynamics (significance) and dimensionality of each of the social presence elements throughout the duration of an array of investigations to fully acknowledge its sophisticated linkages with the impact of teaching elements and the stages of cognitive elements.   In this regard, the recommended questions are as follows: What is the teaching presence dimensionality and how such elements influence social element? Is nurturing group cohesion and open communication at larger extent than nurturing interpersonal linkages for perceived cognitive element?

A key outcome here was that there is a significant correlation exists between disciplines (courses) and perceived cognitive element. Obviously, this raises the following questions: What implications do various disciplines (courses) have on outcomes of learning and cognitive element? Is this clear empirical impact less likely to do with courses (disciplines) and more likely to do with teaching element effects? Are there differences in courses (disciplines) or does teaching element via development, support and direction account for a clear disciplinary or course variances? Larger scale research could also be conducted in future to investigate gender differences across presences and disciplines. The increasing literature supporting the CoI

instrument provides credibility to its utility and benefits at larger extent where such correlations could be examined with much clarity and rigor.

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