

A Structural Equation Model of Predictors of Online Learners' Engagement and Satisfaction

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Abstract

This study investigated the structural relationships among online learners' teaching, social, and cognitive presence, engagement, and satisfaction. Data were collected from graduate students enrolled in an online graduate program at a large midwestern public university through online surveys. Structural equation modeling (SEM) was used to analyze the data. According to the results, teaching presence, cognitive presence, emotional engagement, behavioral engagement, and cognitive engagement were significant predictors of satisfaction, and these determinants explained 88% of the variance in satisfaction. The results indicate that the dominant determinant of the satisfaction was teaching presence, which had direct and indirect effects on satisfaction. Moreover, the study revealed significant predictors of emotional, behavioral, cognitive, and agentic engagement. Implications are discussed in terms of theoretical insights, practices for online learning environments, and further research directions.

Keywords: community of inquiry, structural equation modeling, online learning, social presence, teaching presence, cognitive presence, engagement, satisfaction

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Over the past decade, the popularity of online education has been increasing in the world. In the United States, more than one in four college students (28%) had taken at least one online course in fall 2014 (Allen, Seaman, Poulin, & Straut, 2016). The continuing interest in online education has created a growing and competitive market for online courses, which makes ensuring the quality of such courses an important long-term strategy for higher education institutions (Kozan & Richardson, 2014). The increased capabilities of online technologies have increased expectations for the effectiveness of online education (Means, Toyama, Murphy, & Baki, 2013). In order to increase quality of online education, it is necessary to employ robust theoretical frameworks. The Community of Inquiry (CoI) framework (Garrison & Akyol, 2013; Garrison, Anderson, & Archer, 2000, 2001, 2010; Garrison & Arbaugh, 2007), which is based on social

constructivism and Dewey's notions of community and inquiry (Akyol & Garrison, 2011; Swan, Garrison, & Richardson, 2009; Swan & Ice, 2010), is one of the most popular theoretical frameworks for understanding online learning processes. It has been widely used as a guide for developing and evaluating online courses as well as for training faculty to teach online. The CoI framework suggests that three elements—teaching presence, social presence, and cognitive presence—work together to create and maintain a collaborative community of inquiry and effective learning processes in online education environments (Akyol & Garrison, 2008; Kozan & Richardson, 2014; Swan et al., 2009). The three elements of CoI and their intersection reflect the dynamics of online learning experiences that are important to improving and maintaining the quality of online education (Garrison, Cleveland-Innes, & Fung, 2010).

The main components of teaching presence include design and organization, facilitating discourse, and direct instruction (Akyol & Garrison, 2008; Anderson, Rourke, Garrison, & Archer, 2001). Teaching presence creates opportunities for meaningful learning and ensures that intended learning outcomes are reached when it includes “monitoring and managing purposeful collaboration and reflection” (Garrison et al., 2010, p. 32). In the CoI framework, teaching presence is viewed as influencing both social and cognitive presence (Garrison et al., 2010). Social presence includes emotional expression, open communication, and group cohesion (Garrison et al., 2000), which encourages online learners to participate in social interactions by creating personal but purposeful relationships (Garrison & Arbaugh, 2007). In addition, social presence is considered a mediating variable between teaching and cognitive presence (Garrison et al., 2010; Shea & Bidjerano, 2009). Cognitive presence is based on the practical inquiry model (Dewey, 1938) and includes the iterative phases of the inquiry process—namely, the triggering event, exploration, integration, and resolution phases (Akyol & Garrison, 2008; Garrison et al., 2000; Garrison et al., 2010; Garrison & Arbaugh, 2007). Cognitive presence is central to the student learning process and “refers to the extent to which online learners can construct and validate meaning based on critical and continued communication and thinking” (Kozan & Richardson, 2014, p. 68). In the CoI framework, cognitive presence is viewed as “the focus and success of the learning experience” (Vaughan & Garrison, 2005, p. 8).

Much research has tested the CoI framework (Befus, 2016; Stenbom, 2018) and explored the relationships among the CoI presences (Arbaugh, 2008; Garrison & Arbaugh, 2007; Swan, Garrison, & Richardson, 2009; Garrison et al., 2010; Kozan & Richardson, 2014), and it has been consistently reported that the three presences are related to one another, directly or indirectly (Joo, Lim, & Kim, 2011). Research on the CoI has also shown it to be an effective pedagogical framework in terms of explaining important variables in the online learning process, such as engagement, perceived learning, and satisfaction (Arbaugh, 2001; Nagel & Kotze, 2010; Richardson, Maeda, Lv, & Caskurlu, 2017; Rovai, 2002; Shea, 2006; Shea, Li, & Pickett, 2006; Swan, 2001). However, there is a need to examine how the CoI presences relate to other variables for learning outcomes in order to better understand how to use online learning environments to foster learning. For example, few studies have investigated online learners' engagement. The purpose of this study is to present a path model that predicts online learners' engagement and satisfaction based on the CoI framework.

Determining which factors affect online learners' engagement and satisfaction based on the CoI framework can help guide practitioners in selecting appropriate strategies to promote the active engagement of learners and overall student satisfaction (Ma, Han, Yang, & Cheng, 2015; Richardson & Newby, 2006; Robinson & Hullinger, 2008). In this study, we examine specific

types of student engagement, including behavioral, emotional, cognitive, and agentic engagement, as proposed by Fredricks, Blumenfeld, and Paris (2004), and Reeve and Tseng (2011). *Behavioral engagement* refers to students' attention, effort, and persistence in learning. *Emotional engagement* includes having positive emotions and high interest in class activities. During the learning process, strategic thinking and using sophisticated learning strategies translate into cognitive engagement (Fredricks et al., 2004; Reeve, 2013). Lastly, *agentic engagement* refers to students' constructive contribution to the flow of the instruction they receive, as proposed by Reeve and Tseng (2011), serving as a fourth component of the engagement framework of Fredricks et al. (2004).

In the current literature base, student satisfaction is one of the main predictors of the quality of online courses (Eom & Ashill, 2016; Kauffman, 2015; Moore & Kearsley, 2005; Roach & Lemasters, 2006; Yukselturk & Yildirim, 2008). Satisfaction refers to how students perceive their learning experiences, and it is a fundamental link in student outcomes associated with higher level student engagement and achievement (Biner, Welsh, Barone, Summers, & Dean, 1997; Sahin & Shelley, 2008). In turn, high levels of satisfaction lead to motivation to persevere for online students and so to higher persistence rates (Ali & Ahmad, 2011; Alaulamie, 2014; Joo et al., 2013; Kuo, Walker, Belland, & Schroder 2013; Reinhart & Schneider, 2001; Yukselturk & Yildirim, 2008).

Even though the literature reports that all three CoI components affect student engagement (Dixon, 2011; Young & Bruce, 2011), the relationships between specific engagement elements are unknown. Therefore, additional research is needed to understand how using the CoI framework in designing online courses specifically affects students' engagement (Meyer, 2014). In this study we aim to provide a comprehensive view of the development of the CoI presences in relation to satisfaction and engagement. Understanding interrelationships among these important variables may enrich theoretical insights and practices for online learning environments.

Satisfaction

Many factors may affect online learners' satisfaction, such as presence (social, cognitive, teaching), perceived usefulness of a course, perceived ease of use of the platform, actual usage, computer expertise, flexibility, and flow (Joo, Lim, & Kim, 2011; Joo, Joung, & Kim, 2013; Sahin & Shelley, 2008). Much research has examined the effects of the three presences represented in the CoI framework on satisfaction and found that there are positive relationships between satisfaction and social presence (Cobb, 2011; Gunawardena & Zittle, 1997; Harrison, Gemmell, & Reed, 2014; Johnson, Hornik, & Salas, 2008; Newberry, 2003; Richardson & Swan, 2003; Richardson et al., 2017), teaching presence (Arbaugh, 2008; Estelami, 2012; Jackson, Jones, & Rodriguez, 2010; Khalid & Quick, 2016; Ke, 2010; Kranzow, 2013; Ladyshevsky, 2013; Shea, Pickett, & Pelz, 2003), and cognitive presence (Akyol & Garrison, 2008; Hosler & Arend, 2012; Kang, Liew, Kim, & Park, 2014). Furthermore, several studies have examined how the three CoI presences predict satisfaction. The majority of these studies found that all three CoI presences significantly predict satisfaction (Alaulamie, 2014; Giannousi & Kioumourtzoglou, 2016; Ke, 2010); however, a few studies have found that social presence is not a predictor of online learners' satisfaction (Joo et al., 2011; Kang et al., 2014).

Engagement is an additional predictor of satisfaction. Research shows that engagement has significant effects on satisfaction in online learning environments (Bitzer & Janson, 2014; Gray & DiLoreto, 2016; Shin & Chan, 2004; Swan, 2001). Students who engage in their courses may

experience more satisfaction (Meyer, 2014; Newberry, 2003). Based on the literature, we have formulated the following seven hypotheses related to satisfaction:

- Teaching, social, and cognitive presence have positive effects on online learners' satisfaction.
- Behavioral, emotional, cognitive, and agentic engagement have positive effects on online learners' satisfaction.

Engagement

Engagement, in addition to its relationship with satisfaction, is one of the most important variables for the learning process. *Engagement* refers to active involvement in course activities with continuous efforts to attain desired learning outcomes (Hu & Kuh, 2002; Richardson, Long, & Woodley, 2003; Richardson & Newby, 2006). Students' active involvement affects the level of their learning outcomes, cognitive development, and educational quality (Ma et al., 2015). Regarding online courses, engagement is one of the key factors affecting students' persistence and improving learning efficiency (Dennen, Darabi, & Smith, 2007; Dixon, 2015; Kuh, 2003; Robinson & Hullinger, 2008).

Since online learning differs from traditional education in terms of online learners' time and attention demands, keeping them actively engaged is very important and may require more effort compared with on-campus classes (Meyer, 2014). Previous research has indicated that many factors can influence online learners' engagement—for example, using humor and feedback, choice of activities, presenting extra course resources, applying active learning approaches, using course tutors, and including motivational factors (Baker & Taylor, 2012; Bates & Khasawneh, 2007; Hew, 2016; Kanuka, 2005; Kelly, 2012; Richardson & Long, 2003; Sull, 2012; Sun & Rueda, 2012; Webster & Hackley, 1997). While educationally purposeful activities support student engagement and learning, poor instruction has negative effects on student engagement (Hu & McCormick, 2012; Mason, 2011; Meyer, 2014).

The CoI model is important in understanding the factors that influence online learners' engagement. When online courses are designed by maximizing the three CoI presences, interaction, and engagement, the construction of meaningful knowledge and effective learning occur (Garrison & Arbaugh, 2007; Garrison & Cleveland-Innes, 2005; Joo et al., 2011; Meyer, 2014). Since social presence encourages social interaction through emotional expression, open communication, and group cohesion, greater perceptions of social presence may be related to emotional engagement, while lower social presence levels may cause frustration and impact affective learning negatively (Garrison et al., 2000; Garrison & Akyol, 2013; Wei, Chen, & Kinshuk, 2012). Higher teaching presence facilitates students' interaction with the instructor and potentially a strong classroom community encouraging students to actively engage in the learning process (Joo et al., 2013; Young & Bruce, 2011). Therefore, teaching presence may be a useful predictor for agentic and emotional engagement (Reeve, 2013). Cognitive presence leads to the construction of meaningful knowledge and is supported by employing sophisticated learning strategies, such as critical thinking, learners' active involvement through their experiences, interaction, and communication (Joo et al., 2013; Kanuka & Garrison, 2004). Therefore, cognitive presence may be linked to behavioral, emotional, and cognitive engagement.

Researchers have found the four engagement components to be “dynamically interrelated within the individual; they are not isolated processes” (Fredricks et al., 2004, p. 61; Reeve & Tsai, 2011; Reeve, 2013). The engagement components are relatively new concepts in classroom

research and in research on online learning environments. Hence, there is a need to research the structural relationships among the four components further. For example, since cognitive engagement refers to students' level of investment in learning, it may be a predictor of learning and the engagement process. In online learning environments, students who actively participate in activities requiring cognitive interpretations demonstrate higher cognitive engagement (Meyer, 2014). Moreover, students who have more experience and take more responsibility for their learning promote cognitive engagement (Richardson & Newby, 2006). Therefore, cognitive engagement may itself have an effect on the other three components of engagement. Likewise, behavioral engagement, which means active participation in course activities through completing assignments, may be predictive of agentic engagement. Based on the literature, we have formulated the following 10 hypotheses related to engagement.

- Cognitive presence has a positive effect on behavioral, emotional, and agentic engagement.
- Teaching presence has a positive effect on agentic and emotional engagement.
- Social presence has a positive effect on emotional engagement.
- Cognitive engagement has a positive effect on behavioral, emotional, and agentic engagement.
- Behavioral engagement has a positive effect on agentic engagement.

The hypothesized research model for the study, based on a review of the previous literature, is presented in Figure 1. Arrows show the direction of the influence.

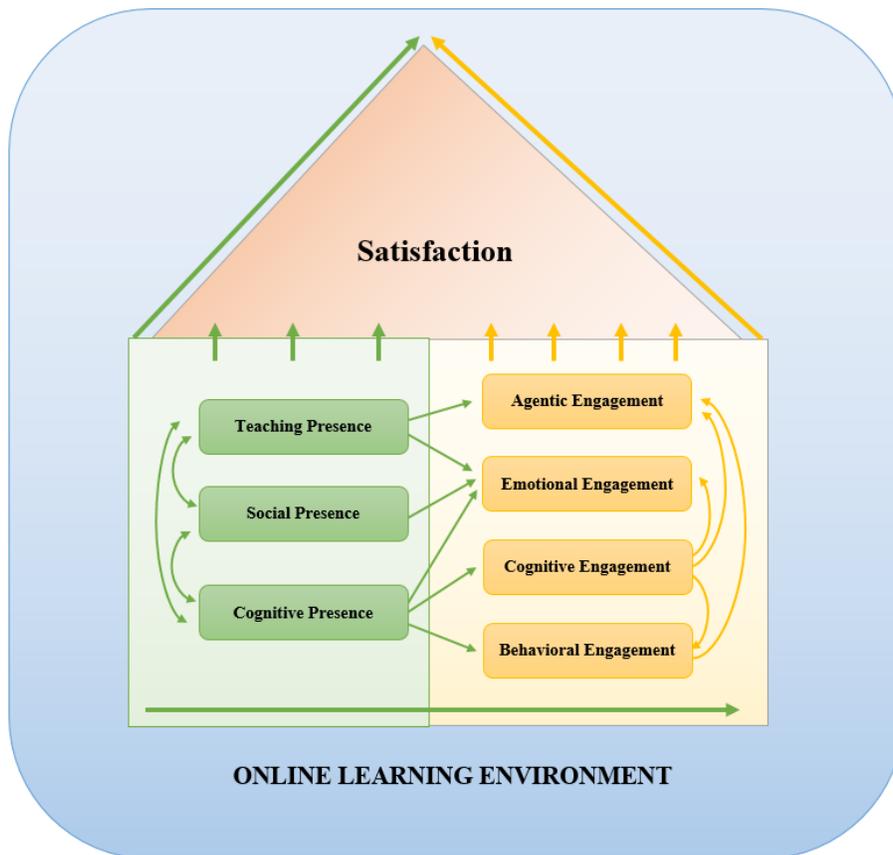


Figure 1. Hypothesized research model.

Methods

In this study, we employed a structural equation modeling (SEM) approach to investigate the structural relationships among the three CoI presences, four components of engagement, and student satisfaction. We collected data in fall 2016 through an online survey and included questions for each variable in the research model. The surveys were posted to the online course announcements area and were collected as part of the course evaluation procedure; completing the surveys was voluntary.

Participants

Students enrolled in an online graduate program at a large midwestern public university participated in this study. We collected data from four 3-credit graduate level online courses consisting of 15 sections with 13 different instructors. These courses are fully online, and the CoI framework is used to design these courses. One hundred and twenty-three students, ranging from 21 to 65 years old, participated in this study, reflecting a 63% response rate. All of the participants had taken at least one online course previously within the program.

Measurement Instruments

The survey for the three CoI presences, four types of engagement, and satisfaction were based on previously designed instruments. The Cronbach's alpha values were recalculated to ensure reliability of the instruments. Table 1 presents the variables, original sources, number of items implemented, and Cronbach's alpha calculated in this study.

Table 1.

List of Measurement Instruments

Variables		Items	Sources	Cronbach's alpha
Presence	Teaching presence	13	Arbaugh et al. (2008)	.96
	Social presence	9		.90
	Cognitive presence	12		.94
Engagement	Agentic engagement	5	Reeve (2013)	.84
	Behavioral engagement	4		.84
	Cognitive engagement	4		.80
	Emotional engagement	4		.91
Satisfaction		5	Kuo et al. (2013)	.89

The CoI questionnaire, developed by Arbaugh et al. (2008), was used to measure teaching, social, and cognitive presence. The instrument is comprised of 34 items on a 5-point Likert scale, and the validity and reliability of the instrument has been established. Cronbach's alpha values indicated high internal consistency: (a) teaching presence (13 items) = 0.94; (b) social presence (nine items) = 0.91; and (c) cognitive presence (12 items) = 0.95 (Arbaugh et al., 2008).

The engagement scale developed by Reeve (2013) was adopted for this study in order to measure engagement. Wording was modified to reflect the online context. For example, "When I'm in this class, I listen very carefully" was modified to "When I'm in my course, I am able to

focus" to fit the fully online environments. The items' meaning did not change. Therefore, we did not need to validate the scale again. The instrument is comprised of 17 items on a 5-point Likert scale; the validity and reliability of the scale has been established. Cronbach's alpha values indicated high internal consistency: (a) agentic engagement (five items) = 0.84; (b) behavioral engagement (four items) = 0.87; (c) emotional engagement (four items) = 0.91; and (d) cognitive engagement (four items) = 0.72 (Reeve, 2013).

In order to measure satisfaction, an instrument developed by Kuo et al. (2013), based on Kuo, Eastmond, Schroder, and Bennett's instrument (2009), was used. The instrument is comprised of five items on a 5-point Likert scale. The reliability and content validity of the satisfaction scale were previously established, and Cronbach's alpha values were $\alpha = 0.93$ (Kuo et al., 2013).

Data Analysis

Regarding sample size requirements for SEM, it has been stated that minimum sample size can be 100–200 and five to 10 observations per estimated parameter (Boomsma, 1985; Bentler & Chou, 1987; Kline, 2011). Since this study includes 17 parameters, the sample size should be at least 85. In the present study, the data was collected from 123 people; therefore, the sample size is sufficient to conduct SEM analysis. The data were analyzed using SPSS 24.0 in order to conduct descriptive analyses to test the validity and reliability of the scores. First, outliers were determined, and eight extreme values were excluded from the data set of 123 ($n = 115$). We checked skewness and kurtosis values and found each variable to be approximately normally distributed. All relationships among the variables were sufficiently linear. Tolerance and variance inflation factor (VIF) values were calculated for multicollinearity. VIF should be less than 10, and tolerance should be above 0.2 (Field, 2009). VIF values were all well below 10, and the tolerance statistics were all well above 0.2; therefore, we found no collinearity within the data. Thus, the data met all of the assumptions for the SEM.

In SEM studies, variables are classified as either *exogenous*, which are like independent variables, or *endogenous*, which are dependent, intermediate, or outcome variables (Hoyle, 1995; Iacobucci, 2009; Kline, 2011). In this study, the proposed model includes five endogenous variables: satisfaction, emotional engagement, cognitive engagement, behavioral engagement, and agentic engagement. AMOS 24.0 was used for the SEM in order to assess the fit of the proposed model.

Results

Descriptive Statistics and Correlations Among the Variables

The descriptive statistics are presented in Table 2. All means were above 3.9. The standard deviations ranged from .45 to .95. The data met assumptions of normality for the purposes of SEM (Kline, 2011). The correlations among all of the variables were significant ($p < .01$).

Table 2
Correlation Coefficients and Descriptive Statistics

Measurement variable	Correlations of measurement variable							
	1	2	3	4	5	6	7	8
1. Teaching presence	1	.325*	.656*	.302*	.387*	.389*	.698*	.823*
2. Social presence	.325*	1	.641*	.464*	.411*	.433*	.528*	.530*
3. Cognitive presence	.656*	.641*	1	.561*	.515*	.555*	.799*	.820*
4. Behavioral engagement	.302*	.464*	.561*	1	.561*	.543*	.494*	.492*
5. Agentic engagement	.387*	.411*	.515*	.561*	1	.539*	.462*	.456*
6. Cognitive engagement	.389*	.433*	.555*	.543*	.539*	1	.589*	.450*
7. Emotional engagement	.698*	.528*	.799*	.494*	.462*	.589*	1	.863*
8. Satisfaction	.823*	.530*	.820*	.492*	.456*	.450*	.863*	1
Mean	3.95	4.35	4.22	4.52	4.00	4.45	3.93	4.21
Standard deviations	.978	.505	.589	.454	.636	.482	.825	.743
Skewness	-.986	-.492	-.411	-.699	.016	-.262	-.661	-.710
Kurtosis	.190	-.472	-.373	-.173	-.642	-1.310	-.185	-.333

* $p < .01$

Assessment of Measurement Model

Based on the result of maximum likelihood estimation, Table 3 shows the goodness of fit indices for the research model. The χ^2 statistic, the goodness-of-fit index (GFI), the root mean square error of approximation (RMSEA), the adjusted goodness-of-fit (AGFI), and the comparative fit index (CFI) values are presented in Table 3. All values satisfied the recommended levels of fit (Baumgartner & Homburg, 1996; Hoyle, 1995; Klem, 2000; Kline, 2011).

Table 3
Fit Indices for the Research Model

Model of fit indices	Values	Recommended guidelines for perfect fit	Fit
χ^2/df	.95	$0 \leq \chi^2/df \leq 2$	Perfect
GFI	.98	$.95 \leq GFI \leq 1.00$	Perfect
RMSEA	.00	$.00 \leq RMSEA \leq .05$	Perfect
AGFI	.93	$.90 \leq AGFI \leq 1.00$	Perfect
CFI	1.00	$.95 \leq CFI \leq 1.00$	Perfect

Hypothesis Testing

Table 4 presents the analysis of the proposed relationships, and Figure 2 shows the resulting path coefficients of the research model. The structural model provided a good fit to the data; 14 of the 17 hypotheses were supported by the data. Among the exogenous variables, the effects of cognitive presence (CP), teaching presence (TP), behavioral engagement (BE), cognitive engagement (CE), and emotional engagement (EE) on satisfaction were significant (CP: $\beta = .207$, $p = .001$; TP: $\beta = .395$, $p = .000$; BE: $\beta = .097$, $p = .029$; CE: $\beta = -.151$, $p = .000$; EE: $\beta = .427$, $p = .000$), whereas the effects of social presence (SP) and agentic engagement (AE) on satisfaction were not significant (SP: $\beta = .061$, $p = .161$; AE: $\beta = -.001$, $p = .979$). Second, the effects of cognitive presence, teaching presence, and cognitive engagement on emotional engagement were significant (CP: $\beta = .458$, $p = .000$; TP: $\beta = .307$, $p = .000$; CE: $\beta = .195$, $p = .001$), whereas the effect of social presence was not (SP: $\beta = .051$, $p = .439$). Third, the effect of cognitive presence on cognitive engagement was significant (CP: $\beta = .555$, $p = .000$). Fourth, the effects of cognitive engagement and cognitive presence on behavioral engagement were significant (CE: $\beta = .334$, $p = .000$; CP: $\beta = .376$, $p = .000$). Fifth, the effects of behavioral engagement, cognitive engagement, and teaching presence on agentic engagement were significant (BE: $\beta = .357$, $p = .000$; CE: $\beta = .277$, $p = .002$; TP: $\beta = .170$, $p = .029$).

Table 4
Hypothesis Testing Results

Hypotheses	Path	Path coefficient	SE	t-value	p	Results
Satisfaction ←	CP	.207	.082	3.201	.001	Supported
	SP	.061	.065	1.403	.161	Not supported
	TP	.395	.037	8.171	-	Supported
	AE	-.001	.050	-.026	.979	Not supported
	BE	.097	.073	2.182	.029	Supported
	CE	-.151	.069	-3.374	-	Supported
	EE	.427	.056	6.952	-	Supported
Emotional engagement ←	CP	.458	.120	5.330	-	Supported
	SP	.051	.108	.774	.439	Not supported
	TP	.307	.056	4.587	-	Supported
	CE	.195	.103	3.237	.001	Supported
Cognitive engagement ←	CP	.555	.064	7.117	-	Supported
Behavioral engagement ←	CE	.334	.083	3.811	-	Supported
	CP	.376	.068	4.281	-	Supported
Agentic engagement ←	BE	.357	.120	4.175	-	Supported
	CE	.277	.117	3.136	.002	Supported
	TP	.170	.051	2.186	.029	Supported

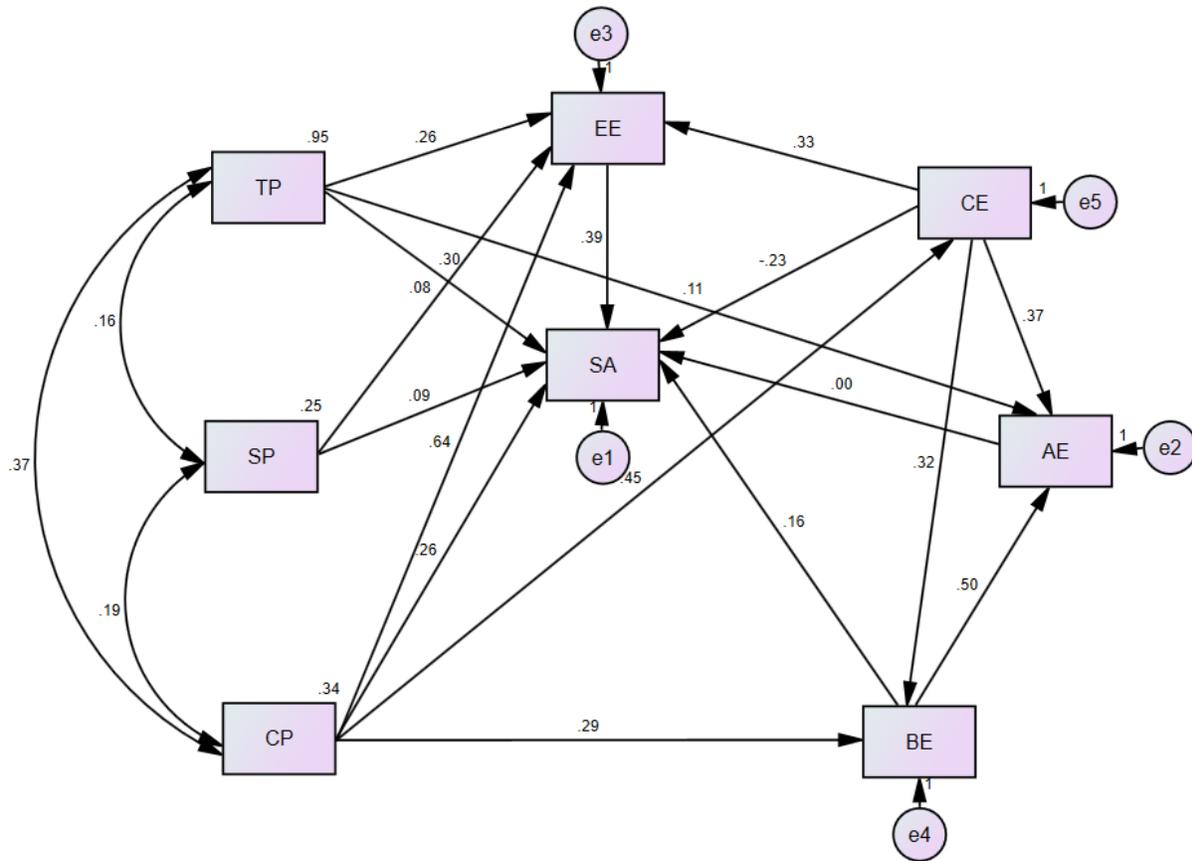


Figure 2. Hypothesized research model.

Based on the analysis of path coefficients, five endogenous variables were tested in the model. Cognitive presence, teaching presence, behavioral engagement, cognitive engagement, and emotional engagement explained 88% of the variance in satisfaction. The other four endogenous variables, emotional engagement, cognitive engagement, behavioral engagement, and agentic engagement, were explained by their determinants in amounts of 72%, 31%, 39%, and 42% respectively (Table 5). Namely, these dependent variables are predicted by the relationships between functions within the model with these percentages.

Table 5 shows the direct and indirect effects and standardized total effects, associated with each of the eight variables. The sum of the direct and indirect effects indicates total effect. According to Cohen (1988), an effect-size value greater than .5 is large, .5–.3 is moderate, .3–.1 is small, and anything smaller than .1 is insubstantial. The dominant determinant of satisfaction was teaching presence, with a total effect of .526. This was followed by emotional engagement and cognitive presence, with total effects of .427 and .420, respectively. The direct, indirect, and total effect values of the determinants on each dimension of engagement are presented in Table 5.

Table 5
Direct, Indirect, and Total Effects of the Research Model

Outcome	Determinant	Standardized estimates		
		Direct	Indirect	Total
Satisfaction ($R^2 = .880$)	CP	.207*	.212*	.420
	SP	.061	.022	.083
	TP	.395*	.131*	.526
	AE	-.001	-	-.001
	BE	.097*	-	.097
	CE	-.151*	.115*	-.036
	EE	.427*	-	.427
Emotional engagement ($R^2 = .719$)	CP	.458*	.108*	.566
	SP	.051	-	.051
	TP	.307*	-	.307
	CE	.195*	-	.195
Cognitive engagement ($R^2 = .308$)	CP	.555*	-	.555
Behavioral engagement ($R^2 = .392$)	CE	.334*	-	.334
	CP	.376*	.185*	.561
Agentic engagement ($R^2 = .420$)	BE	.357*	-	.357
	CE	.277*	.119*	.397
	TP	.170*	-	.170
	CP	-	.354*	.354

* $p < .05$

Discussion

This study investigated the structural relationships among the three CoI presences, four components of engagement, and satisfaction in fully online courses. The results of the study showed that the proposed model perfectly fits the observed relationships with online learners' engagement and satisfaction. Further, the dominant determinant of satisfaction was found to be teaching presence, which demonstrated direct and indirect effects on satisfaction. According to this result, we can infer that when teaching presence is strong, online learners are more likely to be satisfied with their online courses. The study findings are consistent with the results from previous studies (Arbaugh, 2008; Estelami, 2012; Jackson et al., 2010; Khalid & Quick, 2016; Ke, 2010; Kranzow, 2013; Ladyshewsky, 2013; Shea et al., 2003). Teaching presence, which begins prior to course implementation with curriculum design through the duration of the course with facilitation, is generally carried out by instructors, but can also involve peers as "teachers." It involves developing materials and scaffolds, monitoring and managing purposeful collaboration and reflection, and facilitating interactions in order to create meaningful learning (Garrison et al., 2010; Joo et al., 2013). Teaching presence has been shown to lead to increased cognitive presence and social presence (Kozan & Richardson, 2014). Therefore, effective instructional design and engaging teaching activities are extremely important in ensuring online learners' satisfaction.

The results also showed that cognitive presence was a main predictor of satisfaction, which coincides with results from previous studies (Akyol & Garrison, 2008; Giannousi & Kioumourtzoglou, 2016; Hosler & Arend, 2012; Kang et al., 2014). Online learners' understanding of their learning environment, cognitive activity, construction of knowledge to solve learning problems, and resource management to support all of these occur through cognitive presence. Moreover, it is possible to develop self-regulation of learning, ownership of learning, generative learning, and knowledge construction in the online learning process (Garrison & Arbaugh, 2007; Kang et al., 2014; Kozan & Richardson, 2014). Since these outcomes provide the focus and success of the learning experience, cognitive presence may be regarded as an important factor for students in terms of satisfaction. As stated by Akyol and Garrison (2008), cognitive presence is related to the purpose of students enrolling in an online course. Therefore, it should be taken into consideration as the determinant of satisfaction as well.

Contrary to expectations, the results showed that even though social presence was significantly correlated with satisfaction, it was not a significant predictor of satisfaction. A possible explanation for this might be that the students in this study are at the graduate level, enrolled in an online program, and have prior experience with online learning. They have purposefully chosen online learning rather than a face-to-face program, and most are probably aware of their learning preferences. Therefore, they could already have an emotional sense of belonging from previous courses with peers and a willingness to participate in social interactions by focusing on purposeful relationships. The average score for social presence was higher than the other two presences. Taken together, these results may indicate that social presence could have been a mediator for teaching and cognitive presence. As stated by Armellini and De Stefani (2016), social presence plays an important role in the construction of meaningful teaching and cognitive discourse, and both teaching presence and cognitive presence have "become social." Therefore, social presence may aid in enhancing satisfaction through interactions with the other two presences. Additionally, some researchers have outlined the misalignment and the problems with measuring social presence using the CoI framework. Accordingly, in order to obtain clearer results, social presence measures may need to be revisited and adjusted (Armellini & De Stefani, 2016; Kozan & Richardson, 2014; Lowenthal & Dunlap, 2014; Richardson et al., 2017; Shea et al., 2010). Moreover, it can be inferred that as stated by Kozan and Caskurlu (2018), the CoI framework should be refined with more theoretical and methodological considerations.

Emotional, behavioral, and cognitive engagement have significant effects on satisfaction. These results seem to be consistent with other research that found that engagement has significant effects on satisfaction in online learning environments (Bitzer & Janson, 2014; Shin & Chan, 2004; Swan, 2001). Emotional engagement was found to be one of the most important determining factors of satisfaction. Specifically, emotional engagement refers to students' having high interest and positive emotions towards teachers, peers, the course, and the learning experience (Fredricks et al., 2004). Therefore, providing and maintaining the students' emotional engagement for the entirety of the online learning process may contribute to students' overall satisfaction in online courses. Moreover, behavioral and cognitive engagement had small effects on satisfaction while agentic engagement had no significant effect. These results may be explained in part by the fact that these three engagement components are more related to the learning process than students' emotions.

Regarding the predictors of engagement, we found that cognitive presence is the dominant determinant of emotional, cognitive, and behavioral engagement, and had an indirect effect on

agentic engagement. These results indicate that cognitive presence is very important to maintaining engagement. Cognitive presence includes constructing meaningful knowledge, higher order thinking, and active involvement in the learning process based on students' experience, interaction and communication (Kanuka & Garrison, 2004). Therefore, it encourages students to be deeply involved in their learning and facilitates the engagement of students in their learning (Joo et al., 2013; Wang & Kang, 2006). Moreover, cognitive presence promotes the development of self-regulation of online learners. As stated by Park and Yun (2017), specific types of motivational regulation strategies can be used to promote emotional, cognitive, and behavioral engagement of online learners.

Teaching presence also had effects on emotional and agentic engagement. As stated in the literature, instructor presence, the availability of feedback, the choice of activities, and/or instructional deficiencies in the design of online courses are directly related to instructor and instructional design and could affect student engagement (Kelly, 2012; Mason, 2011; Meyer, 2014; Sull, 2012). Specifically, we can infer that students' constructive contribution and emotional involvement in the instructional process may be directly influenced by these factors. On the other hand, it is surprising that, while we found significant correlations between social presence and engagement, social presence is not a significant predictor of emotional engagement. This finding is contrary to studies that have suggested that lower levels of social presence may cause frustration and impact affective learning negatively (Garrison et al., 2000; Garrison & Akyol, 2013; Wei et al., 2012). In this study, since the online classes were at the graduate level and had small numbers of students, some of which may have previously been in class together, the interaction level may have been increased in a shorter period.

Regarding interrelationships among the engagement components, we found that cognitive engagement was mainly a predictor of the other three—agentic, behavioral, and emotional engagement. As explained by Richardson and Newby (2006), students who take more online courses and take more responsibility for their learning become more cognitively engaged. Therefore, triggering cognitive engagement may lead to deep engagement in all aspects of the learning process.

Conclusions

Understanding the predictors of online learners' engagement and satisfaction based on the CoI framework can provide significant contributions to online education theory and practice. This study found that increasing learners' perceptions of levels of teaching and cognitive presence enhanced their satisfaction with emotional engagement in online courses. Therefore, online instructors and instructional designers should apply teaching and cognitive presence strategies as suggested by the CoI framework. Moreover, significant predictors of each of the four engagement components should be considered in designing online courses:

- for emotional engagement, cognitive presence, teaching presence and cognitive engagement;
- for cognitive engagement, cognitive presence;
- for behavioral engagement, cognitive presence and cognitive engagement; and
- for agentic engagement, cognitive engagement, behavioral engagement, and cognitive presence.

This proposed model could serve as a guide for the improvement of both satisfaction and engagement.

This study does present some limitations that should be addressed in further research. First, data were obtained from a single graduate program with a limited sample size that was obtained through convenience sampling. In order to enhance the degree of generalization of research results, this model should be tested on larger, multiprogram samples. Also, the subcategories of each presence could be added as predictors in the model to obtain more detailed implications in terms of theory and practice. Finally, the data were collected through self-report instruments. Further research could enrich the data sources by analyzing students' online behaviors to support the results. Future research could also address other variables such as academic achievement or demographic control variables (e.g., age, experience, gender), which are possibly related to students' perceptions of presence, engagement and satisfaction.

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