

**REVISITING THE COI FRAMEWORK THROUGH A FACTOR
ANALYSIS, META-ANALYSIS, AND THEMATIC SYNTHESIS**

by

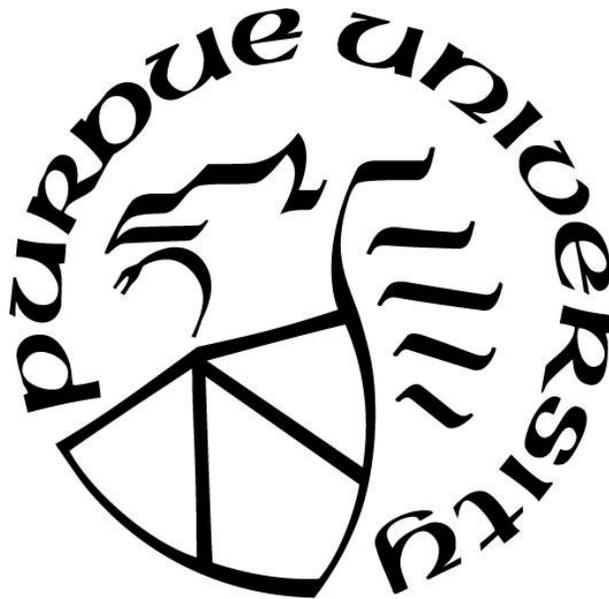
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To all those female scientists who have been contributing to science...

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ABSTRACT

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Title: Revisiting the Community of Inquiry Framework through a Confirmatory Factor Analysis, Meta-Analysis, and Thematic Synthesis

Committee Chair: Jennifer Richardson, William R. Watson

The purpose of this three-manuscript dissertation was to examine the construct and predictive validity of the Community of Inquiry (CoI) framework (i.e., teaching, cognitive and social presence) through a confirmatory factor analysis, meta-analysis, and qualitative synthesis. The first paper was a confirmatory factor analysis study that investigated the construct validity of the social, cognitive, and teaching presences. The second manuscript was a meta-analysis that a) examined the magnitude of the relationship between social presence and student outcomes (i.e., satisfaction and perceived learning) in fully online courses in a higher education setting; and b) identified the patterns (e.g., context, disciplinary areas, course duration, and measures of presences) that moderate the strength of the relationships. The third manuscript was a thematic synthesis that investigated the factors perceived by students as influencing their online learning experiences through the lens of the Community of Inquiry framework. Accordingly, the overall results provided conceptual and empirical insights into the construct and predictive validity of the CoI framework. Finally, the last chapter summarized the main findings and contributions of each manuscript and discussed the potential avenues for future research and implications for practice.

CHAPTER 1: INTRODUCTION

Regardless of the size and type, online enrollment in higher education is growing (Legon & Garnett, 2017; Seaman, Allen, & Seaman, 2018). As of Fall 2016, students at both undergraduate and graduate level taking at least one of their courses online represented 31.6% of the all higher education enrollments (Seaman, Allen, & Seaman, 2018). Seaman et al. (2018) further indicated that, online enrollment in higher education across the US has increased 17.2% since 2012. In addition to flexibility and the “self-paced workload” of online courses, online education also allows students access to educational opportunities, specifically for non-traditional students (e.g., working adults) (Ortagus, 2017). Given the increasing enrollment rates in online, institutions are looking for more innovative ideas to “monitor new tools, pedagogical models, and organizational strategies” to provide satisfying learning experiences for students (Legon & Garnett, 2017, p. 12).

One of the promising models that takes into account satisfying learning experiences for students, is the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000). The CoI framework is situated within the collaborative constructivist theoretical orientation and provides guidance for research and practice in online learning (Akyol & Garrison, 2011; Akyol, Ice, Garrison & Mitchell, 2010; Swan & Ice, 2010). Aligning with the Dewey’s educational philosophy and constructivist approaches in higher education (Garrison & Arbaugh, 2007), the CoI framework suggests that learning cannot be separated from its social context (Garrison et al., 2000). The CoI framework explains deep and meaningful learning through the interaction of three essential elements: a) social, cognitive, and teaching presences. In this framework, social presence is defined as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of

communication being used” (Garrison et al., 2000, p. 94). The second element of the CoI is cognitive presence, which is derived from critical-thinking literature and operationalized based on the cycle of Practical Inquiry Model (Garrison, Anderson, & Archer, 2001) and defined 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). Finally, teaching presence is defined as “the design, facilitation, and direction of cognitive and social process for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison, & Archer, 2001, p. 5). Teaching presence begins before the course starts as the course is planned and prepared, and it continues with the progression of the course implementation as the instructor facilitates the course (Anderson et al., 2001).

Since its development, the CoI framework is the most used framework in online teaching and learning research (Befus, 2016). To date, an extensive body of research has provided empirical evidence on how the presences of the CoI framework contributes to student learning experiences (e.g., satisfaction, perceived learning, actual learning outcomes) in online learning (e.g., Richardson & Swan, 2003). Despite the number of empirical studies, yet, no research has systematically integrated the previous study findings. Therefore, one of the purposes of this dissertation was to synthesize the previous research findings through a meta-analysis and a thematic synthesis to provide a holistic view of the CoI framework and student outcomes. The meta-analysis investigates the magnitude of the relationship between social presence and student outcomes in fully online courses in a higher education setting. The thematic synthesis aims to thematically synthesize previous research which provides qualitative evidence to determine the factors that influence student online learning experiences in online. Before providing research-

based insights into the CoI and student outcomes, I examined the conceptualization of the individual presences of the CoI framework as previous research has addressed concerns related to the construct validity of the individual presences because of a) their multidimensional structures (Arbaugh & Hwang, 2006; Garrison & Arbaugh, 2007; Shea et al., 2006), and b) inconclusive research findings about whether teaching presence has two or three factors (Arbaugh & Hwang, 2006; Shea et al., 2006). Therefore, this dissertation begins by examining the conceptualization as well as the operationalization of the individual presences of the CoI. To that end, following the journal paper format in this dissertation, I have prepared three manuscripts which have either been published or will be submitted to scholarly journals to achieve these goals. Each manuscript will appear as a separate chapter in the dissertation. The following sections provide an overview of each chapter.

Overview of Chapter 2

In order to examine the construct validity of the three individual presences of the CoI framework, I first conducted a confirmatory factor analysis to determine whether they demonstrate a clear factor solution corresponding to each dimension proposed by the CoI framework as operationalized by the CoI instrument (Arbaugh et al., 2008). The main research questions included:

1. Does teaching presence demonstrate a three-factor solution aligning with the CoI framework?
2. Does social presence demonstrate a three-factor solution aligning with the CoI framework?
3. Does cognitive presence demonstrate a four-factor solution aligning with the CoI framework?

The participants of this study included graduate level students (n= 310) enrolled in fully online courses at a large Midwestern University. I run a confirmatory factor analysis for each presence to evaluate fit of the data to the hypothesized factor model proposed by the CoI framework. In addition, I also tested the convergent validity based on factor loadings > 0.5 (Fornell & Larcker, 1981) and discriminant validity by calculating the chi-square difference between un-constrained model, which allows the correlation between constructs to be free, and the constrained model, which the correlation between constructs to be constrained to 1.0 (Deery et al., 1999). When comparing models, a lower chi-square and expected-cross validation (ECVI) values indicate a better fit (Jöreskog & Sörbom, 1993). The results of this study empirically supported the construct validity of the three individual presences of the CoI framework as well as the CoI instrument.

Overview of Chapter 3

As part of a research team I conducted a meta-analyses to examine the degree to which social presence is correlated with student outcomes in fully online courses in a higher education setting. The main research questions included:

1. How strong is the relationship between social presence and students' satisfaction in fully online courses? To what extent does the strength of the correlation vary across studies?
2. How strong is the relationship between social presence and students' perceived learning in fully online courses? To what extent does the strength of the correlation vary across studies?

3. What are the conditions (e.g., type of scale used to measure social presence, audience of the course, discipline area, and course length) that moderate the strength of the correlations?

The target population of this meta-analysis consisted of empirical studies that a) was published from 1992 when social presence was first applied as a construct in online learning research (i.e., Gunawardena, 1995; Spears & Lea, 1992; Walther, 1992) to May 2015); b) used social presence as its theoretical framework, c) investigated the relationship between social presence and either perceived learning or students' satisfaction in fully online courses in a higher education setting; and d) reported quantitative information provided enough statistical information, including correlation, or sample size and mean. Based on these criteria, we included 25 studies in the final pool, including 19 studies that reported effect size for the relationship between social presence and satisfaction and 14 studies that reported effect size for the perceived learning. After handling dependent effect sizes, a total of 28 effect sizes for satisfaction and 30 effect sizes for perceived learning were extracted. To examine the magnitude of the relationship between social presence and student outcomes, we used a random-effects model. The results showed that social presence is positively related to the student outcomes in fully online courses. Further, in order to investigate the variation of the effect sizes across studies, we used three statistics, including a) Q test to assess the homogeneity of effect sizes; b) τ^2 to test the between-groups effect size variance; and c) I^2 statistic to assess the variation in effect sizes among studies. Based on I^2 statistics, there were effect size variations due to differences across. The moderator analysis showed that a) course length, discipline area, and scale used to measure social presence were identified as significant moderators for the relationship between social presence and satisfaction and b) course length, discipline area, and target audience of the course were

identified as significant moderators for the relationship between social presence and perceived learning.

Overview of Chapter 4

Chapter 4 presents a thematic synthesis which aims to provide a comprehensive understanding of the factors that influence students' online learning experiences through the lens of the CoI framework. Serving as first author, I aimed to provide research-based evidence to explain how a collective body of qualitative research contributes to our understanding of the relationship between the CoI presences and student's outcomes in online. Specifically, the research questions were:

1. What are the factors perceived by students as impacting their learning experiences in fully online courses through the lens of the CoI framework?
2. What are the research patterns, including themes and methodologies used in the primary studies?

This synthesis included studies a) published within the last 10 years (2007-2017); b) used the CoI as a framework; c) focused on the student's learning experiences in fully online courses in a higher education setting; d) provided qualitative evidence, including verbatim evidence from the participant's voice/grounded data; and e) reported in English. Based on those criteria, we included 29 studies in the final pool. Following a three-stage procedure specified by Thomas and Harden (2008), we a) coded all included studies; b) developed descriptive themes based on the codes; and c) generated analytical themes based on the descriptive themes. The results revealed ten descriptive themes covered by three overarching categories (i.e. course design, instructors' actions during the course, and peers' actions during the course). Analytical themes included

accountability, being real, and supporting learning process. In addition, the results provided insights for the methodological quality of included studies.

Overview of Chapter 5

Finally, in Chapter 5, I first summarized the results of each manuscript. Then, I brought these three manuscripts together to look at CoI framework and the research holistically. I also discuss the potential directions for the future works as well as for practical application of the research presented in this dissertation.

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CHAPTER 2: CONFIRMING THE SUBDIMENSIONS OF TEACHING, SOCIAL, AND COGNITIVE PRESENCES: A CONSTRUCT VALIDITY STUDY

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Abstract

This confirmatory factor analysis study examined the construct validity of the three presences of the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000). The participants of this study were graduate students enrolled in fully online courses at a large Midwestern university. The results revealed that (a) the data fit very well with the thirteen item-three factor teaching presence model, (b) the data fit very well with the nine item-three factor social presence model, and (c) the data fit very well with the twelve item-four factor cognitive presence model. The results of this study empirically supported that each presence demonstrates a clear factor solution as proposed by the CoI framework. Theoretical and practical implications of the study results are discussed.

Introduction

Within the overall collaborative constructivist approach, the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000) describes and measures the elements of collaborative online learning experiences (Garrison, Anderson, & Archer, 2010; Swan & Ice, 2010). According to this framework, the “online learning experience unfolds” through the interaction of the three key elements: social presence, teaching presence, and cognitive presence (Swan & Ice, 2010, p. 1). Since the development of the CoI, it has been the most widely used and cited framework as a theoretical context for research in both online and blended learning

(Anderson, 2016; Befus, 2016; Swan & Ice, 2010). The CoI framework also provides both theoretical and methodological guidance for designing, teaching and learning in online learning environments (Swan, Garrison, & Richardson, 2009).

Arbaugh et al. (2008) from different institutions developed the self-reporting CoI instrument to operationalize the CoI framework and validated using multi-institutional data. Further studies examining the reliability and validity of the CoI instrument have also empirically supported the reliability of the CoI instrument and the construct validity of the CoI framework (Díaz, Swan, Ice, & Kupczynski, 2010; Garrison, Cleveland-Innes, & Fung, 2010; Kozan & Richardson, 2014). This indicates that teaching, social, and cognitive presences are the individual latent factors of the CoI framework. However, because of their multidimensional structure, previous research has highlighted the need for larger sample empirical studies concerning the construct validity of all three presences of the CoI (Arbaugh, 2007; Arbaugh & Hwang, 2006). For example, although previous research (e.g., Arbaugh & Hwang, 2006; Shea, Li, & Pickett, 2006) has attempted to validate the factor structure of teaching presence by using the Teaching Presence Scale (TPS) developed by Shea, Fredericksen, Pickett, and Pelz (2003), there is no agreement among studies about whether teaching presence has three or two dimensions or factors. The purpose of this study is to examine the latent factor structure of the three presences of the CoI framework to determine whether they demonstrate a clear factor solution corresponding to each construct proposed by the CoI framework as operationalized by the CoI instrument.

Community of Inquiry Framework

The CoI framework is a process model that explains how deep and meaningful learning occurs within the community through the interaction of the three core elements. Social presence

focuses on how participants socially interact in online learning environments and cognitive presence refers to higher-order thinking and critical thinking (Garrison et al., 2000). Teaching presence focuses on the design, facilitation, and direction of social and cognitive presence in order to achieve desired learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001).

Early research on the CoI framework focused on assessing individual presences through content analysis (Anderson et al., 2001; Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 2001). Later, Arbaugh and his colleagues from multiple institutions (2008) developed and validated the self-reporting CoI instrument with 34 items to measure the three presences in online learning environments. Arbaugh et al. (2008) deployed a principal component analysis (PCA) with 287 graduate students from multiple institutions in order to explore the factor structure of the CoI instrument. Their initial analysis yielded the possibility of an additional fourth factor with the eigenvalue > 1.0 . However, this additional fourth factor caused a decrease in magnitude of the first and second factors' eigenvalues. Their results produced a clear three-factor solution aligned with the CoI framework. Over half (51.1%) of the total variance in this three-factor solution is attributed to the first factor, teaching presence. Their results also revealed that the instrument showed a high internal consistency for each presence with Cronbach's alpha values of 0.94 for teaching presence, 0.91 for social presence, and 0.95 for cognitive presence.

Díaz et al. (2010) used multiple rating measures to validate the CoI instrument. They differed from other validation studies by asking students to rate the importance of each CoI instrument item in addition to the degree to which teaching, social, and cognitive presence are manifest in their courses. They conducted PCA with oblimin rotation by specifying a three-factor solution. Aligning with the CoI framework, each item loaded on a corresponding factor.

Cronbach's Alpha was 0.96 for teaching presence, 0.92 for social presence, and 0.95 for cognitive presence. However, they noted that when a number of factors were not specified, PCA resulted in additional fourth factor with an eigen value > 1 . Similar to Arbaugh et al. (2008), they also concluded that teaching presence might measure more than one construct.

In a later factor analysis, Kozan and Richardson (2014) performed an exploratory factor analysis (EFA) with promax rotation and confirmatory factor analysis (CFA). Different from previous studies, they utilized parallel analysis to determine the potential number of factors extracted in addition to scree plot and eigenvalue > 1 . Their initial analysis also indicated a potential additional fourth factor. However, parallel analysis resulted in the three factors proposed by the CoI framework. Consequently, they ran their EFA analysis with three factors and results demonstrated the alignment of the three-factor solution with the CoI framework. Finally, their final CFA model confirmed the three-factor model aligning with the CoI framework ($\chi^2(514) = 1193.71; p < 0.0$). Cronbach's Alpha was 0.96 for teaching presence, 0.91 for social presence, and 0.94 for cognitive presence.

In addition to the studies utilized the CoI instrument in English, previous research has also reported reliability and validity of the translated versions of the CoI instrument. For example, Öztürk (2012) conducted a CFA to examine the validity of the CoI instrument translated in Turkish by using a multi-institutional data ($n = 140$) from three universities. The final CFA model produced a clear three-factor solution aligning with the CoI instrument ($\chi^2(523) = 921.75; p < 0.01$). Cronbach alpha value was 0.92 for teaching presence, 0.88 for social presence, 0.75 for cognitive presence, and 0.97 for the overall instrument. Likewise, Yu and Richardson (2015) performed both EFA and CFA to examine the reliability and validity of the CoI instrument translated in Korean. Their EFA results on 34 items produced a clear three-factor

model aligning with the CoI framework. However, since two items (i.e., “Getting to know other course participants gave me a sense of belonging” in SP and “The instructor clearly communicated important due dates/time frames for learning activities” in TP) cross loaded onto two factors, they were removed from the final analysis. The final EFA on the 32 items supported three factors model of the CoI instrument. They ran CFA with 32 items and the results produced a clear three-factor solution aligning with the CoI instrument ($\chi^2(461) = 1925.88, p < 0.001, IFI = 0.98, CFI = 0.98, GFI = 0.79, RMSEA = 0.084$). Cronbach's Alpha was 0.95 for teaching presence, 0.91 social presence, 0.96 for cognitive presence, and 0.97 for overall instrument.

In all, previous validation studies have provided empirical support that all the items loaded significantly or converge on their corresponding factors aligning with the CoI framework as operationalized by the CoI instrument. Conversely, items showed small loadings onto the other factors, which are measured by different set of items. Respectively, such results provide empirical evidence of convergent and discriminant validity of the CoI instrument items as well as three-factor structure of the CoI framework (addressing a potential fourth factor).

Furthermore, some researchers have argued that the CoI framework does not reflect the full scope of possible components of online learning and have proposed additional presences (e.g., learning presence, emotional presence, autonomy presence, and agency presence). For example, Shea and Bidjerano (2010) proposed learning presence, suggesting that the current CoI framework is not enough to explain learner discourse in online learning environments. They first conceptualized learning presence as self-efficacy and effort regulation. Later, Shea and colleagues (e.g., Hayes, Uzuner-Smith, & Shea, 2015; Shea et al., 2014) continued to assess learning presence in online learning environments through content analysis and social network analysis. They found that the learning presence construct correlated with other presences and

students' learning outcomes, such as course grades. As they have continued to work on learning presence, the definition and conceptualization has evolved. Shea et al. (2014) defined learning presence as “an iterative processes of forethought and planning, monitoring and adapting strategies for learning, and reflecting on results that successful students use to regulate their learning in online, interactive environments” (p. 10).

In a similar vein, Lam (2015) also asserted that the current CoI model does not reflect the learner discourse role in online learning environment and suggested autonomy presence, which is a social dimension of learning. According to Lam (2015):

Autonomy presence occurs when individual and social presences happen with two or more individuals. The sharing of ideas starts in autonomy presence and collaboration initiated from sharing continues in social presence. Autonomy presence initiates the discourse that leads to educational experience in social presence. It extends the discourse in the course, which is facilitated by the teachers (p. 55).

He indicated that autonomy presence leads social and cognitive presence, and students replace the role of teacher in “deciding and sharing the content and initiating and directing the discourse” (Lam, 2015, p. 55). However, he further noted that autonomy presence can be complementary to learning presence and it needs to be further studied.

Anderson (2016) criticized whether the current CoI framework captures all the elements needed for successful online education and suggested agency presence, which captures the components mentioned by both Shea and Lam. Additionally, Cleveland-Innes and Campbell (2012) proposed emotional presence as a new construct in the CoI framework, defining it as “the outward expression of emotion, affect, and feeling by individuals and among individuals in a community of inquiry, as they relate to and interact with the learning technology, course content,

students, and the instructor” (p. 283). In order to provide empirical evidence for emotional presence, they employed a PCA with 219 participants. Their results indicated, “the emotive experience does exist in combination with social presence, but it also clusters together as a unique presence” (p. 283). In a later study, Stenbom, Hrastinski, and Cleveland-Innes (2016) examined emotional presence in online one-to-one math coaching by using the data from a survey of online coaches and a transcript coding procedure from the online coaching service Math Coach. They found that emotional presence exists in online learning, and emotional presence exists as a separate element within the Relationship of Inquiry model, which is an adaptation of the CoI to one-to-one online coaching setting.

These additional presences are under investigation and have not been validated as part of the CoI framework (Kozan & Caskurlu, 2018). Therefore, in this study, the three-factor model proposed by Garrison et al. (2000) were used. Table 2.1 shows the proposed clustering of the dimensions for the three presences (Garrison et al., 2000).

Table 2. 1: Operationalization of the CoI Framework

Dimensions	Categories
Social Presence	<ul style="list-style-type: none"> • Open Communication • Group Cohesion • Affective Expression
Cognitive Presence	<ul style="list-style-type: none"> • Triggering Event • Exploration • Integration • Resolution
Teaching Presence	<ul style="list-style-type: none"> • Design & Organization • Facilitating Discourse • Direct Instruction

The following sections will describe the research related to the three presences and operationalization of each presence.

Social Presence

Social presence refers to “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). Previous research on social presence has demonstrated that social presence is a significant determinant of students' satisfaction with the course (Arbaugh, 2005, 2008; Gunawardena & Zittle, 1997; Richardson, Maeda, Lv & Caskurlu, 2017; Strong, Irby, Wynn, & McClure, 2012), students' satisfaction with the instructor (Richardson & Swan, 2003; Swan & Shih, 2005), and students' perceived learning in online courses (Richardson et al., 2017; Richardson & Swan, 2003).

Initially, Garrison et al. (2000) conceptualized social presence as emotional expression (now affective expression), open communication, and group cohesion. Later, Rourke et al. (2001) expanded these categories and identified 12 indicators of social presence within three categories based on Wiener and Mehrabian's (1968) work on immediacy to assess social presence in online discussions. Tu (2000) conceptualized social presence as social context, online communication, and interactivity. He also addressed privacy as a separate dimension or factor of social presence as it might impact the degree of perceived social presence. However, in Tu and McIsaac's (2002) factor analysis, privacy did not appear as a separate factor. Later, Sung and Mayer (2012) developed and validated the Online Social Presence Questionnaire (OSPQ) based on early measures of social presence, including Aragon (2003), Polhemus, Shih, and Swan (2001), Rourke et al. (2001), Tu and McIsaac (2002), and Yen and Tu (2011). Their operationalization included five factors: social respect, social sharing, open mind, social identity, and intimacy. Research on social presence has tried to address issues that arise because of its diverse definitions and conceptualizations (Kreijns, Kirschner, Jochems, & van Buuren, 2011;

Lowenthal, 2010). For example, in a recent meta-analysis focusing on the magnitude of the relationship between social presence and student outcomes in fully online courses, Richardson et al. (2017) identified > 10 different definitions of social presence and indicated that the commonality among these definitions is “is the ability to perceive others in an online environment” (p. 403). In that regard, Lowenthal (2010) claimed, “it is often hard to distinguish between whether someone is talking about social interaction, immediacy, intimacy, emotion, and/or connectedness when they talk about social presence” (p. 125). In this study it has been hypothesized that social presence dimensions include affective expression (“where learners share personal experiences of emotion, feelings, beliefs, and values”), open communication (“where learners build and sustain a sense of group commitment”), and group cohesion (“where learners interact around common intellectual activities and tasks”) (Swan et al., 2009, p. 52). Just as the conceptualization of social presence varies, there are a number of instruments measuring social presence in the literature (Richardson et al., 2017; Kreijns et al., 2011). However, as Richardson et al. (2017) found, the type of scale used to measure social presence is a significant predictor of the relationship between social presence and student outcomes, specifically student's satisfaction, and concluded that “psychometric properties of a scale used to measure a construct will also affect the correlation among constructs” (p. 414).

Cognitive Presence

Cognitive presence is derived from critical-thinking literature and operationalized based on the cycle of Practical Inquiry Model (Garrison et al., 2001) and defined 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). Relevant research on the impact of cognitive presence on student outcomes in online environments

suggests a significant relationship between cognitive presence and student's perceived learning (Akyol & Garrison, 2008; 2011; Arbaugh et al., 2008; Kyei-Blankson, Ntuli, & Donnelly, 2016) and satisfaction (Joo, Lim, & Kim, 2011; Roh, 2015).

According to the Practical Inquiry Model, learners move deliberately from understanding a problem or issue to exploration, integration and application (Garrison & Arbaugh, 2007). The four phases of cognitive presence include: (a) a triggering event where some issue or problem is identified for further inquiry, (b) students' exploration of the issue both individually and collaboratively through critical reflection and discourse, (c) integration, or constructing meaning from the ideas developed during exploration, and (d) resolution, where learners apply the newly gained knowledge to new educational contexts or workplace settings (Garrison et al., 2001). In addition, it is important to note that the Practical Inquiry Model is iterative and does not progress “sequentially or discretely” (Garrison & Anderson, 2003). Previous studies examining the distribution of cognitive presence in online environments indicated that students did not reach integration and resolution phases (e.g. Akyol & Garrison, 2008). In that regard, Garrison et al. (2010) asserted that most reasonable explanation could be “the design and expectations of the educational experiences” (p. 6). The authors also indicate that this could be a question about the validity of the cognitive presence as well.

Teaching Presence

Teaching presence is defined as “the design, facilitation, and direction of cognitive and social process for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson et al., 2001, p. 5). Teaching presence begins before the course starts as the course is planned and prepared, and it continues with the progression of the course

implementation as the instructor facilitates the course (Anderson et al., 2001). Anderson et al. (2001) conceptualized teaching presence as:

- design and organization which begins before the course starts and focuses on designing and planning the course,
- facilitation discourse that occurs during the course and focuses on facilitating the course, maintaining learner's motivation, and encouraging learners for active learning, and
- direct instruction that also happens during the course where instructor shares subject matter knowledge with students, and provides intellectual and scholarly leadership.

Research on teaching presence has demonstrated that it is a significant predictor of students' satisfaction (Arbaugh, 2008; Khalid & Quick, 2016; Kyei-Blankson et al., 2016) and perceived learning in online courses (Arbaugh, 2008; Shea, Li, Swan, & Pickett, 2005).

As there have been questions about a potential fourth factor for the CoI model, the teaching presence itself has encountered some questions about its conceptualization. It has been argued that if it has three factors (Arbaugh & Hwang, 2006; Miller, Hahs-Vaughn, & Zygoris-Coe, 2014) or two factors (Shea et al., 2005; Shea et al., 2006). For example, Shea et al. (2005) performed a factor analysis to explore the factor structure of teaching presence as measured by TPS. Their factor analysis results produced two factors namely instructional design and organization, and directed facilitation. They noted that direct instruction may not be a latent construct of teaching presence, but it is a discrete factor that contributed to facilitation. The authors concluded that teaching presence of the CoI model may need to be refined. Likewise, in a further study Shea et al. (2006) conducted a PCA to examine the factor structure of teaching

presence by using the TPS. Their final model consisted of two factors: combination of facilitating discourse and direct instruction. Conversely, Arbaugh and Hwang (2006) used structural equation modeling to examine the construct validity of teaching presence by using the TPS with the sample of participants from MBA courses. The results supported a three-factor solution, including design and organization, facilitation discourse, and direct instruction as proposed by the CoI framework after removing three cross-loaded items from facilitation discourse and one non-significant loaded item from the direct instruction (GFI = 0.91; AGFI = 0.86; NFI = 0.98; $\chi^2(91) = 161.31$; RMR = 0.04). As a summary, all these studies indicated the factor structure of teaching presence is still not clear and it might need to be refined.

Current Study

Previous validation studies have provided empirical evidence for teaching, social, and cognitive presence as discriminant latent factors of the CoI framework (Arbaugh et al., 2008; Kozan & Richardson, 2014; Yu & Richardson, 2015; Öztürk, 2012). However, researchers addressed concerns regarding to conceptualization and operationalization of the individual presences because of their multidimensional structures (e. g. Arbaugh & Hwang, 2006; Garrison & Arbaugh, 2007; Kreijns, Van Acker, Vermeulen, & Van Buuren, 2014; Lowenthal, 2010; Shea et al., 2006). Early studies exploring the development and distribution of individual presences in online environments mainly used transcript analysis and utilized coding protocols. Addressing concerns about the diversity of coding protocols, Garrison and Arbaugh (2007) asked that “whether the elements have been well defined and if the categories are valid (representative of the element). Do the categories fully describe the elements (i.e., presences) of the community of inquiry?” (p. 160). Thus, more attention should be given into the factor structure of individual presences. A clear understanding of the multi-dimensional structure of individual presences is

not only a theoretical issue, but also has practical implications as each presence directly or indirectly supports the development of other two presences, and each presence contributes the prediction of student outcomes (e.g., actual learning, perceived learning, satisfaction, etc.) in online (Arbaugh, 2013; Arbaugh & Hwang, 2006). Yet, to date, studies examining the construct validity of the individual presences in online learning environments have been limited to teaching presence as measured by the TPS developed by Shea et al. (2003), however, as previously, their findings were inconclusive (e.g., Arbaugh, 2007; Arbaugh & Hwang, 2006; Shea et al., 2006). Therefore, this confirmatory factor analysis study makes a significant contribution to the CoI literature by being the first study using the CoI instrument to examine the construct validity of each individual presence in online learning. Specifically, this study aims to examine the latent factor structure of teaching, social, and cognitive presences to determine whether they demonstrate a clear factor solution as proposed by the CoI framework. To achieve this, following research questions were posed:

1. Does teaching presence demonstrate a three-factor solution aligning with the CoI framework?
2. Does social presence demonstrate a three-factor solution aligning with the CoI framework?
3. Does cognitive presence demonstrate a four-factor solution aligning with the CoI framework?

Methodology

Participants

The sample for this study came from 12 fully online graduate level courses offered in a Learning Design and Technology program at a large Midwestern University in the US. These

courses are designed by fulltime faculty members but are taught by a number of limited term lecturers (LTLs) as well as fulltime faculty (Richardson et al., 2015). The common elements included in these courses were weekly overviews, interactive discussion forums with prompted questions, authentic learning activities that ask students to apply instructional design theories and principles to solve a real-world problem, and individual and collaborative group projects.

The data were collected from Fall 2011 to Summer 2015. The online questionnaire was accessed by 1017 people. However, 206 of the participants were enrolled in more than one online course. In order to control for the possibility of including these participants more than once, duplicate cases ($n = 600$) were identified based on the ID numbers provided by the participants. Only the initial response from each individual was included in the current study. Since 107 of the participants chose not to provide an ID number, they were removed from the sample. The final data set included 310 participants, of these (a) 155 (49.8%) were female, 59 (19%) male, and 97 (31.2%) did not indicate gender and (b) ages ranged from 23 to 65.

Measure

The CoI instrument (Arbaugh et al., 2008) was used for data collection. The survey instrument is v4 and downloaded from the CoI website (See Appendix A for the instrument). The instrument consists of 34 items including nine items measuring social presence (e.g., “Getting to know other course participants gave me a sense of belonging in the course”, “I felt comfortable interacting with other course participants”, “I felt comfortable disagreeing with other course participants while still maintaining a sense of trust”), 12 items for cognitive presence (e.g., “Problems posed increased my interest in course issues”, “Brainstorming and finding relevant information helped me resolve content related questions”, “Reflection on course content and discussions helped me understand fundamental concepts in this class”, “I can apply the

knowledge created in this course to my work or other non-class related activities”), and 13 items for teaching presence (e.g., “The instructor provided clear instructions on how to participate in course learning activities”, “The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn”, “The instructor helped to focus discussion on relevant issues in a way that helped me to learn”). Items ranged from 1 = “Strongly Disagree” to 5 = “Strongly Agree”.

Data Screening

First, data were screened for missing data points. Since missing data points were < 5%, missing values were replaced with the sample mean (Tabachnick & Fidell, 2013). Second, data were checked for univariate and multivariate outliers, and 40 cases were eliminated. Following, there was no multicollinearity or singularity issue among the items based on the 0.90 or above cut point (Tabachnick & Fidell, 2013). Finally, data were checked for normality assumption. Unfortunately, the majority of items did not meet the normal distribution criteria. Different transformation methods (e.g., log transformation) were applied in order to check if the transformation could improve the distributional properties, but found that they did not. However, it is difficult to assume normality in rating scales (Clason & Dormody, 1994; Wu, 2007), and the sample size is large enough (> 30) that the violation of the normality assumption is not expected to cause major problems (Pallant, 2007).

Data Analysis

A confirmatory factor analysis (CFA) using LISREL 9.2 (Jöreskog & Sörbom, 2014) was conducted to test for significance of item loadings on each corresponding factor, and to evaluate fit of the data to the hypothesized factor model proposed by the CoI framework. A comparative fit index (CFI), an incremental fit index (IFI), normed fit index (NFI), and non-normed fit index

(NNFI) above 0.95 and a goodness of fit index (GFI) above 0.90 are indicative of model fit (Hu & Bentler, 1999). Root mean square error of approximation (RMSEA) value below 0.05 are considered excellent in terms of fit and below 0.10 are considered adequate (Browne & Cudeck, 1993). In addition to the model fit indices, convergent validity and discriminant validity were also used to test construct validity. Convergent validity is defined as “the degree to which measures are associated with corresponding construct”, and discriminant validity is defined as “the degree to which measures of constructs are distinct” (Deery, Iverson, & Erwin, 1999, p. 543). The convergent validity is tested based on factor loadings > 0.5 (Fornell & Larcker, 1981). The discriminant validity was tested by calculating the chi-square difference between unconstrained model, which allowed the correlation between constructs to be free, and the constrained model, which the correlation between constructs to be constrained to 1.0 (Deery et al., 1999). This was performed for one pair of constructs at a time. When comparing models, a lower chi-square and expected-cross validation (ECVI) values indicate a better fit (Jöreskog & Sörbom, 1993).

Results

Descriptive Statistics

To analyze the data, first, the internal reliability of each subscale was tested. Based on the current sample, internal reliability for overall instrument, teaching presence, social presence, and cognitive presence were 0.96, 0.96, 0.89, and 0.94 respectively indicating high internal consistency among the items. Tables 2, 3, and 4 show the means, standard deviations, and correlation coefficients of the categories of the all three presences. All correlation coefficients were significantly related to each other. Mean scores on the teaching presence items (see Table 2.2) ranged from $M = 3.77$ to $M = 4.42$, social presence items (see Table 2.3) ranged from $M =$

4.07 to $M = 4.44$, and cognitive presence items (see Table 2.4) ranged from $M = 4.03$ to $M = 4.40$.

Table 2. 2: Correlation Matrix and Descriptive Statistics of Teaching Presence Items

Items	M	SD	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	TP12
Design & Organization														
TP1	4.16	0.89												
TP2	4.19	0.86	0.83											
TP3	3.91	1.04	0.77	0.77										
TP4	4.15	0.97	0.57	0.61	0.63									
Facilitation														
TP5	3.83	1.02	0.65	0.6	0.64	0.5								
TP6	3.78	1.04	0.71	0.7	0.67	0.5	0.82							
TP7	3.81	1.03	0.68	0.68	0.63	0.45	0.74	0.82						
TP8	3.85	0.99	0.73	0.72	0.69	0.49	0.73	0.83	0.84					
TP9	3.98	0.95	0.58	0.57	0.56	0.46	0.65	0.71	0.68	0.73				
TP10	3.86	1	0.59	0.6	0.57	0.39	0.65	0.73	0.73	0.73	0.67			
Direct Instruction														
TP11	3.82	1.05	0.66	0.68	0.66	0.45	0.77	0.83	0.83	0.84	0.74	0.78		
TP12	3.86	1.06	0.6	0.59	0.57	0.46	0.62	0.7	0.64	0.65	0.62	0.58	0.67	
TP13	3.77	1.23	0.57	0.6	0.63	0.49	0.58	0.66	0.64	0.59	0.5	0.53	0.62	0.63

Table 2. 3: Correlation Matrix and Descriptive Statistics of Social Presence Items

Items	M	SD	SP14	SP15	SP16	SP17	SP18	SP19	SP20	SP21
Affective Expression										
SP14	4.02	0.78								
SP15	4.07	0.72	0.59							
SP16	4.06	0.75	0.46	0.4						
Open Communication										
SP17	4.45	0.58	0.35	0.35	0.51					
SP18	4.47	0.61	0.41	0.36	0.46	0.78				
SP19	4.45	0.57	0.44	0.36	0.52	0.8	0.84			
Group Cohesion										
SP20	4.27	0.67	0.42	0.34	0.51	0.57	0.61	0.63		
SP21	4.3	0.62	0.49	0.42	0.31	0.48	0.56	0.59	0.54	
SP22	4.08	0.78	0.56	0.36	0.5	0.38	0.44	0.46	0.5	0.56

Table 2. 4: Correlation Matrix and Descriptive Statistics of Cognitive Presence Items

Items	M	SD	CP23	CP24	CP25	CP26	CP27	CP28	CP29	CP30	CP31	CP32	CP33
Triggering Event													
CP23	4.03	0.79											
CP24	4.04	0.84	0.7										
CP25	4.03	0.87	0.71	0.78									
Exploration													
CP26	4.2	0.69	0.5	0.6	0.65								
CP27	4.13	0.71	0.53	0.52	0.57	0.61							
CP28	4.26	0.69	0.46	0.34	0.43	0.38	0.5						
Integration													
CP29	4.24	0.6	0.57	0.49	0.6	0.55	0.62	0.64					
CP30	4.2	0.73	0.64	0.67	0.66	0.53	0.52	0.46	0.6				
CP31	4.16	0.75	0.6	0.61	0.63	0.43	0.51	0.41	0.58	0.74			
Resolution													
CP32	4.23	0.69	0.52	0.52	0.52	0.49	0.48	0.38	0.57	0.65	0.6		
CP33	4.27	0.67	0.51	0.51	0.5	0.49	0.49	0.33	0.53	0.56	0.55	0.7	
CP34	4.4	0.66	0.49	0.53	0.53	0.45	0.51	0.34	0.54	0.55	0.55	0.6	0.78

Examining Teaching Presence

An initial teaching presence model was created with the three factors proposed by the CoI framework. However, based on the model fit values stated in the data analysis section, the initial model did not show an adequate fit for the data ($\chi^2 (62) = 298.46$, $p < 0.001$) due to high RMSEA value of 0.12 and low GFI value of 0.86. An examination of modification indices from the LISREL confirmatory factor model output revealed a need for estimation of error covariance between:

- TP5 “The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn” and TP6 “The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking”
- TP12 “The instructor provided feedback that helped me understand my strengths and weaknesses” and TP13 “The instructor provided feedback in a timely fashion”.

Accordingly, a final model as represented in the Fig. 1 was tested in order to reach an acceptable RMSEA value and increase GFI value by estimating the error covariance between TP5 and TP6, and TP12 and TP13. After estimating these error covariances, the data fit the final model very well, ($\chi^2 (60) = 127.30$, $p < 0.001$) with an acceptable RMSEA value of 0.06. The obtained t values ranged from 12.07 to 19.51, indicating that all the items are significant at <0.001 (>3.29 , Hatcher, 1994). Table 2.5 shows the other fit indices used to evaluate the model fit.

The factor loadings from the CFA provided evidence for convergent validity as all the items loaded sufficiently high, > 0.50 (Fornell & Larcker, 1981) on their corresponding factors.

On the other hand, the standardized covariance value between facilitation and direct instruction was > 1.0 . This might cause violation of the discriminant validity. The discriminant validity was tested by calculating the chi-square difference between the un-constrained model (See Figure 2. 1) and the constrained models.

Table 2. 5: Fit Indices for Teaching, Social, and Cognitive Presence Models

Model	χ^2 (df)	ECVI	GFI	NFI	NNFI	CFI	IFI
Recommended	-	-	>0.90	>0.95	>0.95	>0.95	>0.95
Teaching Presence							
Three-factor	χ^2 (60)= 127.30 **	0.69	0.93	0.96	0.97	0.98	0.98
Two-factor	χ^2 (61)= 131.48 **	0.67	0.91	0.95	0.96	0.97	0.97
Social Presence							
Three-factor	χ^2 (22)= 56.49 **	0.38	0.96	0.96	0.96	0.98	0.98
Two-factor	χ^2 (24)= 59.63**	0.33	0.95	0.96	0.96	0.98	0.98
Cognitive Presence							
Four-factor	χ^2 (45)= 119.84 **	0.69	0.93	0.95	0.95	0.95	0.98

** $p < 0.001$

Given the significant chi-square change (See Table 2.6), Model 1 is significantly better than Model 3 ($\Delta \chi^2$ (1) = 51.17, $p < 0.001$) and Model 4 ($\Delta \chi^2$ (1) = 202.24, $p < 0.001$) with a lower chi-square value. This indicated that design and organization is distinct from both direct instruction and facilitation. On the other hand, chi-square difference between Model 1 and Model 2 was not significant indicating that direct instruction and facilitation may not be distinct from each other.

Another model was tested with two factors, including design and organization, and combination of direct instruction and facilitation. Examination of the fit indices showed that the data fit the two-factor model very well (χ^2 (64) = 165.13, $p < 0.001$) with an acceptable RMSEA value of 0.08.

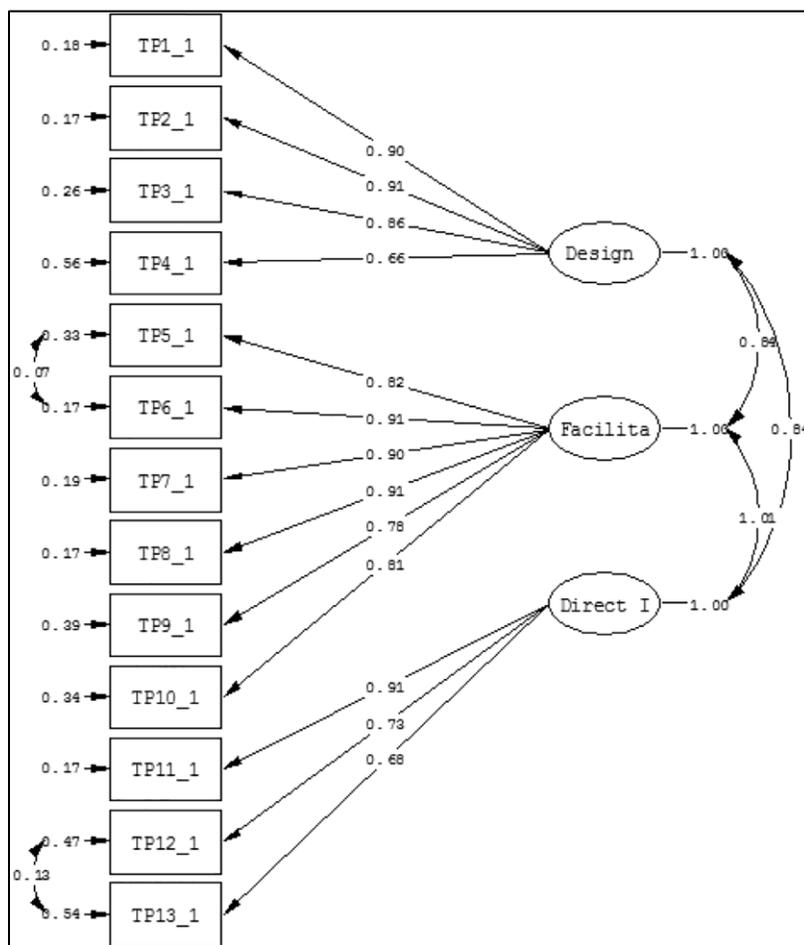


Figure 2. 1: Final Teaching Presence Model

The chi-square difference test was performed to compare three- and two-factor teaching presence models. Change in, chi-square between the models suggested that three-factor model is significantly better than the two-factor model with a lower chi-square value ($\Delta \chi^2 (4) = 37.83, p < 0.001$). Furthermore, ECVI value was lower and other fit indices were greater for the three-factor model than two-factor model. Based on these results, three-factor teaching presence model (See Fig. 3) allowing two error covariances between TP5 and TP6, and TP12 and TP13 is considered the better model. The first factor, design and organization, had four items (TP1, TP2, TP3, and TP4) with loadings between 0.66 and 0.91. The second factor, facilitating discourse, had six

items (TP5, TP6, TP7, TP8, TP9 and TP10) with loadings between 0.78 and 0.91. The third factor, direct instruction, had three items (TP11, TP12, and TP13) with loadings between 0.68 and 0.91. The final teaching presence model aligned with the CoI framework.

Table 2. 6: Un-constrained and Constrained Model Differences for Discriminant Validity

Model	Constrained Factors	χ^2 (df)	$\Delta \chi^2$ (df)
Teaching Presence			
Model 1 (Unconstrained)	-	χ^2 (60)= 127.30 **	-
Model 2	Direct instruction & Facilitation	χ^2 (61)= 131.48 **	$\Delta \chi^2$ (1) = 1.47
Model 3	Direct instruction & Design	χ^2 (61)= 152.62 **	$\Delta \chi^2$ (1) = 51.17 **
Model 4	Design & Facilitation	χ^2 (61)= 143.85 **	$\Delta \chi^2$ (1) = 202.24 **
Social Presence			
Model 1 (Unconstrained)	-	χ^2 (22)= 56.49 **	
Model 2	Affective expression & Open communication	χ^2 (23)= 84.65 **	$\Delta \chi^2$ (1)= 28.06 **
Model 3	Affective expression & Group cohesion	χ^2 (23)= 56.50**	$\Delta \chi^2$ (1)=0.01
Model 4	Open communication & group cohesion	χ^2 (23)= 105.59**	$\Delta \chi^2$ (1)= 49 **
Cognitive Presence			
Model 1 (Unconstrained)	-	χ^2 (45)=119.83 **	-
Model 2	Triggering event & Exploration	χ^2 (46)= 140.31**	$\Delta \chi^2$ (1)= 20.48 **
Model 3	Triggering event & Integration	χ^2 (46)= 154.95**	$\Delta \chi^2$ (1)= 35.12 **
Model 4	Triggering event & Resolution	χ^2 (46)= 205.58**	$\Delta \chi^2$ (1)= 85.75 **
Model 5	Exploration & Integration	χ^2 (46)= 138.61**	$\Delta \chi^2$ (1)= 18.78**
Model 6	Exploration & Resolution	χ^2 (46)= 165.07**	$\Delta \chi^2$ (1)= 45.18**
Model 7	Integration & Resolution	χ^2 (46)=149.74**	$\Delta \chi^2$ (1)= 29.91**

Examining Social Presence

An initial social presence model was tested with the three factors suggested by the CoI framework. However, based on the model fit values stated above, the initial CFA model did not show an adequate fit for the data ($\chi^2(24) = 265.46$, $p < 0.001$) due to the high RMSEA value of 0.19, and low CFI of 89; IFI of 0.89, and GFI of 0.84. Modification indices recommended estimating error covariance between:

- SP14 “Getting to know other course participants gave me a sense of belonging in the course” and SP15 “I was able to form distinct impressions of some course participants”
- SP16 “Online or web-based communication is an excellent medium for social interaction” and SP21 “I felt that my point of view was acknowledged by other course participants”

Accordingly, a final model was created in order to reach an acceptable RMSEA value and increasing CFI, IFI, and GFI values by estimating error covariance between SP14 and SP15, and SP16 and SP21. After estimating these error covariances, the data fit the final model very well, $\chi^2(22) = 56.49$, $p < 0.001$ with an adequate RMSEA value of 0.08 (See Table 2.5 for the other fit indices used to evaluate model fit). The obtained t values ranged from 8.81 to 20.11, which indicates that all items are significant at < 0.001 (> 3.29 ; Hatcher, 1994).

The factor loadings from the CFA provide evidence for convergent validity as all items loaded sufficiently high > 0.50 (Fornell & Larcker, 1981) to the corresponding factors. However, as seen on the Figure 2. 2, the high standardized covariance value of 1.01 indicates that affective expression and group cohesion may not be distinct from each other. The discriminant validity was tested by calculating the chi-square difference between the un-constrained model and the

constrained models. Change in chi-square between the constrained and non-constrained models were significant for the Model 2 ($\Delta \chi^2 (1) = 28.06, p < 0.001$) and 4 ($\Delta \chi^2 (1) = 49, p < 0.001$), however, it was not significant for the Model 3. The results of the difference tests confirmed that open communication is distinct from both affective expression and group cohesion. However, the results indicated that group cohesion and affective expression might not be distinct from each other.

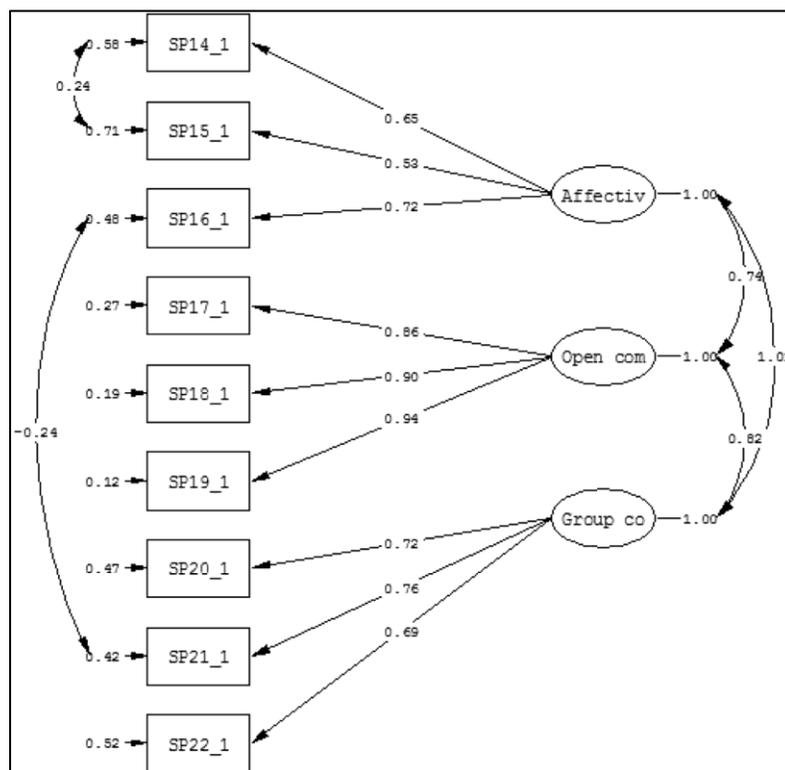


Figure 2. 2: Final Social Presence Model

Following, another model was tested with two factors including open communication, and combination of affective expression and group cohesion. This model did not show a good fit ($\chi^2 (26) = 137.49, p < 0.001$) due to high RMSEA value of 0.15. Model indices suggested estimation of error covariance between SP14 and SP15, and SP16 and SP21. Accordingly, a final model was created in order to reach an acceptable RMSEA value by estimating two error

covariances. After estimating these error covariances, the data fit the final model very well, $\chi^2(24) = 59.63$, $p < 0.001$ with an acceptable RMSEA value of 0.07.

Chi-square difference test was employed to compare three- and two-factor social presence model. However, change in the chi-square was not significant ($\Delta \chi^2(2) = 3.14$, $p > 0.05$). When other model fitness indices were compared, ECVI value was equal for both models but three-factor model revealed higher GFI value than two-factor model. Since combining affective expression and group cohesion did not contribute a significant improvement on the hypothesized three-factor model, three-factor model allowing two error covariances between SP14 and SP 15, and SP16 and SP21 is considered as a better model. The first factor, affective expression, had three items (SP14, SP15, and SP16) with loadings between 0.53 and 0.72. The second factor, open communication, had three items (SP17, SP18, and SP19) with loadings between 0.86 and 0.94. Finally, the third factor, group cohesion, had three items (SP20, SP21, SP22) with loadings between 0.69 and 0.76.

Furthermore, the three-factor model also suggested a need for estimating the cross loading for SP20 “I felt comfortable disagreeing with other course participants while still maintaining a sense of trust” and SP22 “Online discussions help me to develop a sense of collaboration” on both affective expression and open communication factors. After estimating these correlations, the model showed a better fit but it was not significantly improved from the previous model. Consequently, the final model consisted of three factors with nine items, including the two error covariances, and aligned with the CoI framework.

Examining Cognitive Presence

An initial cognitive presence model was created with four factors as proposed by the CoI framework. However, the initial CFA model did not provide an adequate fit for the data ($\chi^2(48)$

= 201.91, $p < 0.001$) due to high RMSEA value of 0.11 and low CFI value of 0.89. Modification indices suggested estimating error covariance between:

- CP28 “Online discussions were valuable in helping me appreciate different perspectives” and CP29 “Combining new information helped me answer questions raised in course activities”,
- CP 32 “I can describe ways to test and apply the knowledge created in this course” and CP34 “I can apply the knowledge created in this course to my work or other non-class related activities”, and
- CP33 “I have developed solutions to course problems that can be applied in practice” and CP34 “I can apply the knowledge created in this course to my work or other non-class related activities”.

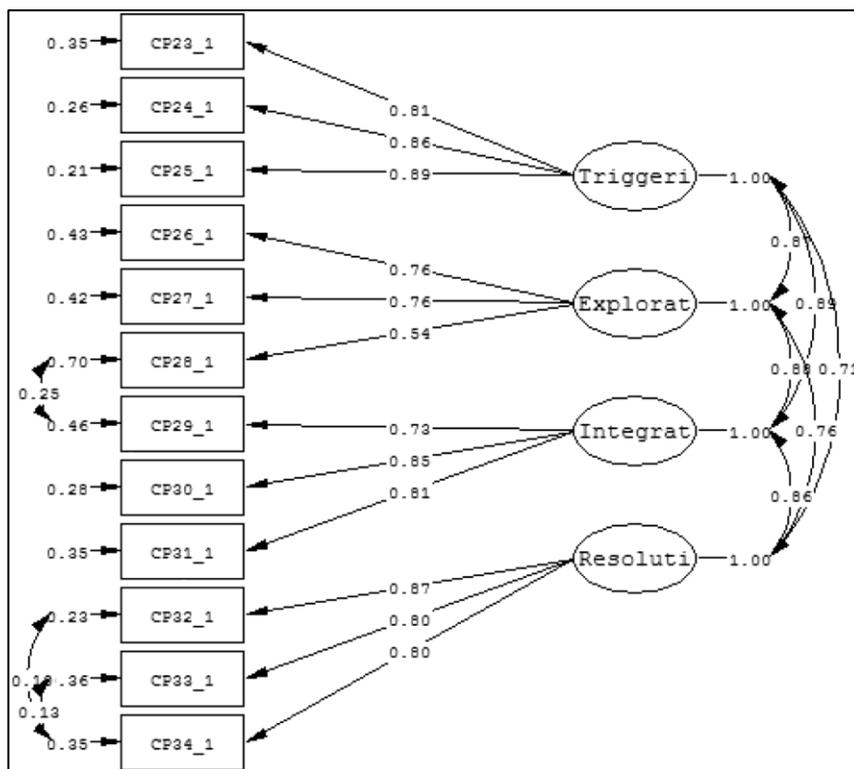


Figure 2. 3: Final Cognitive Presence Model

The final model for the cognitive presence was created according to modification indices in order to increase all CFI, IFI, and GFI indices as well as to reach an acceptable RMSEA value by estimating the three error covariances. After releasing the error covariances, the data fit the final model very well ($\chi^2(45) = 119.84, p < 0.001$) with an acceptable RMSEA value of 0.08. Table 2.5 shows the other fit indices used to evaluate model fit. The obtained t values ranged from 9.11 to 18.28 which indicates that all items are significant at < 0.001 (> 3.29 , Hatcher, 1994).

Furthermore, the factor loadings from the CFA provide evidence for convergent validity as all items loaded > 0.50 (Fornell & Larcker, 1981) on their corresponding factors. The discriminant validity was tested by calculating the chi-square difference between the unconstrained model and each constrained model. As shown in Table 2.6, change in chi-square between the constrained and non-constrained models were significant for all of the models at $p < 0.001$. The results of the difference test confirmed the discriminant validity of the cognitive presence. The final cognitive presence model is aligned with the CoI framework. The first factor, triggering event, had three items (CP23, CP24, and CP25) with loadings between 0.81 and 0.89. The second factor, exploration, had three items (CP26, CP27, and CP28) with loadings from 0.54 and 0.76. The third factor, integration, had three items (CP29, CP30, and CP31) with loadings between 0.73 and 0.85. Finally, the fourth factor, resolution, had three items (CP32, CP33, and CP34) with loadings between 0.80 and 0.87.

Discussion

This study seeks to examine the construct validity of the three presences of the CoI framework using the CoI instrument. The results of this study empirically supported the

conceptualization of all three presences as initially proposed by the CoI framework (Garrison et al., 2000) as well as the reliability and validity of the CoI instrument.

Does teaching presence demonstrate a three-factor solution aligning with the CoI framework?

The analysis of the teaching presence demonstrated a clear three-factor solution as proposed by the CoI framework, allowing two error covariances. Since these error covariances are between the items that belong to the same factor, it is not problematic. The CFA results affirmed the convergent validity of teaching presence. Theoretically, it is expected to have a significant relationship between each factors of teaching presence (Arbaugh, 2007; Arbaugh & Hwang, 2006). However, the CFA results yielded a high standardized covariance between direct instruction and facilitation indicating that these two factors may not be unique factors. This result raised the question whether teaching presence has three factors as proposed by the CoI framework or two factors as suggested by Shea et al. (2006) and Arbaugh and Hwang (2006). Therefore, both two- and three-factor models were tested in the current study. Examining the chi-square difference and other fit indices showed that three-factor model demonstrates a better fit with the current sample. Unlike the studies suggesting a two-factor solution for teaching presence (Arbaugh, 2007; Shea et al., 2006), this study yielded a three-factor solution aligning with Arbaugh and Hwang's (2006) findings. Garrison and Arbaugh (2007) asserted that the discrepancy among studies might be related to the participants' college level. For instance, Shea et al.'s (2006) participants included undergraduate students while Arbaugh and Hwang's (2006) study included MBA students. Further, Garrison (2007) claimed that “undergraduate students may not be sophisticated enough to distinguish between facilitation and direct instruction” (p. 68). Moreover, depending on the design and facilitation approach, students may not differentiate

between design and direct instruction or facilitation (Garrison et al., 2010). Another possible explanation for the discrepancy could be related to how an individual instructor addresses the three elements of teaching presence, as addressing only one or two elements may not be enough to establish effective teaching presence (Arbaugh & Hwang, 2006). Yet, it still remains as a question whether the discrepancy among study findings are related to course participants or course design and facilitation, or structure of teaching presence. All in all, more empirical studies with the data from multiple institutions and different level of participants are needed to determine the three-factor structure of teaching presence (Swan et al., 2009) as well as refine teaching presence survey items based on further distinguishing the factors of teaching presence, and the design and sequence of course activities (Arbaugh, 2007; Garrison et al., 2010). Future research should also consider the integration of items from the CoI instrument with the TPS to examine the construct validity of the teaching presence.

Does social presence demonstrate a clear three-factor solution aligning with the CoI framework?

The analysis on the social presence demonstrated a clear three-factor structure aligning with the CoI framework, estimating two covariance errors. The conceptualization of social presence is an ongoing discussion in the CoI literature and there is no agreement among researchers on the conceptualization as well as the definition of social presence (Kreijns et al., 2014; Lowenthal, 2010). Corresponding with the previous research, the results of this study also addressed concerns about the factor structure of social presence. Examination of the discriminant validity of social presence test indicated that affective expression and group cohesion might not be unique factors due to the high covariance between these factors. Given this, both two- and three-factor social presence models were tested in the current study, and then chi-square

difference test was employed to compare these two models. Since combining affective expression and open communication factors did not contribute significantly to the model fit, three-factor model allowing two error covariances was considered the better model. Another discussion on the conceptualization of social presence is whether social presence measures more than one concept. For example, in their validation study, Carlon et al. (2012) found that social presence items loaded on two different factors, namely social comfort and social experience. The first factor consisted of open communication and group cohesion items except SP22 “Online discussions help me to develop sense of collaboration” and the second factor included affective expression items and SP22. This current study did not confirm this structure. In addition to the conceptualization of social presence, the results of this study also addressed need for refining social presence survey items. For instance, model indices for the final three-factor model also recommended potential cross loading for the items SP21 “I felt that my point of view was acknowledged by other course participants” and SP22 “Online discussions help me to develop a sense of collaboration” on both affective expression and group cohesion. Estimating these cross loadings made the model better, but it was not significant. In their review paper, Lowenthal and Dunlap (2014) discussed the issues with measuring social presence. They asserted that while other items in the scale focus on students' perceptions about how they present themselves as a real person, item SP 22 “Online discussions help me to develop a sense of collaboration” focuses on students' perceptions about others' behaviors/actions. Further, they indicated that it is expected for this item to be more related to other categories. Reasoning that online discussion forums are not the only place where group communication occurs, they pointed out that this item should either be stated more broadly or broken down into multiple questions in order to address different media. Likewise, Kozan and Richardson (2014) also found SP22 to be problematic

since it is loaded on both social and cognitive presence with the following values 0.379 and 0.546. However, their CFA did not suggest a cross loading for this item. They also tested another model by removing this item but ultimately determined that the model did not signify a remarkable change to the model fitness. They further claimed that this might be related to a language issue as some of the social presence items use present tense whereas others were written with past tense.

Does cognitive presence demonstrate a clear four-factor solution aligning with the CoI framework?

The analysis of cognitive presence demonstrated a clear four-factor solution corresponding with the CoI framework estimating four error covariance errors. Consistent with Akyol and Garrison's (2008) results, the results of this study also showed a clear distinction among the phases (factors) of cognitive presence. One primary issue pointed out in the previous research on assessing cognitive presence in online learning environments is that students may not reach the integration and resolution phase (Akyol & Garrison, 2008; Garrison, 2007; Garrison et al., 2001; Vaughan & Garrison, 2005). One explanation would be related to course design and facilitation (Akyol & Garrison, 2008; Arbaugh, 2007; Garrison, 2007). Garrison (2007) indicated it is important to design appropriate collaborative activities, which include problem solving, identifying solution, evaluating solutions, and acting solution to move students to a resolution phase. As Swan et al. (2009) explained that in some cases the lack of reaching the integration and resolution levels might lie with the nature of assignments; “students were challenged to resolve a problem and explicit facilitation and direction provided, students did progress to resolution” (p. 8). Similarly, sometimes “convergent thinking, hence resolution, is not the desired outcome” (Richardson et al., 2012, p. 7) (e.g. Literary understanding focuses on exploration and

integration). Another explanation could be related to course duration; as Akyol and Garrison (2008) proposed, students may not have enough time to apply their final products and share the application results with others. It is also important to note that capturing cognitive presence can be problematic for studies using transcription analysis since it may not capture the whole cognitive inquiry process (Arbaugh, 2007; Swan et al., 2008). Arbaugh (2007) highlighted the need for using end of semester survey data to support transcription analysis. Future studies might focus on comparing how different course activities impact cognitive inquiry process by using both transcription analysis and end of semester survey data.

Conclusion

The literature on the conceptualization of the CoI framework has pointed out a need for examining the construct validity of each individual presences of the CoI framework. Yet, all the empirical studies have been conducted only focused on examining the factor structure of teaching presence by using the TPS instrument (Shea et al., 2003). By being the first study examining the construct validity of the teaching, social, and cognitive presences by using the CoI instrument, this study aimed to provide empirical evidence for the conceptualization and operationalization of each individual presence. In spite of the potential concerns with the conceptualization and operationalization of teaching presence and social presence, the results of this study confirmed the construct validity of the each presence as proposed by the CoI framework. The current findings also suggested refining teaching and social presence items distinguishing their factors.

There are limitations with the generalizability of the results. Data were gathered from online graduate students in a single program. Considering the highlights from previous research (e.g., Garrison, 2007), more empirical studies are needed to obtain data from learners across

different student levels and disciplines. Thus, factor structure of the three presences should be examined with the data obtained from multiple institutions and different level of participants. In addition, future research focusing on the psychometric properties of the CoI instrument as well as the individual presences is also suggested.

The increasing validity of three dimensions of the CoI carries implications for researchers interested in the CoI framework, course signers, practitioners, and instructors. Researchers can use the results from this study for assessing the three presences of CoI in online learning environments as well as their influences on student learning outcomes. Furthermore, practitioners and course designers can use the results from this study in course design and as a program assessment tool. For example, by looking to the instrument one can reverse engineer the types of activities, the operationalization of the items that should be included to make a course align more fully with the CoI model. For designers looking to move to a more inquiry-based approach or to implement a more social-constructivist approach, the instrument item indicators, and thus the CoI model, are a means to do so.

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CHAPTER 3: SOCIAL PRESENCE ON RELATION TO STUDENTS' SATISFACTION AND LEARNING IN THE ONLINE ENVIRONMENT: A META-ANALYSIS

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Abstract

Social presence, the ability to perceive others in an online environment, has been shown to impact student motivation and participation, actual and perceived learning, course and instructor satisfaction, and retention in online courses; yet very few researchers have attempted to look across contexts, disciplinary areas, or measures of social presence. This meta-analysis allowed us to look across these variables of the primary studies and identify the pattern of student outcomes (e.g., perceived learning and satisfaction) in relation to social presence through scrutiny of differences between the studies. The results showed a moderately large positive average correlation between social presence and satisfaction ($r = 0.56$, $k = 26$) and social presence and perceived learning ($r = 0.51$, $k = 26$). Large variation among correlations (86.7% for satisfaction and 92.8% for perceived learning, respectively) also indicated systematic differences among these correlations due to online course settings. We found that (a) the strength of the relationship between social presence and satisfaction was moderated by the course length, discipline area, and scale used to measure social presence; and (b) the relationship between social presence and perceived learning was moderated by the course length, discipline area, and target audience of the course. Implications and future research are discussed.

Introduction

Current State of Online Education

Online learning continues to be a popular format for educational experiences because of its flexibility and customizability to students' needs (Allen & Seaman, 2016; Cui, Lockee, & Meng, 2013). According to Allen and Seaman (2016), 5.8 million students were enrolled in at least one online course in 2014, with the rate of students enrolling in online courses continuing to match or outpace those of traditional enrollments. Allen and Seaman's report further supports these findings by noting that a large number of higher education academic leaders (63.3%) have indicated that online education is critical to their long-term strategy.

Nevertheless, researchers and practitioners continue to grapple with concerns over online learning, including student feelings of isolation, disconnection from peers and instructors, and a lack of preparation for learning in an online environment, all of which result in higher dropout rates and the perception of an inferior educational experience (Liu, Gomez, & Yen, 2009). The construct of social presence is the ability to perceive others in an online environment can go a long way to overcoming these issues. In fact, Boston et al. (2009) found that two affective expression indicators of social presence accounted for more than 20% of the variance in student retention.

We have conducted this study to provide a holistic view of social presence in online learning. Through meta-analysis, we examine the nature of the relationship between social presence and student outcomes across contexts, disciplinary areas, and varying measures of social presence.

The Origins of Social Presence for Online Learning

Anyone who listens carefully to the way people say things quickly learns that the particular words a speaker uses to describe an event or experience can be a rich source of information about his feelings and attitudes (Wiener & Mehrabian, 1968, p. 1).

While Wiener and Mehrabian (1968) may have been speaking to an audience that could hardly conceive of today's online learning environments, their opening sentence still holds true. As a construct, social presence today is often considered integral to online education; but in fact, the research base stems from work going much further back. For example, researchers in social psychology, such as Argyle and Dean (1965) and Argyle (1969)'s work with nonverbal communication and interpersonal behaviors and Mehrabian's (1966, 1972) work on immediacy and non-verbal nonverbal communication have all had a significant influence over how we have come to define social presence. Social presence in the online environment is a setting that upon initial glance may appear to be lacking in traditional verbal and nonverbal behaviors.

The most clearly defined line between today's research on social presence and its predecessors is the work of Short, Williams, and Christie (1976) based on their communications research on "the effectiveness and impact of person-to-person telecommunications" (p. vi). They coined the term "social presence," and over time their work has been cited regularly throughout the literature. They posited that social presence is a quality of medium, with some mediums having a lesser ability to convey social presence (e.g., text-based communication). "[Social presence] varies between different media, it affects the nature of the interaction and it interacts with the purpose of the interaction to influence the medium chosen by the individual who wishes to communicate" (Short et al., 1976, p. 65).

The widespread use of computer-mediated communication (CMC), the term often associated with the early years of online learning, incited several researchers to begin questioning earlier works to see how previous assumptions related to the newer technologies. Walther (1992), for example, provided a critical evaluation on the role of the medium constraining users' communication, specifically by highlighting weaknesses in CMC research. To illustrate his point, he takes issue with the comparison of task-oriented assignments between simulated computer conferencing groups and face-to-face (F2F) groups with a limited time frame, which by its nature alleviates the advantages of CMC communication channels. Additionally, although he indicated the commonality of comparing verbal communication behaviors between computer conferencing groups and F2F groups, Walther also noted a lack in the examination of nonverbal communication behaviors in F2F in research, which could provide insights into CMC substitutions or equivalences in the research. He also discussed the possibly unfair comparison of F2F and CMC based on contexts and purposes of the communication being studied, including the findings of experimental studies versus authentic CMC groups. At one point Walther explained, "it appears that the conclusion that CMC is less socio-emotional or personal than face-to-face communication is based on incomplete measurement of the latter form..." (p. 63). Later, a meta-analysis of the interpersonal effects of CMC (Walther, Anderson, & Park, 1994), found that the treatment of time (from 15 min to 6 months, in this case) plays a strong role in explaining socially-oriented communication. Walther et al. (1994) go on to say that although room exists to interpret their findings, interpersonal dynamics may not be at the mercy of the medium; up until this point little evidence had supported this case.

Gunawardena (1995) alleviated this tension by situating social presence theory into a particular educational context, and examining the likelihood that users attributed their social

presence to either the medium itself or their perception of the medium. The educational context was a multi-university distance education project called The Globalised conferences, and was conducted using a listserv. Gunawardena conducted two studies within this context and found that it was students' perceptions of CMC, and not the medium itself, that derived their impression of social presence. Additionally, she found that because instructors can cultivate or create social presence they need to learn to how to adapt to the medium.

Researching Social Presence in Online Learning

Since the concept of social presence was first linked to online learning, researchers and practitioners have been reconceiving not only what social presence is, but also the particular role/s it plays in online learning (Annand, 2011; Gunawardena, 1995; Kreijns, Van Acker, Vermeulen, & Van Buuren, 2014; Lowenthal, 2010; Oztok & Brett, 2011). This is appropriate because the environments being studied have grown beyond text-based CMC and listservs and are researched in a number of disciplines and contexts. These reconceptions are supported by the varying definitions of social presence presented in Table 1. What all of the definitions have in common, and what we accept as the definition for social presence for this study, is the ability to perceive others in an online environment.

Variations in wording aside, as shown in Table 3. 1, we have learned much about social presence and its influence in online learning over the past 20 years, including the perception that it can be (strongly) felt by participants in computer-mediated communication (Gunawardena, 1995; Richardson & Swan, 2003; Swan & Shih, 2005; Tu & McIsaac, 2002; Walther, 1996). Social presence has been shown to influence a variety of factors in students' learning experiences. More specifically, social presence can positively influence students' participation and motivation to participate (Jorge, 2010; Mazzolini & Maddison, 2007; Swan & Shih, 2005;

Tao, 2009; Tu & McIsaac, 2002; Weaver & Albion, 2005), course and instructor satisfaction (Akyol & Garrison, 2008; Cobb, 2009; Gunawardena & Zittle, 1997; Gunawardena, 1995; Hostetter & Busch, 2006; Richardson & Swan, 2003; Swan & Shih, 2005), and both actual and perceived learning (Hostetter & Busch, 2013; Joksimovic, Gasevic, Kovanovic, Riecke, & Hatala, 2015; Kang & Im, 2013; Picciano, 2002; Richardson & Swan, 2003; Russo & Benson, 2005; Wise, Chang, Duffy, & del Valle, 2004). Further, social presence has implications for course design (Arbaugh, 2005; Mykota & Duncan, 2007; Richardson, Schnieders, vanBarneveld, Pistilli, & Moke, 2013, November; Swan, Matthews, Bogle, Boles, & Day, 2012; Tu, 2000; Tu & McIsaac, 2002; Vrasidas & McIsaac, 2000) and even for retention and intention to enroll in online course (Boston et al., 2009; Liu et al., 2009; Reio & Crim, 2013). Finally, while the concept of social presence has much to do with the interactions between online participants, it has also been found to permeate areas noted for being completed by individual students such as final projects and papers (Hostetter & Busch, 2013; Richardson & Swan, 2003). Ultimately, social presence research underscores the concept that we should encourage social interaction as a means to engage learners in critical thinking and higher-level learning (Garrison & Akyol, 2013).

Research on social presence has increased not only due to the rise in online learning environments and the search for best practices therein, but also in part because of the popularity of the Community of Inquiry (CoI) survey, of which social presence is measured along with teaching presence and cognitive presence. The CoI is a framework widely adopted in the past 15 years and has been used to develop and evaluate meaningful online learning experiences (Akyol & Garrison, 2008; Arbaugh, 2008; Arbaugh et al., 2008; Boston et al., 2009; Cobb, 2011; Garrison & Akyol, 2013; Kozan & Richardson, 2014; Swan et al., 2008).

Table 3. 1: Evolution of the Definition of Social Presence

Study	Defines Social Presence as...
Short, Williams, & Christie (1976)	"...the salience of the other in a mediated communication and the consequent salience of their interpersonal interactions" (p. 65).
Walther (1992)	"the feeling that other actors are jointly involved in communicative interaction" (Walther, 1992, p. 54)
Gunawardena & Zittle (1997)	"the degree to which a person is perceived as 'real' in mediated communication" (p 8).
McLeod, Baron, Marti, & Yoon (1997)	"The degree of tangibility and proximity of other people that one perceives in a communication situation" (p. 708).
Garrison, Anderson, & Archer (1999)	"the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people" (p. 89).
Biocca, Harms, & Gregg (2001)	"Mediated social presence is the moment-by-moment awareness of the co-presence of another sentient being accompanied by a sense of engagement with the other (i.e., human, animate, or artificial being)" (p. 2).
Picciano (2002)	"A student's sense of being in and belonging in a course and the ability to interact with other students and an instructor although physical contact is not available" (p. 22).
Biocca & Harms (2002)	"moment-to-moment awareness of co-presence of a mediated body and the sense of accessibility of the other being's psychological, emotional, and intentional states" (p. 10).
Tu & McIsaac (2002)	"the degree of feeling, perception, and reaction to another intellectual entity in the CMC environment" (p. 146)
Shin (2002)	"feeling intimacy or togetherness in terms of sharing time and place" (p. 122).
Shea, Pickett, & Pelz (2003)	"the ability of students to project themselves socially and affectively into a community of inquiry" (p. 65).
Kang, Choi, & Park (2007)	"perceived depth of relationships with other learners and the community during e-learning" (p. 2).
Kehrwald (2008)	"an individual's ability to demonstrate his/her state of being in a virtual environment and so signal his/her availability for interpersonal transactions" (p. 94).
Swan, Richardson, & Garrison (2009)	"the degree to which participants in computer-mediated communication feel affectively connected one to another" (p. 9).
Garrison (2011)	"ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities" (p. 34).

Note. Adapted from Swan, Richardson, and Cleveland-Innes (2012).

Measuring Social Presence

The complex measurement of social presence varies sometimes based on specific contexts. The two most common formats for measuring social presence are self-reporting, such as surveys (Arbaugh et al., 2008; Gunawardena & Zittle, 1997; Richardson & Swan, 2003; Tu, 2002a), and behavioral indicators, used to code communication and behaviors (Richardson et al., 2015; Rourke, Anderson, Garrison, & Archer, 1999; Swan & Shih, 2005; Swan, 2003; de Bruyn, 2004). Table 3. 2 provides a list of some of the commonly used self-report measures of social presence, as well as those included within this study. Survey usage results include the work of Gunawardena and Zittle (1997) (k= 5), Richardson and Swan (2003) (k= 5), which is based on Gunawardena and Zittle, and the CoI survey or common instrument (Swan et al., 2008) (k= 6). Other instruments (e.g., Biocca, Harms, & Gregg, 2001; Garrison, Cleveland-Innes, & Fung, 2004; Kang, Choi, & Park, 2007; Kang, Park, & Choi, 2006; Kang, Park, Jung, & Park, 2009; Kim, 2011; Shih, 2004; Wise, Change, Duffy, & del Valle, 2004) accounted for eight of the studies listed in Table 2 and were used in the subsequent synthesis via meta-analysis.

Social Presence and Student Outcomes

To date, the majority of research on social presence in online courses has included the student outcomes of perceived learning and satisfaction, yielding much information about associated variables such as potential moderators, potential relationships between variables, predicting social presence, or using social presence to predict outcomes. Outcomes, in the case of this research, refers to learners' perceived measure of performance.

Table 3. 2: Overview of Social Presence Self-report Measures for Online Learning Environments

Study*	Measures	Description	Reliability**
Gunawardena (1995)	GlobalEd Survey Questionnaire, v. 1 (Gunawardena, 1995)	<ul style="list-style-type: none"> • 17 bi-polar scales 	<ul style="list-style-type: none"> • Not reported
Gunawardena & Zittle (1997)	GlobalEdSurvey Questionnaire, v. 2 developed for this study (Gunawardena & Zittle, 1997)	<ul style="list-style-type: none"> • 53 five-point Likert scale • 14 items for social presence • One dimension for social presence; immediacy 	<ul style="list-style-type: none"> • $\alpha = 0.88$ for social presence subscale
de Greef & Ijsselsteijn (2001)	IPO Social Presence Questionnaire (IPO-SPQ) (de Greef & Ijsselsteijn, 2001)	<ul style="list-style-type: none"> • 12 seven-point Likert scale • Two different approaches to measure social presence: agree-disagree items and semantic differential items 	<ul style="list-style-type: none"> • $\alpha = 0.72$ for social presence (agree-disagree items) • $\alpha = 0.90$ for social presence (semantic differential items)
Biocca, Harms, & Gregg (2001)	The Networked Minds Questionnaire (Biocca, Harms, & Gregg, 2001)	<ul style="list-style-type: none"> • 69 seven-point Likert scale • Three dimensions of social presence; co-presence, psychological involvement, and behavioral engagement 	<ul style="list-style-type: none"> • $\alpha = 0.69$ to 0.87
Tu (2002a)	Social Presence and Privacy Questionnaire (SPPQ; Tu, 2002a), based on the CMC attitude instrument (Steinfeld, 1986) and perceived privacy (Witmer, 1997)	<ul style="list-style-type: none"> • 17 five-point Likert scale items for social presence • Three dimensions of social presence; social context, online communication and interactivity 	<ul style="list-style-type: none"> • $\alpha = 0.74$ to 0.85
Tu & McIsaac (2002)	The CMC Questionnaire (Tu, 2002a) (aka Tu's SPPQ instrument)		<ul style="list-style-type: none"> • $\alpha = 0.71$ to 0.82 for social contexts, online communication, interactivity, system privacy, and feeling of privacy

Table 3. 2 continued

Picciano (2002)	Researcher-developed scale based on the Inventory of Presence Questionnaire developed by the Presence Research Working Group and Tu's work (2001)	<ul style="list-style-type: none"> • 11 seven-point Likert scale items for social presence 	<ul style="list-style-type: none"> • Not reported
Richardson & Swan (2003)	Social Presence Survey (Gunawardena & Zittle, 1997)	<ul style="list-style-type: none"> • 16 six-point Likert scale • Two dimensions for social presence: intimacy and immediacy 	<ul style="list-style-type: none"> • Not reported
Garrison, Cleveland-Innes, & Fung (2004)	Researcher-developed scale (Garrison, Cleveland-Innes, & Fung, 2004)	<ul style="list-style-type: none"> • 10 five-point Likert scale for a social presence subscale 	<ul style="list-style-type: none"> • $\alpha = 0.92$ for social presence subscale
Wise, Chang, Duffy, & del Valle (2004)	Perceived Instructor Social Presence Survey (Wise, Chang, Duffy, & del Valle, 2004)	<ul style="list-style-type: none"> • 26 five-point Likert scale • Three dimensions of social presence; message friendliness, instructor friendliness, and knowing instructor 	<ul style="list-style-type: none"> • $\alpha=0.85$ for message friendliness • $\alpha=0.96$ for instructor friendless • $\alpha =0.93$ for knowing instructor
Swan & Shih (2005)	Social Presence Survey (Swan & Shih, 2005) based on Richardson & Swan (2003) and Shih (2004)	<ul style="list-style-type: none"> • 19 five-point Likert scale • Eight items for perceived social presence of peers • Five items for perceived social presence of instructors 	<ul style="list-style-type: none"> • not reported
Laffey, Lin, & Lin (2006)	Social Ability Instrument (Laffey et al., 2006) based in part on Picciano (2002) and Tu (2001)	<ul style="list-style-type: none"> • 12 seven-point Likert scale • Four items for social presence 	<ul style="list-style-type: none"> • $\alpha = 0.84$ for social presence

Table 3. 2 continued

Hostetter & Busch (2006)	Researcher-developed scale based on Richardson & Swan (2003) and Gunawardena & Zittle (1997)	<ul style="list-style-type: none"> • 10 six-point Likert scale 	<ul style="list-style-type: none"> • $\alpha = 0.87$
Mykota & Duncan (2007)	The Computer-mediated Communication Questionnaire (CMCQ) (Tu,2005)	<ul style="list-style-type: none"> • 24 five-point Likert scale 	<ul style="list-style-type: none"> • Not reported
Kang, Choi, & Park (2007)	Researcher-developed scale (Kang, Choi, & Park, 2007)	<ul style="list-style-type: none"> • 19 five-point Likert scale • Three dimensions for social presence: co-presence (5 items), influence (7 items) and cohesiveness (7 items) 	<ul style="list-style-type: none"> • $\alpha = 0.74$ for co-presence • $\alpha = 0.76$ for influence • $\alpha = 0.73$ for cohesiveness
Arbaugh, et al. (2008).	Community of Inquiry survey (CoI survey) (Arbaugh et al., 2008)	<ul style="list-style-type: none"> • 34 five-point Likert scale • nine items for the social presence subscale • Three dimensions of social presence; open communication, group cohesion, and affective expressions 	<ul style="list-style-type: none"> • $\alpha = 0.91$ for social presence subscale
Arbaugh (2008)	Researcher-developed scale (Arbaugh, 2008)	<ul style="list-style-type: none"> • 22 seven-point Likert scale • Eight items for social presence 	<ul style="list-style-type: none"> • $\alpha = 0.87$ for social presence

Table 3. 2 continued

Boston, Diaz, Gibson, Ice, Richardson, & Swan (2009)	The CoI survey (Arbaugh et al., 2008)	<ul style="list-style-type: none"> • 34 five-point Likert scale • nine items for the social presence subscale • Three dimensions of social presence; open communication, group cohesion, and affective expressions 	<ul style="list-style-type: none"> • Not reported
Liu, Gomez, & Yen (2009)	The Social Presence and Privacy Questionnaire (SPPQ) (Tu, 2002a, 2002b)	<ul style="list-style-type: none"> • 87 five-point and 3 two-point Likert scale 	<ul style="list-style-type: none"> • Not reported
Cobb (2011)	Social Presence scale from the GlobalEd Questionnaire, v. 2 (Gunawardena & Zittle, 1997)	<ul style="list-style-type: none"> • 14 five-point Likert scale 	<ul style="list-style-type: none"> • $\alpha = 0.87$ for social presence
Kim (2011)	Researcher developed Social Presence scale (Kim, 2011)	<ul style="list-style-type: none"> • 19 five-point Likert scale • Four dimensions for social presence: mutual attention & support, affective connectedness, sense of community and open communication. 	<ul style="list-style-type: none"> • $\alpha = 0.82$ to 0.87 for the four dimensions
Leong (2011)	Social Presence and Cognitive Absorption survey adopted from Tu (2002a) and Agarwal & Karahanna (2000)	<ul style="list-style-type: none"> • 44 seven-point Likert scale • 16 items for social presence • Three dimensions of social presence; social context, online communication, and interactivity 	<ul style="list-style-type: none"> • $\alpha = 0.67$ for social context • $\alpha=0.84$ for online communication • $\alpha =0.67$for interactivity

Table 3. 2 continued

Joo, Lim, & Kim (2011)	The scale by Garrison, Cleveland-Innes, & Fung (2004) translated into Korean	<ul style="list-style-type: none"> • 26 five-point Likert scale • six items for social presence subscale 	<ul style="list-style-type: none"> • $\alpha = 0.84$ for social presence
Kim, Kwon, & Cho (2011)	Researcher developed scale based on Kim (2011)	<ul style="list-style-type: none"> • 18 five-point Likert scale • Four dimensions of social presence; attention and support, affective connectedness, sense of community, and open communication 	<ul style="list-style-type: none"> • $\alpha = 0.897$
Strong, Irby, Wynn, & McClure (2012)	The Social Presence Scale (Short et al., 1976)	<ul style="list-style-type: none"> • 14 five-point Likert scale 	<ul style="list-style-type: none"> • Ex post facto $\alpha = 0.94$
Hostetter & Busch (2013)	Social Presence Survey (Richardson & Swan, 2003)		<ul style="list-style-type: none"> • Not reported
Reio & Crim (2013)	Social Presence Survey based on Gunawardena & Zittle (1997)	<ul style="list-style-type: none"> • 12 five-point Likert scale 	<ul style="list-style-type: none"> • $\alpha = 0.93$
Kang & Im (2013)	Learner-Instructor Interaction Survey (Kang, 2009)	<ul style="list-style-type: none"> • 27 five-point Likert scale • Five dimensions: guidance and facilitating learning, social intimacy, instructional communication, presence of instructor, and instructional support 	<ul style="list-style-type: none"> • $\alpha = 0.96$ for overall scale • $\alpha = 0.82$ to 0.92 for learner-instructor interaction

Note. *Studies listed in chronological order by publication date. * α = Cronbach's alpha for internal consistency reported for their study sample.

Student satisfaction

Student satisfaction, for the purpose of this study, is an indicator of whether learners are satisfied with their learning experience (Li, Marsh, Rienties, & Whitelock, 2016). Several studies have found social presence to have an impact on student satisfaction. For example, Gunawardena and Zittle (1997) examined social presence as a strong predictor of student satisfaction in a text-based computer conferencing environment. Through regression analysis, they found that social presence accounted for 58% of variance in student satisfaction. Likewise, Strong, Irby, Wynn, and McClure (2012) assessed students' perceptions of the learning environment, social presence, and satisfaction in online agricultural education courses. They found that social presence and the learning environment accounted for 26% of the variance in student satisfaction. Similarly, Hostetter and Busch (2006) found that similar levels of social presence could be generated between F2F and online course settings. In addition, they found with regression analysis that 40% of the variance in learner satisfaction was explained by social presence. This coincides with findings from others, such as Wise et al. (2004) and Kang, Liew, Kim, and Park (2014).

Satisfaction and perceived learning

Richardson and Swan (2003) demonstrated with their correlational study that students who perceived a high level of social presence in an online course were not only more satisfied with their instructor, but also perceived they learned more than students who reported low social presence. Swan and Shih (2005) conducted a mixed-methods study and found significant correlations between perceptions of social presence (peers and instructors) and perceived learning, as well as between the perceived presence of instructors' and satisfaction with instructors. The qualitative results showed that “students perceiving more social presence also used significantly more social presence indicators to project their own presence to their

classmates” (p. 130). Cobb’s (2011) work on nursing education found that social presence was highly correlated to both student satisfaction and perceived learning. Using multivariate regression, Cobb found that social presence accounted for 44% of the variance in overall satisfaction and 36% of the variance in perceived learning. Arbaugh (2008) examined 55 online MBA courses to determine if the CoI framework, of which social presence is a measure, could predict student outcomes. He found that social presence was positively associated with students' perceived learning and their satisfaction with the online delivery medium implemented by courses. Similarly, Kang and Im (2013) conducted multiple regression analyses to determine the factors in learner-instructor interaction that predicted learners' perceived learning and satisfaction in online courses. Using Kang's, 2009 questionnaire consisting of five factors (guidance and facilitating learning; social intimacy; instructional communication; presence of instructor and instructional support), they found that factors related to instructional interaction significantly predicted learners' perceived learning achievement. They also found that these five factors significantly predicted learners' satisfaction.

Traditional academic performance

Only a few studies have examined social presence in relation to traditional academic performance, or grades. Picciano’s (2002) early study of traditional academic performance examined the impact of interaction and social presence on performance outcomes. After breaking students into three social presence groupings (low, moderate, and high), Picciano compared mean scores for both a written assignment and an examination, and found that students' perceptions of social presence were not a statistically significant predictor for performance on the examination. However, it was a significant predictor for performance on the written assignment. Picciano concluded that the type of performance measures, in this case an

examination versus written assignment, and its alignment with the tasks taking place on the discussion board may be a factor in his findings. Correspondingly, Hostetter and Busch (2013) used a content analysis of graded discussion postings ($n = 4000$), a social presence survey, and the Classroom Assessment Technique (CAT) which involved a written assignment as a measure of academic performance. The content analysis used Rourke et al.'s (1999) social presence indicator coding schema and was conducted by two independent raters. In this case the researchers found that students who demonstrated higher levels of social presence in the online discussions also perceived higher levels of social presence. A regression analysis indicated that students with higher levels of social presence also performed better on the CAT. Similarly, using an experimental design groups, Joksimovic et al. (2015) compared graded student online discussion postings ($n = 1747$), which were also coded in accordance to Rourke et al. (1999) social presence indicator coding schema. With the treatment groups reporting higher mean social presence values, the researchers found that certain social presence indicators (i.e., continuing a thread, complimenting, and expressing appreciation) were significant predictors of student academic performance, in this case course grades. This led them to conclude that “the ability of a student to project himself within an online learning community is also a significant predictor of academic performance” (p. 13). They also concluded that instructional design and the inclusion of support for meaningful interactions, which allowed for deeper social presence interactions here, are important for better student academic performance outcomes.

Satisfaction and perceived learning as student outcomes

For this study, we examined students' satisfaction and perceived learning as target student outcomes for the subsequent meta-analysis. Studies examining satisfaction have long been established as part of the post-secondary research landscape, in part because as a variable, it has

been found to influence student persistence, retention, motivation, and success (Astin, 1977, 1992; Booker & Rebman, 2005; Keller, 1983; Kuo, Walker, Belland, & Schroder, 2013; Pike, 1993; Roberts & Styron, 2010; Schreiner & Nelson, 2013). However, some researchers have criticized the construct of perceived learning as not being as valid or critical as traditional learning outcomes. Thus, we wish to establish our rationale for selecting this construct as a variable. To begin, our selection of student outcomes to include is due in large part to a number of studies related to online learning that have also included these variables; whereas, as indicated previously, very few studies have examined social presence and traditional learning outcomes, such as grades.

Second, we argue that sometimes perceived learning is the appropriate measure for the research context and may be exactly what a number of the researchers planned to examine, never intending for it to be viewed as a substitute for cognitive or traditional learning outcomes. As Richardson, Maeda, and Swan (2010) explained, the outcome measures in a number of studies about online learning are intentionally affective; they are studies concerned with the online learning and the development of social presence and how social presence affected student perceptions of online courses. Affect is still a major source of contention in online learning because a number of researchers and practitioners believe that such education spaces are “not rich enough to communicate affect” (Richardson et al., 2010, p. 331). Finally, we would like to point out that perceived learning may be a better measure than traditional learning measures has been argued by several researchers who maintain that traditional measures can be problematic to compare across disciplines and across instructors (Arbaugh, 2005; Pace, 1990; Richardson et al., 2010; Richmond, Gorham, & McCroskey, 1987; Rovai, 2002).

Purpose of the Study

Social presence has been shown to impact student motivation and participation (Jorge, 2010; Swan & Shih, 2005), actual and perceived learning (Hostetter & Busch, 2013; Picciano, 2002; Richardson & Swan, 2003), course and instructor satisfaction (Akyol & Garrison, 2008; Gunawardena & Zittle, 1997), and retention in online courses (Boston et al., 2009); yet very few researchers have attempted to look across contexts, disciplinary areas, or measures of social presence. The synthesis of past studies can contribute new knowledge with greater certainty than individual studies, which often vary in their qualities, focus, and findings (Lipsey & Wilson, 2000). Thus, our purpose was to identify the pattern of outcomes in previous research on social presence through scrutiny of differences between the studies statistically linked to their variation in results (Lipsey & Wilson, 2000) and to provide a holistic view of social presence for researchers, course designers, and instructors.

Overall, our meta-analysis sought to better understand the nature of the relationship between social presence and student outcomes (i.e., student satisfaction and perceived learning) by systematically integrating quantitative findings in order to determine the reasons for variation across studies. We also explored how the relationship varies among studies that measure social presence as functions of online course characteristics and other moderators. Specific research questions we addressed with the meta-analysis were:

1. How strong is the relationship between social presence and students' satisfaction in fully online courses? To what extent does the strength of the correlation vary across studies?

2. How strong is the relationship between social presence and students' perceived learning in fully online courses? To what extent does the strength of the correlation vary across studies?
3. What are the conditions (e.g., type of scale used to measure social presence, audience of the course, discipline area, and course length) that moderate the strength of the correlations?

Method

Sampling of Studies

The target population of this synthesis is a set of studies that report on the relationship between social presence and either students' satisfaction or perceived learning between 1992, when the construct of social presence was first applied in online learning literature (i.e., Gunawardena, 1995; Spears & Lea, 1992; Walther, 1992) and May 2015. As a means of searching relevant studies, we used electronic database and search engines including EBSCO, PsycINFO, ERIC, Education Full Text, digital dissertations, and Google scholar. We also reviewed the Community of Inquiry website (<https://coi.athabascau.ca/>) to identify studies. Further we reviewed the unpublished conference papers presented at major education and online learning conferences including Sloan C, Association for Educational Communications and Technology, American Educational Research Association, and Association for the Advancement of Computing in Education. These papers were obtained through the conference websites. The key words used for the search were “social presence”, “perceived learning”, “online learning”, “satisfaction”, “online”, “retention”, and/or “teacher immediacy”. A manual search was conducted by reviewing the reference list of the identified articles via the preceding electronic search. The entire search process identified 98 studies that might fit the meta-analysis. We

carefully read the abstract and evaluated the content of each study to determine the adequacy of these studies for the meta-analysis using the pre-determined criteria.

Inclusion and exclusion criteria

To be included in the meta-analysis, each study must fit three conditions: the study (a) investigated the relationship between social presence and either perceived learning or students' satisfaction in fully online courses in a higher education setting; (b) used social presence as its theoretical framework; and (c) reported quantitative information, including sample sizes, correlation between social presence and students' satisfaction or perceived learning, or other statistics, such as a t-value, regression coefficient, means, standard deviations or Cohen's d, that can be used to calculate the correlation between social presence and either satisfaction or perceived learning.

Based on these criteria, 73 out of 98 originally identified studies were excluded from the sample pool. Of the remaining 25 studies, there were 10 published journal articles, 6 conference proceedings, and 9 dissertations. Fourteen out of 25 studies reported the correlation between social presence and perceived learning, and 19 reported a correlation between social presence and satisfaction; the studies included 3051 online course participants for perceived learning and 3862 participants for satisfaction. See Table 3. 3 for detailed information of these studies.

Table 3. 3: List of Studies included in the Meta-Analysis

Author(s)	Year	Course Length (weeks)	Subject Area	Scale	Outcome	<i>N</i>	<i>r</i>
Akyol & Garrison	2008	16	Ed	CoI	PL	15	0.46
Alaulamie	2014		O	CoI	SAT	814	0.50
Arbaugh	2008		B	Richardson & Swan (2003)	PL	656	0.19
Catron	2012		O	CoI	SAT	252	0.43
Cobb	2011	12	O	CoI	SAT SAT PL	1281 2812 8	0.63 0.69 0.61
Crim	2006	16	O	Gunawardena & Zittle (1997)	SAT PL SAT PL	280 241 270 280	0.72 0.72 0.72 0.55
Gunawardena & Zittle	1997	16		Gunawardena & Zittle (1997)	SAT	50	0.78
Horzum	2015		O	Gunawardena & Zittle (1997)	SAT	205	0.60
Hostetter	2012			Richardson & Swan (2003)	PL	121	-0.41
Jones	2007		B	Gunawardena & Zittle (1997)	PL PL PL PL	150 150 148 148	0.43 0.34 0.42 0.41
Joo, Lim, & Kim	2011	16	O	Garrison, Cleveland-Innes, & Fung (2004)	SAT	709	0.41

Table 3. 3 continued

Kang, Liew, Kim, & Park	2014	16	Ed	Kang, Choi, & Park (2007)	PL SAT SAT PL	63 63 47 47	0.18 0.38 0.63 0.29
Kang, Kim, Kim, Yoo & Kim	2012	10	Ed	Kang, Park, Jung, Park (2009)	SAT	53	0.23
Kang, Park, & Choi	2006	6	Ed	Kang, Park, & Choi (2006)	SAT PL	71 71	0.69 0.02
Kim, Kwon, & Cho	2011	16	Ed	Kim (2011)	SAT	81	0.41
Newberry	2004	16	O	Biocca, Harms, & Gregg (2001)	SAT SAT SAT	94 51 51	0.34 0.06 0.58
Nyachae	2011	6	Ed	CoI	PL SAT	81 81	0.76 0.82
Richardson & Swan	2003	16		Richardson & Swan (1997)	PL SAT PL PL PL PL PL PL	95 95 94 74 45 93 39 86	0.68 0.60 0.83 0.55 0.50 0.46 0.80 0.40
Rockinson-Szapkiw	2009	8 & 16	O	CoI	PL	347	0.49
Spears	2012	--	O	Gunawardena & Zittle (1997)	SAT	159	0.73
Strong, Irby, Wynn, & McClure	2012		Ed	Richardson & Swan (2003)	SAT PL	109 14	0.22 0.56

Table 3.3 continued

Swan & Shih	2005	--	Ed	Richardson & Swan (2003)	PL	51	0.70
					PL	51	0.74
					SAT	51	0.56
					SAT	51	0.81
Teng	2005	--	Ed	Adaption of Shih (2004)	PL	46	0.69
					SAT	46	0.57
					PL	13	0.75
					SAT	14	0.44
					PL	13	0.64
					SAT	13	0.61
Wise, Chang, Duffy, & del Valle	2004	--	Ed	Perceived Instructor Social Presence	PL	40	0.22
					SAT	40	0.14

Note. -- = not reported, O=other, Ed=Education, B=Business, SAT=satisfaction, PL=Perceived Learning, N = primary study sample size, r = Pearson's correlation between social presence and the outcome

Coding of Studies

Once we developed an initial coding scheme, we reviewed the scheme and piloted it with the sample of identified studies. The coded variables for study characteristics include:

- course design elements which may have an impact on social presence (e.g., welcome messages, collaborative learning activities, individual assignments),
- publication type (journal, conference paper, dissertation/thesis), target audience (undergraduate, graduate, and “other” such as professional development),
- course length (6, 8, or 16 weeks),
- discipline area (Education, Business, and “Other” for areas only having a single study such as nursing), and
- scale used for measuring social presence (Gunawardena & Zittle, 1997; Richardson & Swan, 2003; CoI by Swan et al., 2008; and “Other” for scales represented only a single time in the meta-analyses).

We also evaluated the quality of a primary study by evaluating six indices (i.e., statistical conclusion validity, fishing and error rate problems avoided; external validity; internal validity; evidence that statistical assumptions examined; statistical conclusion validity-likely that strong/good statistical power present; statistical conclusion validity-likely that assumptions of statistical tests satisfied). Two members of the research team coded all of the studies individually. The entire team of four members (two faculty members, two graduate students) then reviewed and discussed the results of this coding to determine if any disagreement between two coders existed. The initial inter-coder reliability of agreement expressed in percentages was 95.68% for students' satisfaction and was 96.43% for students' perceived learning. Any

disagreement on coding was solved and the final rate of agreement is 100% for coding of the correlations.

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Effect Size Extraction

Two types of Pearson's correlation coefficient (r) that represent the relationship between social presence and student satisfaction or the relationship between social presence and student perceived learning, respectively, served as effect sizes. These retrieved directly from 24 out of the 25 studies. However, because the study by Wise et al. (2004) did not report the correlation, we calculated it from the quantitative information retrieved from the study. A total of 28 effect sizes on the relationship between social presence and student satisfaction from 19 studies, and a total of 30 effect sizes from 14 studies on the relationship between social presence and student perceived learning were extracted.

Handling Dependent Effect Sizes

Four studies (i.e., Crim, 2006; Kang et al., 2014; Swan & Shih, 2005; Teng, 2005) reported multiple correlations between social presence and perceived learning, as well as between social presence and satisfaction. In addition to these four studies, two other studies (i.e., Jones, 2007; Richardson & Swan, 2003) reported multiple correlations between social presence and perceived learning, and another two studies (i.e., Cobb, 2011; Newberry, 2003) reported multiple correlations between social presence and satisfaction. These multiple effect sizes were obtained from same or nested groups, which were considered dependent on each other. Because handling dependent effect sizes is necessary to avoid misestimation of standard errors in a meta-analysis, we computed the weighted average effect size of the dependent effect sizes within group for the same student outcome (e.g., satisfaction). We then used it as a final effect size representing the group. When two types of effect sizes (i.e., the correlation between social presence and satisfaction and between social presence and perceived learning, respectively) were reported for the same group (e.g., Akyol & Garrison, 2008), we treated them as independent for the analysis as we conducted the meta-analysis for each outcome separately (Cooper, 2009). By doing so, a total of 52 effect sizes, 26 independent effect sizes per student outcome (i.e., satisfaction and perceived learning), were used for data analysis.

Data Analysis

We chose a random-effects model as a theoretical approach for synthesis (Hedges & Vevea, 1998). We acknowledge that the selection of methodological framework (fixed-effect vs. random-effects model) for a meta-analysis has been a great debate (Hedges, 2009), and according to some researchers, the estimated average effect under random-effects model tends to be less conservative than that under fixed-effect model (e.g., Poole & Greenland, 1999).

However, we consider the random-effects approach an appropriate choice because we expected that all the studies focusing on each of the two relationships are neither accessible nor identifiable via the described searching methods; located studies were treated as a sample from all the studies in the target population.

Fisher's *r-to-z* transformation (Fisher, 1915) was used to normalize the sampling distribution of Pearson's correlation coefficient. To compute the average effect size, we employed the weight the inverse of total variance (Hartung, Knapp, & Sinha, 2008) to reflect the difference in the precisions among effect sizes, which occurred because of the differences in primary study sample size. We then transformed the results back to the original correlation metric for reporting results.

Heterogeneity of effect sizes

We investigated variation of the effect sizes across studies with three statistics. We used a Q test (Hedges & Olkin, 1985) to assess the homogeneity of effect sizes. We computed an I^2 statistic that represents the ratio of between-groups variance to the total variation across effect sizes to indicate the amount of effect sizes' variation due to the differences among studies. Finally, we calculated a between-groups variance statistic, τ^2 (Higgins, Thompson, Deeks, & Altman, 2003).

Moderator analysis

Moderator analyses were performed to identify study characteristics (i.e., publication type, target audience of the course, discipline area, course length, and scale used) that may explain the difference in the magnitudes of the relationship between social presence and two student outcomes. Neither course design elements nor instructor behaviors served as a moderator because only seven out of 25 studies reported the course design elements or instructor's

behavior/role. As Table 3. 4 shows, our coding revealed inconsistent reporting practice of course design; yet these elements are often identified as being critical for creating effective online learning environments. We also investigated the moderating effect of the scale used for measuring social presence on the relationship to explore how various operationalization, or possibly measurement error, may explain the effect size variation. Comprehensive Meta Analysis (CMA) V2.0 software were used to conduct all quantitative analyses.

Table 3. 4: Summary of Coded Variables for Online Course Characteristics and the Number of Studies (*k*) Reporting Characteristics

Variable	Code	<i>k</i>
Course design elements	Welcome messages	4
	Include student profiles	2
	Incorporate audio	4
	Limit class size	0
	Structure collaborative learning activities	6
	Individual assignments	3
	Self-tests	2
	Written assignments	4
	Lectures/notes/readings	3
Instructor behaviors	Contribute to discussion boards	6
	Promptly answer e-mail	3
	Provide frequent feedback	3
	Strike up a conversation	3
	Share personal stories and experiences	3
	Use humor	2
	Use emoticons	3
	Address students by name	3
	Allow students options for addressing the instructor	0
	Include instructor profile	1
	Share personal values, beliefs, and attitudes	2
	Salutations and greetings	1
	Accommodating diverse learners	0

Sensitivity analyses

We conducted a priori power analyses with the expected correlation of .5 with 25 effect sizes (Valentine, Pigott, & Rothstein, 2010), ensuring the current meta-analysis has sufficient

statistical power (i.e., power =1) for testing both the average effect size and heterogeneity of effect sizes for both outcomes (i.e., satisfaction and perceived learning).

Studies that report significant outcomes, relatively high effect sizes, and large sample sizes, are more likely to be published than studies with non-significant outcomes, lower effect sizes and smaller sample sizes (Stern & Simes, 1997). This may result in publication bias because more weights on published studies than unpublished ones were given when summarizing the obtained effect sizes. We used funnel plots (i.e., plot of effect sizes as a function of standard error) to examine if any publication bias exists in the current meta-analysis. We also conducted Orwin's Failsafe N analysis (Orwin, 1983) and Duval and Tweedies's Trim and Fill test (Duval, 2005) using CMA to explore the existence of publication bias.

Results

Relationship between Social Presence and Satisfaction

The average correlation of social presence and satisfaction

The weighted average effect size of the original Pearson's correlation metric was 0.56 (SE = 0.02), which indicated a strong, positive relationship between social presence and satisfaction. The forest plot of the 26 independent Pearson's r effect sizes with their 95% confidence intervals is shown in Figure 3. 1. The mid-point of each line represents the point estimate of the effect size. The length of each line represents the range of 95% chance that the true effect size lies in. The plot suggests large variation among the effect sizes. In addition, large confidence intervals for some effect sizes also indicate variation in precision among effect sizes. Consistent with the observation from the forest plot (Figure 3. 1), the result of Q test indicates significant heterogeneity among effect sizes, $Q(25)=187.64$, $p<0.001$, $\tau^2 =.048$. The I^2 statistic was 86.68%, indicating about 87% of variation in the correlations between social presence and satisfaction is

due to systematic differences among studies being included in the meta-analysis. The large variation in effect sizes also suggests the need for moderator analyses.

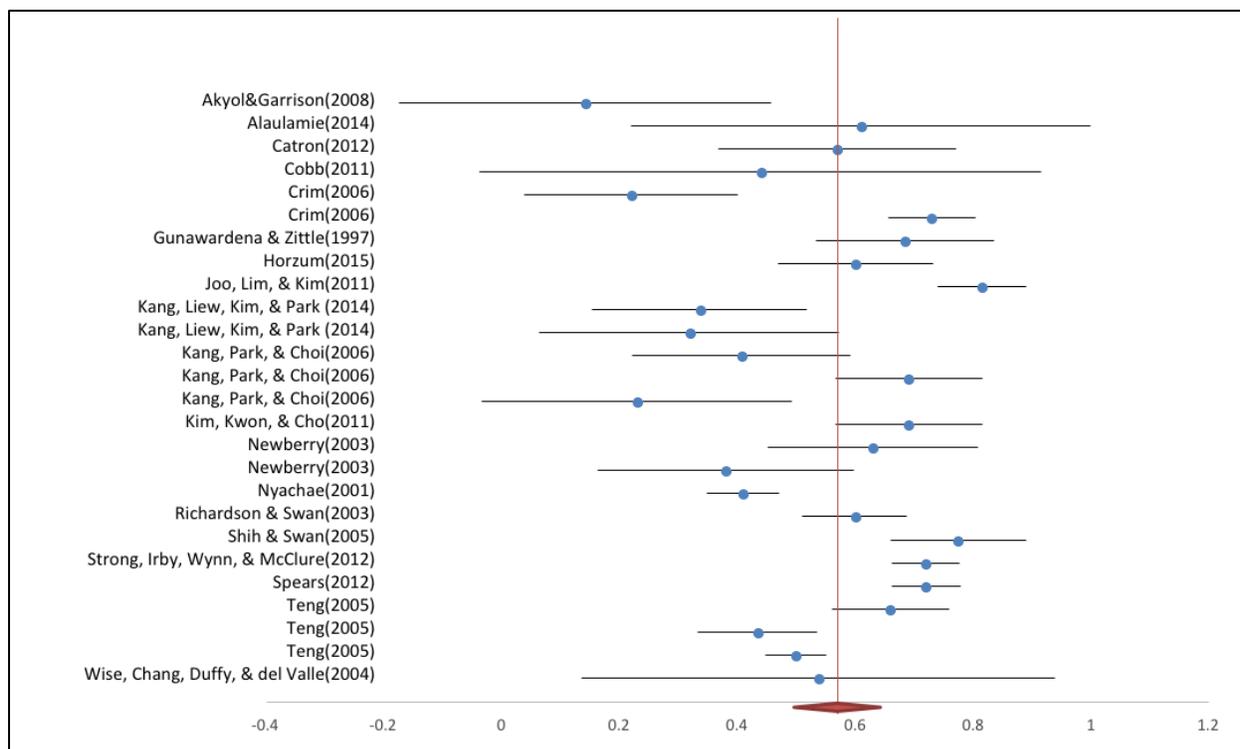


Figure 3. 1: Forest Plot of Correlations of Social Presence and Students' Satisfaction

Moderators for Social Presence and Satisfaction Relationship

Course length, discipline area, and the type of scale used for measuring social presence were identified as significant moderators in determining the strength of the correlation between social presence and satisfaction as reported in Table 3. 5. More precisely, the weighted average correlation significantly varied among the courses with different course length, $Q(2) = 18.26$, $p < 0.001$. The average correlation between social presence and satisfaction is weakest when the course length is shorter (6 weeks; $r = 0.48$, $k = 3$). Although sample sizes for the 8-week courses are small, the magnitude of the correlation seems to be stronger as the course length is longer (8 weeks; $r = 0.72$, $k = 2$; 16 weeks; $r = 0.53$, $k = 9$). Second, the strength of the correlation between

social presence and satisfaction varies across academic disciplines ($Q(2) = 11.93, p=0.004$). The correlation for online courses in education ($k = 7, r = 0.42$) is weaker than in other disciplines (i.e., agriculture and life science, nursing, introductory computer skill, and other mixed, $k = 8, r = 0.62$), but stronger than in business ($k = 3, r = 0.32$). Third, the scale type was a significant moderator, $Q(3) = 15.89, p=0.001$. The correlation between social presence and satisfaction is stronger when social presence was measured by the Richardson & Swan (2003) ($k = 3, r = 0.73$), compared when that was measured by other scales such as the scale of Guanwardena & Zittle (1997) ($k = 8, r = 0.58$), the CoI Survey ($k = 4, r = 0.62$), or other scales including scales that were developed for a particular study ($k = 9, r = 0.39$). Finally, neither publication type ($Q(2)=1.90, p=0.39$) nor target audience ($Q(2)=2.361, p=0.307$) served as a significant moderator. Interestingly, our result showed that the correlation between social presence and satisfaction are the same regardless of whether courses are offered at the graduate or undergraduate level.

Table 3. 5: Results of the Moderator Analyses

Variable	Category	Satisfaction			Perceived Learning		
		<i>r</i>	<i>k</i>	Q_{between}	<i>r</i>	<i>k</i>	Q_{between}
Publication type	Journal article	0.50	10	1.90	0.51	13	2.49
	Unpublished conference paper	0.60	5		0.16	3	
	Dissertation/Master's Thesis	0.59	12		0.59	10	
Target audience of the course	Graduate	0.52	5	2.36	0.47	5	7.69*
	Undergraduate	0.42	3		0.35	4	
	Other (e.g., mix, certification)	0.60	8		0.59	9	
Discipline area	Education	0.42	7	11.92*	0.42	7	11.92*
	Business	0.32	3		0.32	3	
	Other	0.62	8		0.62	8	
Course length	6 weeks	0.48	3	18.26*	0.45	3	7.19*
	8 weeks	0.72	2		0.49	2	
	16 weeks	0.53	9		0.58	11	
Scale	Richardson & Swan (2003)	0.73	3	15.89*	0.39	4	4.51
	Gunawardena & Zittle (1997)	0.58	8		0.60	8	
	CoI (2008)	0.62	4		0.52	4	
	Other	0.39	9		0.43	7	

* $p < 0.05$

Relationship between Social Presence and Perceived Learning

The average correlation of social presence and perceived learning

The weighted average Pearson's correlation was 0.51 (SE= 0.05), which indicated a strong positive relationship between social presence and perceived learning. The forest plot of the 26 independent Pearson's r effect sizes with their 95% confidence intervals is shown in Figure 3. 2. Similar to the effect size for satisfaction, the precision of effect sizes for perceived learning varied across studies. The result of Q test showed significant heterogeneity among effect sizes, $Q(25)=345.77$, $p<0.001$. The estimated between- groups effect size variance was $\tau^2 = 0.123$, a relatively large variation among 26 effect sizes. The I^2 statistic was 92.77%, which indicates about 93% of variation in effect sizes was due to the differences among studies. Similar to the results with satisfaction, this high I^2 statistic suggests the need of moderator analysis to identify the factors that explain variation in effect sizes.

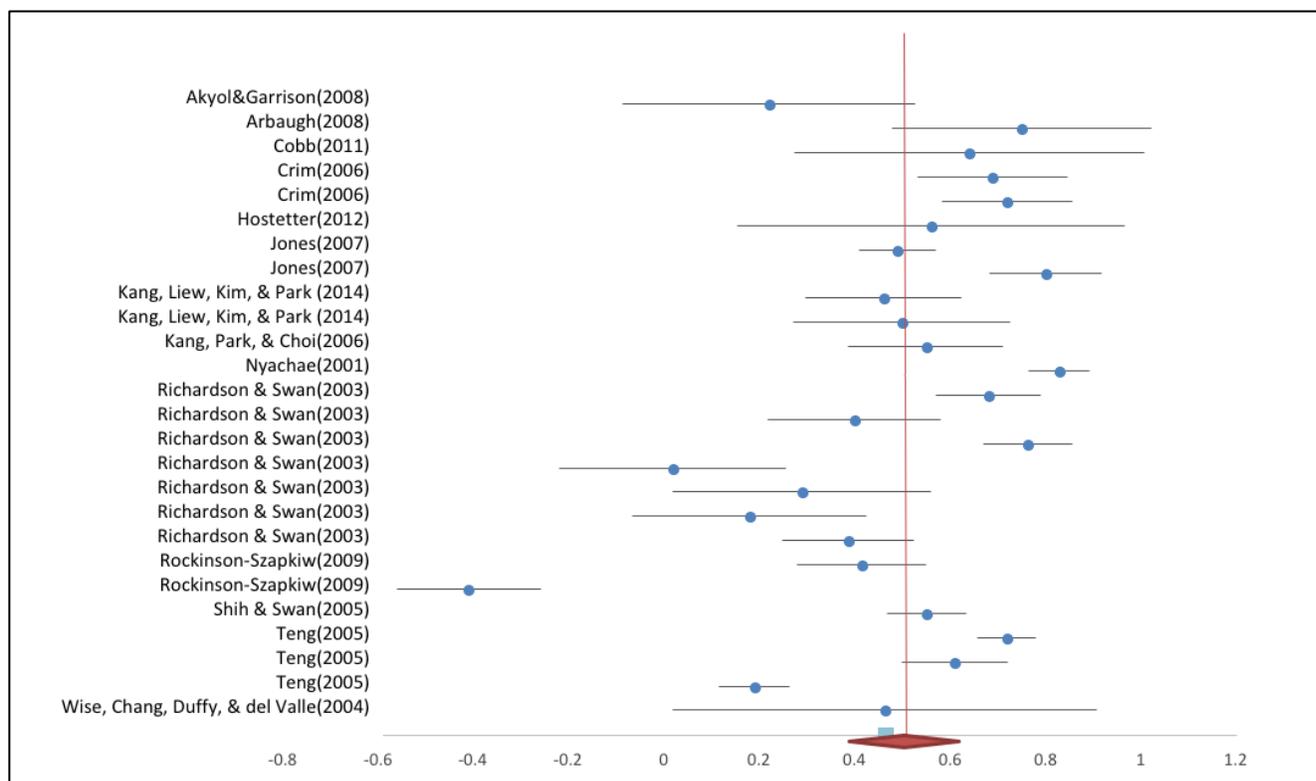


Figure 3. 2: Forest Plot for Correlation of Social Presence and Students' Perceived Learning

Moderators for social presence and perceived learning relationship

First, course length was identified as a significant moderator, $Q(2)=7.19$, $p=0.42$. The weighted average correlation between social presence and perceived learning for courses last 16 weeks was 0.58 ($k=11$), for courses last 8 weeks was 0.49 ($k= 2$), and for courses 6 weeks in length was 0.45 ($k= 3$). This indicates that the longer the course lasted, the stronger the relationship between social presence and perceived learning. Second, the average correlations differed by discipline area, $Q(2)=11.92$, $p=0.003$. Although the sample size is small, the correlation tends to be weaker for online courses in Education ($k=7$, $r=0.42$), compared with courses in other disciplines ($k=8$, $r=0.62$), but higher than that for courses in Business ($k=3$, $r=0.32$). Third, the target audience was a significant moderator, $Q(2)=7.69$, $p=0.021$. The online courses for certification or mixed program showed higher average correlation between social presence and perceived learning ($k=9$, $r=0.59$) than the courses offered in graduate program ($k=5$, $r=0.47$) or in undergraduate program ($k=4$, $r=0.35$). Finally, publication type (i.e., $Q(2)=2.49$, $p=0.29$) and scale type (i.e., $Q(3)=4.51$, $p=0.34$) were identified as non-significant moderators, which indicates that no difference in magnitude of the relationship by the type of reports or the scale used for measuring social presence.

Sensitivity Analyses

Figures 3. 3 and 3. 4 are the funnel plots of Pearson's s to examine publication bias. The funnel plot for student satisfaction was nearly symmetrical with two studies on the very left top of the funnel (Figure 3. 3). This indicated that no serious publication bias existed. The results of Orwin's Failsafe N and Trim and Fill analyses also suggested no indication of publication bias as Failsafe N is 134 assuming that the mean of missing effect sizes is 0 and the minimal effect size to be considered it important is 0.1.

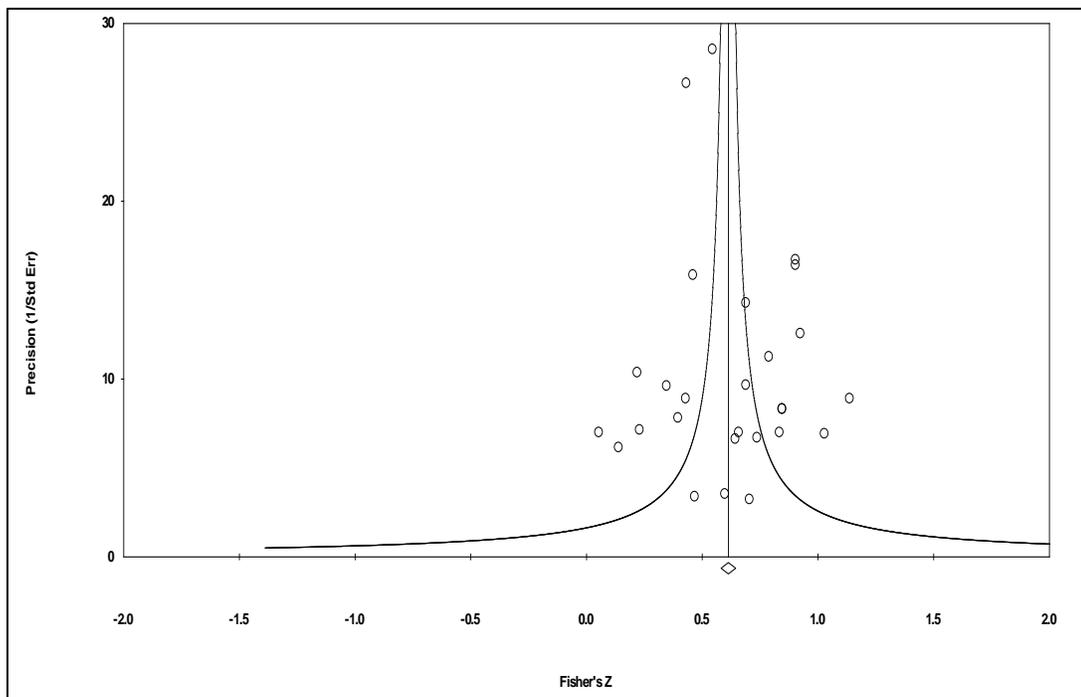


Figure 3. 3: Funnel Plot for Correlation of Social Presence and Students' Satisfaction ($k = 26$)

1

In contrast, the funnel plot for perceived learning (Figure 3. 4) was asymmetrical, with an absence of studies on the left bottom of the funnel, indicating that studies with smaller sample sizes were absent in the pool of studies included in the meta-analysis so that a publication bias might exist. However, smaller sample studies tend to be less influential in meta-analysis because the weight assigned to the effect size based on a small sample size is small. In addition, Orwin's Failsafe N is 82 when we assume the mean of the missing effect sizes is 0 (i.e., no correlation), and the effect size would not hold practical importance when it is smaller than 0.1. This means that at least an additional 82 studies (with the average effect size of 0) would be needed to reduce the current overall effect to 0.1. Because it is unlikely that the average effect size of all missing effect sizes are close to zero even when we retrieve additional effect sizes from the population, the result supports no publication bias for perceived learning effect size. Further, Duval and

Tweedie's (Duval, 2005) Trim and Fill result suggested that three missing cases would make the funnel plot symmetric. With the imputation of the three missing cases, the average effect size is 0.613, which is even higher than the current result. Thus, we can conclude that the impact of publication bias on our finding is minimal and will not alter our findings.

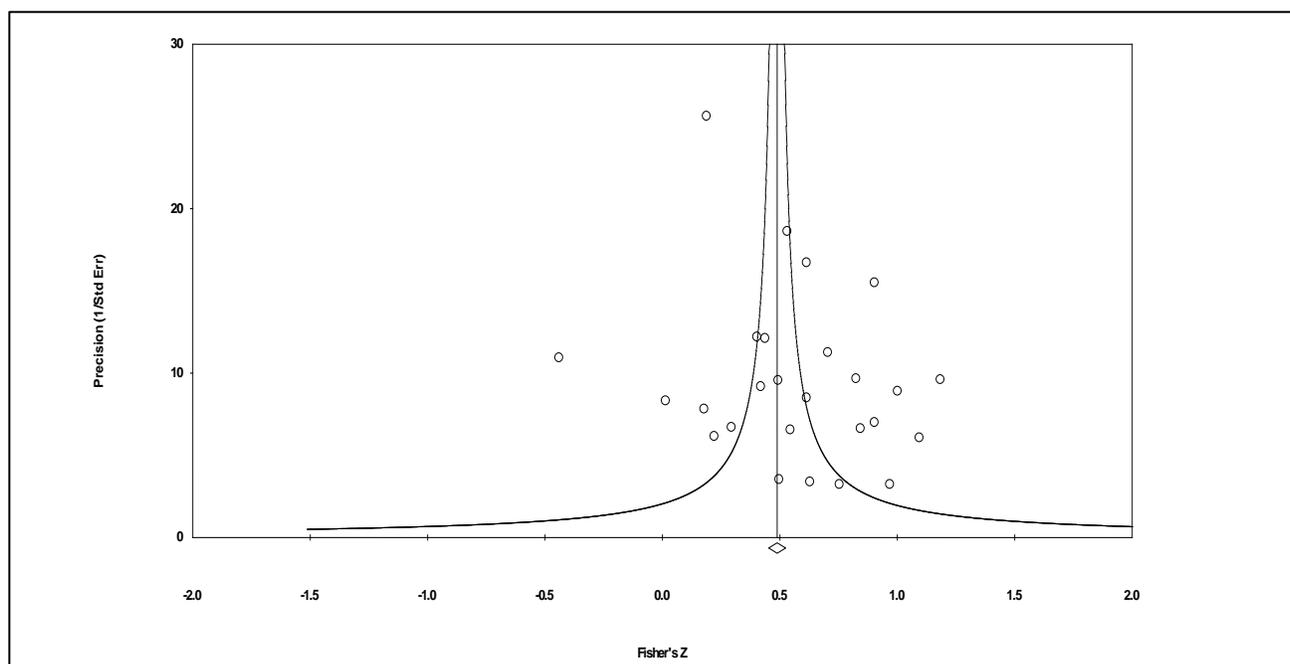


Figure 3. 4: Funnel Plot for Correlation of Social Presence and Students' Perceived Learning ($k = 26$)

Discussion

Social Presence and Student Outcomes

Although social presence may not be the only factor to consider when designing or evaluating online courses, this meta-analysis on social presence has revealed its exceedingly important function in predicting essential student outcomes, namely satisfaction and perceived learning. In turn, these student outcomes have consistently been shown to impact student persistence, retention, motivation, and success (Astin, 1977, 1992; Booker & Rebman, 2005; Kuo et al., 2013; Pike, 1993; Roberts & Styron, 2010; Schreiner & Nelson, 2013). The concept of social presence highlights the ideal that we should encourage social interaction as the

underpinnings of critical thinking and higher-level learning for students (Garrison & Akyol, 2013). Additionally, when considering the importance of social presence in online courses, we can return to previous studies that frame social presence as having a relationship to students' participation and motivation to participate, course and instructor satisfaction, perceived learning, traditional academic outcomes such as grades, and as having implications for course design and retention (Boston et al., 2009; Cobb, 2009; Gunawardena & Zittle, 1997; Hostetter & Busch, 2013; Jorge, 2010; Swan & Shih, 2005; Swan et al., 2012; Tu & McIsaac, 2002; Weaver & Albion, 2005).

Our findings revealed the magnitude of the relationship between social presence and student outcomes, as well as the ability to predict student outcomes in fully online courses. For students' satisfaction in fully online courses, the magnitude was 0.56; for students' perceived learning it was 0.51, thus indicating that social presence may very well predict students' satisfaction and perceived learning. There is, however, significant variation in the magnitude of the correlations across online course settings. With this in mind, we then conducted moderator analyses to explain some of the features that may differentiate the relationships.

Moderators for Social Presence-Student Outcome Relationship

For students' satisfaction, we identified course length, discipline area, and the type of scale used for measuring social presence as significant moderators in determining the magnitude of the correlation between social presence and satisfaction. We found that courses longer in duration (more than 6 weeks) tended to have stronger magnitude of the correlation (8 week courses, $r = 0.72$, $k = 2$; 16 week courses, $r = 0.53$, 9). We also found that the correlation varies across discipline area, with education weaker than other disciplines (i.e., agriculture and life science, nursing, introductory computer skill, and other mixed), but stronger than business.

Finally, the correlation between social presence and satisfaction is higher when social presence was measured by the Richardson and Swan scale (2003) compared to other scales included in the meta-analysis.

For students' perceived learning, course length was a significant moderator, the longer the course length the stronger the magnitude, Academic discipline area was again a significant moderator with the correlation tending to be weaker for online courses in Education compared with courses in other disciplines. We also found that course target audiences served as a significant moderator with courses offered for certification or mixed levels showing higher average correlations than general courses offered in graduate or undergraduate program.

Because course length presented as a significant moderator for predicting both student outcomes, we suggest additional research in this area. We found that longer courses more accurately predicted student outcomes. Does this mean we need to expand the context in which we consider the length of a course? Is it better for students to enroll in two semester-length courses or two shorter courses that run consecutively within a semester? We know from the work of Akyol and Garrison (2008) that social presence “develops” over time, with particular aspects increasing and waning as needed. One example is the development of community playing a bigger role early on in the course but once it is established the need to develop wanes. When Akyol and Garrison examined a semester length course they found that open communication (where learners build and sustain a sense of group commitment) and affective expression (where learners share personal expressions of emotion, feelings, beliefs, and values) were higher in the beginning of the course and that affective expression waned as group cohesion (where learners interact around common intellectual activities and tasks) increased (Akyol & Garrison, 2008; Swan, Garrison, & Richardson, 2009). Would the same or some parallel process occur in shorter

intensive courses? A later study by Akyol, Vaughan, and Garrison (2011) looked at course duration and social presence with a 6- and 13- week format, all else being the same including instructor and discussion topics with the exception of group dynamics. They found statistically significant differences in both affective communication ($t(34) = 5.074, p < 0.01$) and group cohesion ($t(34) = -4.554, p < 0.01$) between the two course duration formats (p. 235). There was not a difference for open communication. The authors suggested a longer duration would have allowed for the development of group cohesion and community, although students in the short-term class perceived themselves to be a community.

Academic discipline area was also a significant moderator for predicting both student outcomes. Specifically, we found significant differences between “education,” “business,” and “other” disciplines, suggesting that the correlations varied across these three categories. The findings complement the study by Arbaugh, Bangert, and Cleveland-Innes (2010), who found differences between academic disciplines and concluded the differences in part could be a result of hard versus soft paradigm development and an emphasis on pure versus applied disciplines. In another study, Gorsky, Caspi, Antonovsky, Blau, and Mansur (2010) examined the relationship between disciplinary difference between natural sciences versus humanities and students' and instructors' active participation (posting message) in course forums. They found much higher interaction in science courses than in humanities. The authors noted that one possible explanation might be related to the nature of assignments in science courses. They indicated that since mandatory problem solving is essential part of assignment in science courses, high level of interaction between student-instructor and student-student is expected. Additionally, Arbaugh and Rau (2007) found that students' perceived learning was lower in more quantitative courses than in qualitative courses. The authors pointed out that the discrepancy between different

disciplines might be related to how an individual instructor establishes and facilitates the course (i.e. schedules of activities, structured activities with specific instructions for learner participation). Given this we have to ask ourselves, is this the nature of the teaching methods employed by the disciplines from a traditional context? Or, is it that the specific studies that were conducted and included represent but a fraction of what is available online across disciplines? This finding leads us to more questions than answers and therefore, future research initiatives focusing on discipline-specific differences in the design, facilitation, and outcomes as they relate to social presence.

Moreover, this study provides insights into the measures of social presence currently in use. As summarized in Table 3. 2, previous researchers used a variety of scales to measure social presence. Most prevalent are the CoI survey (Arbaugh et al., 2008), the Gunawardena and Zittle scale (1997), and Richardson and Swan scale (2003). It shows that no two scales are equal, while also indicating that strengths can be found in each despite this disparity. Although two scales may purport to measure the same construct, the dimensions may vary and capture a different element of the same construct based on the set of items (operationalization) included in scale, resulting in differing outcomes. However, we should note that psychometric properties of a scale used to measure a construct will also affect the correlation among constructs. For example, when higher reliability is consistently reported for one scale compared to other scales that measure the same construct (i.e., social presence in our study), the correlation of the construct measured by the scale with higher reliability with student outcomes will also be higher compared with the correlations from other scales as lower reliability results from larger measurement errors and will attenuate the correlation. In this case, the Richardson and Swan scale (2003) demonstrated higher

reliability estimates (less measurement error) than the other scales examined. Our result of the meta-analysis was consistent with this finding.

As with other constructs regularly investigated in educational research (e.g., critical thinking), the elusiveness of social presence continues to confound attempts to capture it with a single measure, whether that be through behavioral indicators (de Bruyn, 2004; Rourke et al., 1999; Swan & Shih, 2005) or self-report measures (Gunawardena & Zittle, 1997; Swan et al., 2008; Tu, 2002a). Several researchers have concluded that because of social presence's multi-dimensional nature, measuring it is no easy feat: especially since defining it is also challenging (Garrison & Akyol, 2013; Kozan & Richardson, 2014; Lowenthal & Dunlap, 2014; Tu, 2002a). As researchers now engaged with this line of inquiry, we concede the struggle of capturing the complex and multifaceted dimensions of social presence. Since these dimensions and our understandings of them seem to evolve with each new context, we implore future researchers to offer concise and succinct operational definitions of the various terms employed. Doing so will help establish a solid foundation from which researchers and educators may engage in fruitful and productive conversations about the nature of learning and the digital realms in which this learning increasingly takes place.

Through the process of conducting the review (in particular the meta-analysis), we determined the need for improved reporting practices. For example, in some cases instruments used to measure social presence were not described fully. Of the 98 initial studies 57 did not include the statistical information necessary to obtain effect sizes thereby causing their exclusion from the study. Moreover, the vast majority of studies did not report on the design elements of the online courses ($k=18$ as per Table 3. 4), which may imply that attention is not being paid to

principles used to enhance social presence or design effective online courses (Garrison, 2006; Swan, Matthews, Bogle, Boles, & Day, 2012; Swan & Shih, 2005; Yamada & Goda, 2012).

Since researchers for online learning and social presence tend to hail from many diverse disciplinary backgrounds, improving reporting practices by making the various linguistic and conceptual fixtures more accessible and transparent could not only legitimize the field, but also go a long way to further student learning and bolster student outcomes.

Strengths and Limitations of the Present Study

Limitations of this study include a small sample size (i.e., 26 effect sizes per outcome) despite our attempt to locate relevant studies, which resulted in limiting the generalizability of our meta-analysis. More importantly, the small sample size restricted our opportunities to investigate the heterogeneity of variances in effect sizes. Although we identified some of the moderators that determine the magnitude of effect sizes, a large amount of variation in effect sizes are still unexplained. In particular, it may be worth investigating how the effect size would change as a function of design features either in a primary study or a future meta-analysis. Further, some of the variables that may potentially affect the relationship between social presence and student outcomes (e.g., the role of the instructor, instructor behaviors) were not included in our moderator analyses because of a lack of relevant information reported in the studies, making it a worthy area for future investigations.

Despite these limitations, our study also has a number of strengths, including providing a comprehensive summary of the current literature related to social presence in online learning environments, understanding the nature of the relationship between social presence and student outcomes, and identifying the source of disparity in the reported correlations based on the meta-analytic method. For example, our review provides researchers and practitioners easy access to

the wide-ranging research evidence related to social presence in online learning environments as the foundation for future research and practice. Our review indicates the lack of studies that incorporated theory-based course design elements. Little attention to reporting design elements may imply the limited application of the relevant theory to practice. Moreover, our meta-analysis is the first attempt to synthesize the relevant studies to quantify the common effect size and the disparity among effect sizes across 26 sampled studies. Although the synthesized number of studies may be considered small for a meta-analysis, our results are based on the cumulative outcomes of 3862 participants for satisfaction and of 3051 participants for perceived learning. Finally, careful selection of the included studies using the predetermined criteria enhances the statistical validity of our findings.

Future Research

Our findings point to several possibilities for extending the line of research on social presence and for maximizing students' online learning experiences. First, our review identified a gap in the current literature base in social presence. For example, a primary study in which researchers elucidate the link between social presence and discipline-specific differences in the design, facilitation, and outcomes will provide insights into creating an effective online learning environment but one that may be tailored to that a specific discipline. Second, as students' enrollment in online learning continues to grow, future quality research should focus on identifying how course design elements interact with learning environments and outcomes unique to a particular academic discipline and target student populations.

Conclusion

In conclusion, this study provided a comprehensive summary of the current state of the research on social presence using scale-based measures in online learning environments. We

have determined that the scale-based measures currently in use can aid in investigating social presence, can be used to predict student outcomes, but can also be improved. The results of this study have implications for conversations about course duration and optimization for facilitating learning. Additionally, the findings from the moderator analyses can be used to facilitate current and new discussions on how to design a meaningful learning environment from a social learning perspective, one that successfully promotes students' learning. We hope our findings will stimulate the improvement in the quality of reporting practices of research design and findings, as well as to direct future research toward advancing our understanding of effective online learning environments.

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CHAPTER 4: A CRITICAL THEMATIC SYNTHESIS OF QUALITATIVE EVIDENCE OF FACTORS INFLUENCING ONLINE LEARNING EXPERIENCES THROUGH THE COMMUNITY OF INQUIRY FRAMEWORK

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Abstract

This thematic synthesis aimed to synthesize qualitative empirical studies to achieve a comprehensive understanding of the factors perceived by students as influencing their online learning experiences through the lens of the Community of Inquiry framework. Following a three-stage procedure specified by Thomas and Harden (2008), we a) coded all included studies ($n = 29$); b) developed descriptive themes based on the codes; and c) generated analytical themes based on the descriptive themes. The results revealed ten descriptive themes covered by three overarching categories (i.e. course design, instructors' actions during the course, and peers' actions during the course). Analytical themes included accountability, being real, and supporting learning process. All these conceptual insights provided both theoretical and practical implications as well as directions for future research.

Introduction

According to the Seaman, Allen and Seaman (2018), as of 2016, more than 6.3 million students (31.6% of all higher education students) took at least one of their courses at a distance in the US, and this number increased 17.2 % since 2012. This trend is not surprising as learners have reported that online courses offer flexibility and convenience, provide the opportunity to work at a preferred pace, allow increased access to diverse courses, and present educational

opportunities at affordable prices (Capra, 2014; Davidson-Shivers, Rasmussen, & Lowenthal, 2018; Kruger-Ross & Waters, 2013). Although institutions continue to increase their online course offering because of its benefits for institutions, instructors, and students, providing students satisfying online learning experiences still remains a major concern (Davidson-Shivers et al., 2018; Lee & Martin, 2017). To this end, “a more in-depth analysis requires a lens that illuminates the complexities of online learning” (Richardson et al., 2012, p. 98).

Within the overall collaborative constructivist approach, the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000) provides both theoretical and methodological guidance for designing, teaching, and evaluation of the effectiveness of online learning (Arbaugh, 2013; Richardson et al., 2012; Swan, Garrison, & Richardson, 2009). The CoI framework consists of three overlapping presences: social presence, teaching presence, and cognitive presence (Akyol & Garrison, 2008; Arbaugh, 2013). Social presence focuses on creating a climate that “supports and encourages probing questions, skepticism, expressing and contributing to ideas” (Garrison & Akyol, 2013, p. 7), Cognitive presence focuses on higher-order thinking skills and critical thinking, while teaching presence focuses on giving direction and guidance to enhance the development of social and cognitive presences to reach the desired learning outcomes (Garrison et al., 2000). An extensive body of research has provided empirical evidence on the relationship between CoI presences and student outcomes (e.g., satisfaction, perceived learning, actual learning) in online learning (e.g., Richardson, Maeda, Lv, & Caskurlu, 2017, Richardson & Swan, 2003) and determined the factors (e.g., course design, facilitation) that influence students’ online learning experiences (e.g., Asoodor et al., 2014; Borup, West, & Graham, 2012; Kupczynski, Ice, Wisenmayer, & McCluskey, 2010). Yet, to date only few studies have synthesized the previous study findings (e.g., Befus, 2016; De Gagne & Walters,

2009; Richardson et al., 2017). For example Befus (2016) conducted a synthesis to thematically synthesize what has been studied in CoI research in terms of nature, focus, and context of the study. Different from Befus's synthesis, the current synthesis is more interpretive and focuses on the previous qualitative study findings to provide a more comprehensive and recent understanding of the factors that influence student's online learning experiences through the lens of the CoI framework by synthesizing.

The Community of Inquiry Framework

Grounded from Dewey's beliefs in "scientific inquiry and the reflective process" (Garrison, 2013, p. 3), Garrison et al. (2000) proposed the CoI framework to "illustrate the multifaceted components of teaching and learning in a text-based environment" (Anderson, Rourke, Garrison, & Archer, 2001, p. 3). The focus of the CoI framework is to create a deep and meaningful learning experience through the intersection of three multidimensional elements (Akyol & Garrison, 2011; Garrison, 2003, 2013): social presence, cognitive presence, and teaching presence. Social presence is defined as "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people" (Garrison et al., 2000, p. 89) and conceptualized as a) affective expression (being confident to express feelings related to the educational experience); b) open communication (reciprocal and respectful exchanges); and c) group cohesion (activities that build and sustain a sense of group commitment). Secondly, cognitive presence is "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 derived from critical thinking literature and operationalized based on the cycle of Practical Inquiry Model (Garrison, Anderson, & Archer,

2001): triggering event (“recognizing the problem”), exploration (“information exchange, discussion of ambiguities”), integration (“connecting ideas, create solutions”), and resolution (“vicariously apply new ideas, critically assess solutions”) (Garrison et al., 2000, p. 102). Finally, teaching presence is defined as “the design, facilitation, and direction of cognitive and social process for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, et al., 2001, p. 5). Teaching presence plays a mediating role between social and cognitive presence by bringing them together to support the establishment of community of inquiry for critical inquiry (Anderson et al., 2001). Teaching presence is conceptualized as: design and organization (planning and designing the online course both before and during the course), facilitating discourse (facilitation of learning experiences to sustain communication, motivation, and active learning), and direct instruction (providing subject matter expert knowledge and leadership to students for the attainment of learning goals) (Anderson, et al., 2001).

Research on Community of Inquiry Framework and Student Online Learning Experiences

Student learning experience is “a combination of the factors that students experience in the attainment of their educational goals: satisfaction, engagement and motivation; successful acquisition of knowledge; course completion; course delivery methods; and faculty and institutional support” (Bleffert-Schmidt, 2011, pp. 8-9). The purpose of an educational experience is “to structure the educational experience to achieve defined learning outcomes” (Garrison & Cleveland-Innes, 2005, p. 134). To date, an extensive body of research has provided empirical evidence on all three presences of the CoI, showing them as significant predictors of student outcomes.

Furthermore, researchers have noted that systematic and purposeful design of a community of inquiry is needed to guide and support the development of community of inquiry. For instance, in an early study, Shea, Swan, Li, and Pickett (2005) found that instructor facilitation in student discussions, course design and organization are significant predictors of student's sense of learning and sense of belonging. Likewise, Kupczynski, Ice, Wisenmayer, and McCluskey (2010) conducted a mixed-methods study to explore student perceptions of the impact of the indicators of teaching presence on their success in online courses. Their results showed that students reported positive learning experiences when a) they receive timely and constructive feedback on their assignments; b) the instructor actively participates within the course by facilitating discourse (e.g., clarifying their thinking, providing direction and prompting responses in discussion forums, etc.); c) learning activities encourage students to control pacing/learning and to explore new concepts; and d) the course has clear instructions, deadlines, and tips and guidelines for how to be successful in the course. As a summary, such results suggested that a community of inquiry in a text-based course could be built with the guidance and support of course design, facilitation, and direct instruction (e.g., Ice, Curtis, Phillips, & Wells, 2007).

Arguing that meaningful technology integration can enhance group interaction, thereby supporting knowledge building in a community of inquiry (Asoodar, Atai, Vaezi, & Marandi, 2014; Borup et al., 2012; Huss & Eastep, 2013; Kim, Kozan, Kim, & Kohler, 2013; Mills et al., 2014; Pinks, Curran, Poirier, & Coulson, 2014), previous research has also focused on the use of technology to support a community of inquiry in online environments. For instance, in their case study, Borup et al. (2012) focused on the effects of using asynchronous video communication on social presence. Their participants reported that asynchronous video communication improved

their learning, helped them develop a sense of belonging, and enhanced instructor social presence. These results were congruent with the findings of Ice et al. (2007) in that students preferred audio feedback not text-based feedback due to a better sense of involvement and being in a real classroom. In a later mixed method study, Asoodar et al. (2014) focused on student's perceptions about using weblogging and the effects of the sense of community on students' perceived learning. The results showed that weblogging encouraged them to think outside of the box by seeking information from their peers and sharing their own opinions or experiences.

Purpose of the Study

Previous research findings strongly established the relationships between teaching, cognitive and social presences and student outcomes in online learning (e.g., Akyol & Garrison, 2011; Miller, Hahs-Vaughn, & Zygouris-Coe, 2014; Richardson et al., 2017; Richardson & Swan, 2003). To provide a deeper and more comprehensive understanding of these relationships, the present thematic synthesis uniquely presents conceptual insights into those relationships by translating findings from primary studies into themes and comprehensive descriptions. Specifically, this thematic synthesis is a follow-up, complementary synthesis after the three meta-analyses conducted by our research team earlier (i.e., Richardson et al., 2017; Caskurlu, Lv, Maeda, & Richardson, 2017). This thematic synthesis is a follow-up synthesis of three meta-analyses conducted by our research team earlier (i.e., Richardson et al., 2017; Caskurlu et al., 2017). These meta-analyses only synthesize the quantitative empirical evidence to identify the magnitude of the relation between the presences of the CoI and student outcomes (i.e., students satisfaction, perceived learning). Overall, these meta-analyses revealed that that all three presences were positively and moderately related to student outcomes in fully online courses. However, due to the insufficient information provided on course design and instructors' actions

in online courses, we were not able to present enough insights into whether those factors determine the extent of that relationship between the presences and student outcomes through the quantitative synthesis. Further, our review of the studies on the CoI framework and student outcomes revealed that course design- and instructors' action-related factors are mainly addressed by using qualitative evidence. Therefore, the purpose of this synthesis is to integrate the empirical studies that provide qualitative evidence of the factors influencing student online learning experiences through the lens of the CoI framework, and thus presenting a more comprehensive understanding of student online learning experiences, including satisfaction and perceived learning. The following research question was posed: What are the factors perceived by students as influencing their learning experiences in fully online courses through the lens of the CoI framework?

Methodology

This qualitative synthesis utilized a thematic synthesis methodology promoted by the likes of the National Institutes of Health (NIH) (see Thomas & Harden, 2008). A thematic synthesis is a specific type of qualitative synthesis that differs from other types of narrative review because of its explicit intent to treat reported qualitative findings in individual studies as 'data' for analysis and aims to identify prominent or recurrent themes in the relevant literature (Thomas & Harden, 2008). We chose thematic synthesis as a method because of the exploratory purpose of the synthesis. Specifically, use of thematic synthesis allowed us to explore the students online learning experiences beyond what have been described in the primary studies by integrate the findings from primary studies. Thomas and Harden (2008) proposed the following three steps for thematic synthesis: a) line-by-line coding; b) developing descriptive themes based on the codes created in the first stage; and c) generating analytical themes based on the

descriptive themes. According to Thomas and Barden (2008) descriptive and analytical themes are different since “While the development of descriptive themes remains 'close' to the primary studies, the analytical themes represent a stage of interpretation whereby the reviewers 'go beyond' the primary studies and generate new interpretive constructs, explanations or hypotheses (Thomas & Harden, 2008, Abstract, para. 2).

Search Procedure

We used criterion sampling to ensure the retrieved studies were relevant to the synthesis aim. Relevant studies were identified through electronic search through search engines, such as Google Scholar, and electronic databases, including EBSCO, ERIC, PsycINFO, ProQuest. In order to identify additional studies that might be missed in a database search, we also hand searched the following journals where mostly online learning research is published: The Internet and Higher Education, British Journal of Educational Technology, Online Learning, Computers & Education, Distance Education, American Journal of Distance Education, and The International Review of Research in Open and Distributed Learning. Finally, we used snowball sampling by reviewing the references of the identified studies to detect additional studies that were not found through the aforementioned methods. The search terms included “community of inquiry”, “online”, “higher education”, “qualitative”, and “learning experience”. We also searched book chapters through the Purdue library website and we included the book chapters that are online access available. We excluded conference proceedings because one of our inclusion criteria is providing verbatim evidence to support the reported findings and identified proceedings did not provide such info.

Inclusion and Exclusion Criteria

To be included in the current synthesis, a study had to a) be published within the last 10 years (2007 - November, 2017) for recency of evidence; b) use the CoI as a framework to describe students' online learning experiences; c) focus on student's learning experiences in fully online courses in a higher education setting; d) provide qualitative evidence, including verbatim evidence from the participant's voice/grounded data; and e) be reported in English. We included mixed method studies when qualitative data were reported. As depicted in Figure 4. 1, our electronic and manual search produced a total of 3641 potential studies. After applying inclusion and exclusion criteria, 29 studies were included in the final pool.

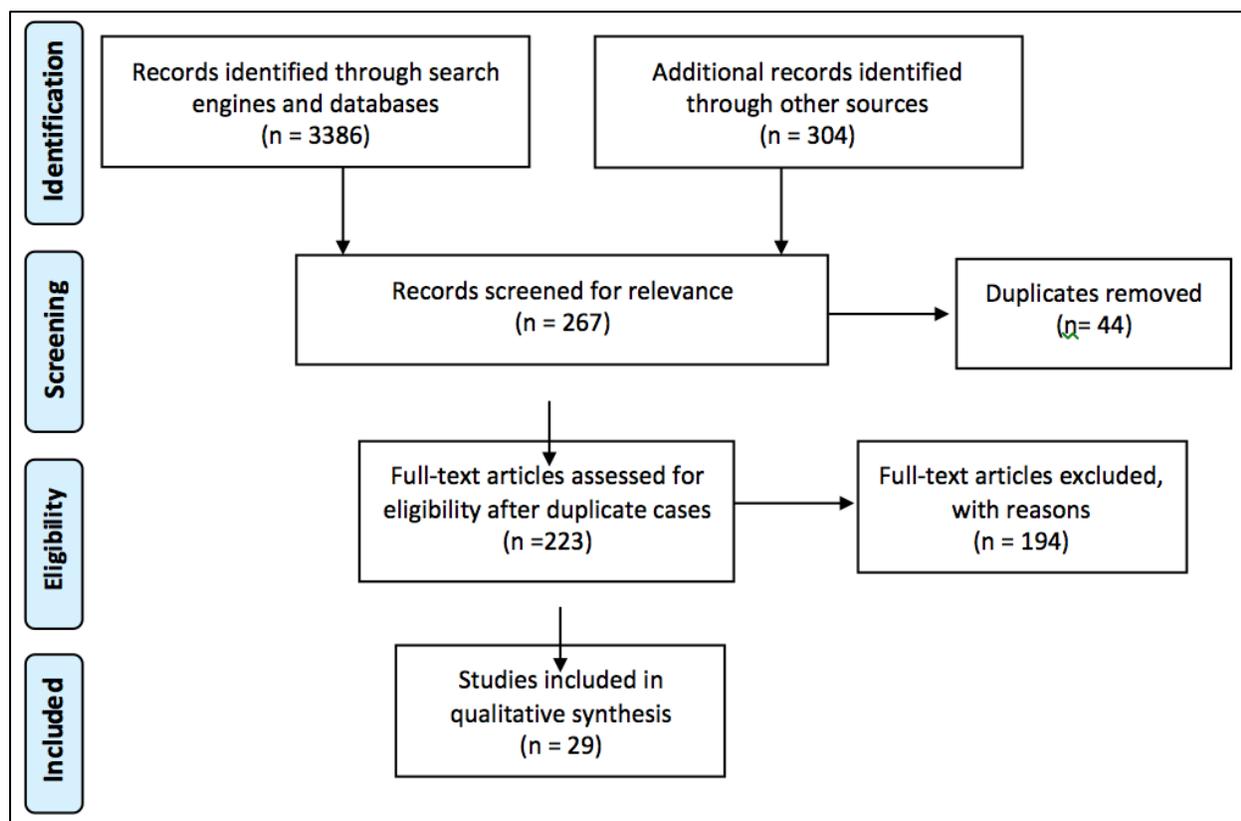


Figure 4. 1: Search Procedure

Critical Appraisal of the Included Studies

Quality of the included studies was assessed using the critical appraisal (See Appendix A) developed by our research team, and based on the available quality assessment tools (e.g., CASP, QARI, EPPI). Although researchers agree that quality appraisal should be part of the synthesis process to assess the trustworthiness of the included findings and relevance of the study to the goal of the synthesis, there is no consensus of how the results of quality assessment should be reflected in synthesis (e.g., Carroll & Booth, 2015). For example, even though some researchers suggest excluding poor quality studies to enhance the quality of synthesis (e.g., Atkins et al., 2008), others argue that excluding studies based on their methodological quality might lose some important qualitative evidence (e.g., Campbell et al., 2011). Furthermore, some

researchers argued that due to the lack of information provided in the primary studies, reviewers do not have sufficient information to judge the quality (Carroll et al., 2012; Dixon-Woods et al., 2004). Finally, there is no threshold point for exclusion or counting a study as a high quality (Heyvaert, Hannes, & Onghena, 2017). Therefore, in this thematic synthesis, the result of critical appraisal was used for descriptive purposes to provide information about reporting practices of the included studies and for examining the credibility of synthesis findings through sensitivity analysis. In the critical appraisal process, we reviewed each study based on what is not reported rather than judging the quality of content or methodology.

Data Extraction and Synthesis of Results

The synthesis followed the following three steps: line-by-line coding of the primary study findings, developing descriptive themes, and generating analytical themes.

First, all primary studies were imported to the QSR's NVivo (11) software for qualitative data analysis. Then, we coded the primary study findings line-by-line, with the unit of analysis at the phrase level. If a phrase represented more than one code, multiple codes were assigned to the phrase. We conducted three cycles of coding. First, the initial codes, which align with the CoI indicators identified by previous work (e.g., Anderson et al., 2001; Garrison et al., 2001; Rourke, Anderson, Garrison, & Archer, 2001), were created inductively through five sampled studies from the final study pool. In the second cycle of coding, the first author coded all primary studies individually. As the researcher continued coding, reading and rereading the primary studies, new codes were added as necessary.

Next, the first and second author discussed the codes with example quotes and revised the coding schema. In the revised coding schema, the three initial themes became overarching categories, and initial descriptive themes were created inductively by grouping and organizing

the codes within each category (e.g., sense of belonging, interactive, support sense of community).

In the third cycle of coding, one researcher coded all the studies individually based on the revised coding schema with the descriptive themes. The second author coded five randomly selected studies to validate data extraction and coding. In the final stage, we created the analytical themes (i.e., accountability, being real, and supporting student learning process) based on the descriptive themes identified in the previous stage.

Trustworthiness and Reliability

To strengthen the trustworthiness and reliability, several strategies were employed. First, in order to establish reliability of coding process, the first author coded all of the studies individually and the second author coded five randomly selected studies including one dissertation and four journal articles. Initial inter-coder reliability was 97% and any disagreements were resolved: 100% agreement was reached. Second, study search, coding, and synthesis processes were explained in a detailed and clear way. Third, verbatim evidence from the included studies was used to support the inferences made in this synthesis. Fourth, primary characteristics of the included studies were provided to enhance dependability. Lastly, this synthesis employed a sensitivity analysis by using the results of the critical appraisal to increase the credibility of findings. Specifically, the first and fourth author appraised all 29 included studies individually and compared their codes. The initial agreement was 73% between the two, and full consensus (i.e., an inter-coder reliability of 100%) was achieved by resolving all disagreements. The results of sensitivity analysis showed that removing low quality studies from the synthesis did not change the overall themes and factors included in these themes and thus we

concluded that inclusion of studies with low reporting quality will not impact on the synthesis findings.

Furthermore, the trustworthiness and reliability of synthesis is improved when the researchers are reflexive about their position in relation to the process of qualitative synthesis (Suri & Clark, 2011). The researchers approached this study from a collaborative constructivist approach, as it is the foundation of the CoI framework. According to the collaborative constructivist approach, “constructing knowledge is situated in discourse by way of advancing personal meaning and adding to shared understanding (Garrison, 2013, p. 4). Thus, knowledge construction is a joint activity of all participants in a CoI (Garrison, 2013). In line with the collaborative constructivist approach, we sought to identify the factors that influence students’ online learning experiences in relation to course design, instructor, and peers. Last but not least, we are experienced online instructors and course developers, and we have experience with the use of the CoI framework for conducting research, designing and evaluating online courses. Therefore, our integrated experience provided informed decisions on online course design and facilitation practices as well as learning in online environments.

Results

Characteristics of Primary Studies

Twenty-nine qualitative and mixed-methods studies were included in this synthesis and are presented in Table 4. 1. Of these 29 studies, 15 were qualitative, 12 were mixed-methods studies, and two did not specify the research method. In addition, studies used different qualitative and mixed-methods design. Of the 15 qualitative studies, 12 studies conducted case study ($n=1$ phenomenological, $n=1$ cross-case, $n=2$ multiple case study, $n=1$ descriptive case study, and $n=7$ did not specify the type of case study), one phenomenological study, and two did

not specify the type of qualitative research method. Of the 12 mixed-methods studies, two conducted sequential explanatory, two explanatory, one sequential, one action research, one concurrent, and five did not specify the research design.

The main data sources among 29 studies were interview (i.e., semi-structured, open, and ethnographic) ($n=21$), focus group ($n=4$), observation ($n=3$), transcript analysis (e.g., discussions, student journals) ($n=7$), open-ended questions ($n=4$), researcher log ($n=1$), participant reflection ($n=2$), and field notes ($n=1$). To note that some studies used more than one data sources. The studies explicitly reporting qualitative data analysis methods employed content analysis ($n=4$), thematic analysis ($n=6$), constant comparisons ($n=3$), cross-case analysis ($n=3$), cross-study analysis ($n=1$), and phenomenological approach ($n=1$). A total of 2664 participants participated in the qualitative phases across the 29 studies. Study sample sizes ranged from four to 1085. Of the studies specifying the grade level of the participants or courses, 16 were undergraduate level, three were graduate, five were mixed group including undergraduate and graduate students, and one was other (i.e., nursing, midwifery).

Table 4. 1: Characteristics of Primary Studies

Author(s)	Aim	Research Method	Participants	Sample size	Data Sources	Data Analysis
Archibald (2011)	To explore cognitive presence and the learning experiences of participants using an online learning resource in higher education research methods courses.	Mixed Method (Explanatory Design)	<ul style="list-style-type: none"> - Workshop for practicing physicians (workshop) - Students from one undergraduate, one graduate and one-post graduate course from Faculty of Education Nursing - Inter-professional community health course 	25	Semi-structured interview	Not specified (inductive approach)
Berry (2017)	To explore the teaching strategies that instructors in one online doctoral program utilized to help first year students develop a sense of community.	Qualitative (Case study)	<ul style="list-style-type: none"> - Online doctoral students 	13	<ul style="list-style-type: none"> Semi-structured interview Course observation Transcript analysis 	Content analysis

Table 4. 1 continued

<p>Bokhari (2016)</p>	<p>To explore undergraduate Saudi female students' perceptions of using asynchronous online discussion boards as a learning tool and to try to determine what factors emerged that helped their learning.</p>	<p>Qualitative Phenomenological case study</p>	<p>- Undergraduate Saudi female students</p>	<p>10 total, 6 for focus group 5 for semi-structured interview</p>	<p>- Focus group - Semi-structured interview - Field notes and participant's reflection narratives</p>	<p>Thematic analysis</p>
<p>Borup et al. (2012)</p>	<p>To explore how video-based strategies influence students' perceptions of the instructor's social presence and how video-based strategies influence students' perceptions of their own and their peers' social presence.</p>	<p>Qualitative Cross-case study</p>	<p>- Undergraduate pre-service teachers</p>	<p>18 (12 secondary and 6 elementary education)</p>	<p>- Semi-structured interview</p>	<p>Constant comparison</p>

Table 4.1 continued

Brakhage (2015)	To explore the experiences of adult online college honor students in order to identify important factors supporting honor students' use of technology in the online learning environment.	Qualitative Multiple case study	Adult online college honor students	4	Semi-structured interview	Cross-case analysis
Capra (2014)	To explore how community college students in online courses describe their learning experience in terms of social, cognitive, and instructional presence.	Qualitative Phenomenology	Community college students	15	- Interview Participant responses to e-mail journal prompts	Not specified
Catron (2012)	To examine the relationship between students' perceptions of social, teaching and cognitive presence and their overall satisfaction ratings	Mixed method	Students enrolled in online certificate programs	252	- Open-ended questions	Not specified (analytic induction)

Table 4.1 continued

Christen et al. (2015)	to identify cues that students perceive attribute to a social presence for their instructor.	Not specified	- Graduate and undergraduate business students	341	- Open-ended questions	Thematic analysis
Clark et al. (2015)	To determine whether the integration of asynchronous video posts and synchronous videoconferencing as part of a discussion platform would more effectively help increase feelings of social and teaching presence when compared with the currently used text-based discussion tool	Mixed method Action research	- Undergraduate pre-service teachers	16 total, and 6 participated in the interview	- Open-ended interview	- Constant comparison

Table 4.1 continued

Dzubinski (2014)	To examine my own efforts to co-create a social context in an online classroom environment that was welcoming and supportive to a diverse student population enrolled in a graduate research methods course.	Qualitative	- Not specified	11	Researcher log - Semi-structured interview	- Constant comparison
Finley (2016)	To explore how undergraduate Business students perceive Teaching Presence in online Business courses, what components of Teaching Presence undergraduate Business students find most valuable, and how exemplary Teaching Presence is demonstrated.	Qualitative Case Study	- Undergraduate business students	20 student 3 student-nominated online Business faculty	- Semi-structured interview - Documentation - Observation (not main data source, for triangulation purposes)	- Cross-study analysis

Table 4.1 continued

Huss & Eastep (2013)	To explore the attitudes and perceptions of students at a Midwestern university who were enrolled in at least one online-only course during the fall 2012 semester.	Mixed (The blended (concurrent collection)	- Students from multiple colleges	1085	- Open-ended questions	- Content analysis
Ice et al. (2008)	To explore whether feedback provided at the individual level as opposed to feedback provided to learners as a group impacts satisfaction and perceived learning.	Explanatory mixed method	Mater's and PhD students in education	89for quantitative 48 for interview	- Survey for quantitative - Semi-structured interview	Not specified
Kgatla (2016)	to explore the ways in which social presence manifested itself amongst first-year undergraduate students in a fully asynchronous web-based course, at an ODL institution which is situated in South Africa, a developing country	Qualitative Descriptive case study	First year undergraduate students in the College of human Sciences	18	- Semi-structured interview	Thematic analysis

Table 4.1 continued

Kupczynski et al. (2010)	To explore student perceptions of the impact of the indicators of Teaching Presence on their success in online courses	Mixed method Sequential	Students enrolled in certificate (n= 362) Undergraduate and graduate students enrolled in College of Human Resources and Education (n= 281)	643	- Open-ended questions	Cross-case analysis
Lambert & Fisher (2013)	To examine the existence of the three CoI elements in a graduate-level educational technology online course.	Mixed method	Graduate students enrolled in an elective course offered in Educational Technology	15	- Student blog posts	Not specified
Lazarevic (2011)	To address whether or not the implementation of a short asynchronous introductory video in a primarily text-based online course has a positive role in developing students' perception of teaching presence.	Mixed method (sequential explanatory design)	Undergraduate students (double check)	6 for qualitative	- Semi-structured interview	Not specified
Mills et al. (2016)	To evaluate student satisfaction with a redesigned postgraduate core nursing and midwifery research subject, delivered using a CoI.	Not specified	Postgraduate nursing or midwifery programs	56 total, 10 for interview	- Semi-structured interview	Not specified

Table 4.1 continued

Pinsk et al. (2014)	To explore to what degree the use of student-generated video discussion posts create social presence for those students	Qualitative Case study	Non-traditional undergraduate students	5	- Semi-structured interview	- Cross-case analysis
Robinson (2013)	To carry out a qualitative analysis of students' accounts of experience with group work online in order to further our knowledge of their emotional and learning experience when required to engage in a shared task remotely using computer mediated communication	Qualitative	Adult distance learning students studying part-time for a British Psychological Society	Not specified	- Interview	- Thematic analysis
Scialdone (2014)	To understand how the educational experiences of students are affected when social media are incorporated into online and blended course activities.	Qualitative Case study	Not clear but based on case descriptions, graduate and undergraduate students	9 total (5 blended and 4 online)	- Artifacts/documents - Ethnographic Interview - Observation (did not use for analysis)	- Deductive content analysis for artifacts - Inductive content analysis for interview

Table 4.1 continued

Snyder (2014)	To identify the factors in online learning that impacted students' persistence in coursework.	Qualitative Case study	Community college students	10	Semi-structured interview - Field notes (did not use for analysis) - Researcher log (did not use for analysis)	- Not specified
Tolu (2010)	To investigate use of synchronous communication for creating a community of inquiry and student satisfaction in an online ESOL (English Speakers of Other Languages) endorsement course for preservice teachers.	Qualitative Case study The author also mention naturalistic inquiry as research method	Preservice teachers	13	- Course live recordings - Student reflections - Researcher's journal - Semi-structured interview	- Not specified
Thiessen (2015)	To investigate community college students' perception of online courses through an examination of their experiences with online learning	Qualitative Case Study	Community college students	15	- Focus group Semi-structured interview	- Not specified

Table 4.1 continued

Wheeler (2015)	To explore how students perceived their experience in an undergraduate, introductory technology, synchronous-enhanced distance learning course.	Mixed method	Undergraduate students	52 for quantitative 10 focus group	- CoI instrument - Focus group	- Independent t-test for quant - Thematic analysis
Townsend (2015)	To identify which learning modalities facilitate higher order thinking and to provide the local online educators with evidence-based data regarding best practices in online RN to BSN learning.	Mixed method Sequential explanatory	Undergraduate nursing students	602 quantitative 15 qualitative	- Survey - Interview	- Not specified
Wojenski (2014)	To identify factors that influence pre-departure study abroad students' intercultural development and experiences in an online intervention.	Mixed method	Pre-departure accepted students in a study abroad program	46 total Focus group not specified	- Pre- intervention needs assessment - Pre and post IDI scores - Focus group - Online discussions	- Two-factor ANOVA for quantitative data analysis - Phenomenological approach

Descriptive Themes

The thematic synthesis revealed 10 descriptive themes covered by three overarching categories: course design, instructor actions during the course, and student actions during the course. The following section will discuss the themes under each overarching category.

Course design

This category focuses on the design elements of the course, which occurred before course implementation. The following section discusses the course design-related aspects that are emphasized by primary study participants as influencing their online learning experience. These aspects included designing course content and learning activities, supporting interaction, collaboration and working in small groups, sense of community, ease of navigation, and being successful in the course.

Designing learning resources

Primary study participants perceived course content and learning materials as important factors for satisfaction in online learning experiences (e.g., Archibald, 2011; Bokhari, 2016; Snyder, 2014; Theissen, 2015; Wojenski, 2014). Students emphasized that they feel more engaged to participate in class when the subject and course content encourages them to search and seek more information (Bokhari, 2016; Snyder, 2014). For instance, a participant indicated that “It just starts at the very beginning and goes through and then kind of keeps it in really centralized to something that were experiencing right now... The content kept me totally engaged. I’m excited about the next chapter” (Snyder, 2014, p. 60).

In addition to the course content, the learning materials used to deliver course content were also considered as another important factor that contribute to students learning experience. Primary study participants stressed the following aspects related to learning materials. First,

students reported that having different type of learning materials in a variety of delivery modes (e.g., readings, video lectures, PowerPoint slides) helped them to maintain their motivation, perceive different perspectives, and support their learning (Archibald, 2011; Finley, 2016; Huss & Eastep, 2013; Mills et al., 2016; Snyder, 2014; Wojenski, 2014). For example, one participant from Huss and Eastep's (2013) study indicated that "the only technology used was regular PowerPoints and links to resources. It was a very boring class. I was teaching myself" (p. 9). Another participant mentioned that having different types of resources helped them understand the subject better: "I felt that the articles, Pinterest, and YouTube helped me understand the subject matter and did a good job of giving thorough explanation" (Wojenski, 2014, p. 84).

Designing learning activities

Design of learning activities in online courses was perceived as another major factor by primary study participants such that it influences their learning process and experience in online courses. Specifically, relevance to the real world was one of the main aspects of the learning activities. Students regarded it as "the most rewarding aspect" of a satisfying learning experience when learning activities and course materials are relevant to their work (Mills et al., 2016, p. 38). Such type of activities also help them link their learning to their personal experience, better understand the concept of the class, and apply their learning in their workplace (Archibald, 2011; Bokhari, 2016; Snyder, 2014; Thiessen, 2015). For instance, one participant indicated:

I would always prefer to be able to do activities or assignments that are real-life based rather than based on the information in the text. I like to learn the material in the text and then apply it to my life. This makes writing about the material easier and I feel that I understand the concept better when I can see how it is used in the real world (Thiessen, 2015, p. 104).

In addition to relevance to the real world, students also valued real-world application because it helped them transfer their learning into their lives and workplaces (Bokhari, 2016; Thiessen, 2015). For example, one participant mentioned, “so there was lots of real examples that I could use and it translated in a lovely sort of a way to that multidisciplinary team that demanded that evidence. So, for me, personally, it worked beautifully” (Thiessen, 2015, p. 103). Finally, participants considered learning activities enjoyable, motivating, and helpful for their learning when the new learning experience takes their previous learning into account rather than repeating what they already know (Bokhari, 2016). For instance, a participant from Bokhari (2016) reported an unsatisfying experience because she did not feel the class took into account their prior learning. Another participant mentioned that “Actually, I did study English courses before I started my college learning. So it was like a repetition for me in terms of my grammar and in term[s] of my understanding to some words and sentences, and I did not improve in my speaking or listening” (Bokhari, 2016, p. 81).

Collaboration and working in small groups

In addition to having learning activities that are relevant to the real world and taking into account prior learning, collaborating with others and working in small groups in these activities were also perceived as valuable by primary study participants. Primary study participants reported that having group projects encourage them “involve more in the work and produce more precious output” (Bokhari, 2016, p. 71). Students also preferred having small group discussions rather than whole group discussions as it helped them to “focus and follow up each other’s work closely” (Dzubinski, 2014, p. 102).

Despite the fact that students reported positive learning experiences while working in small groups or collaborating with others, it may not work all the time due to student learning

preferences, disagreements among group members, communication issues among group members because of technology and students' unresponsiveness, and lack of contribution to group projects (Archibald, 2011; Brakhage, 2015; Huss & Eastep, 2013; Robinson, 2013; Theissen, 2015; Townsend, 2015; Wojenski, 2014). Unsurprisingly, in addition to collaborative learning activities, students also prefer to have individual learning activities, which support their self-directed learning (Archibald, 2011; Bokhari, 2016; Lambert & Fisher, 2013; McDonald, 2013; Snyder, 2014; Townsend, 2015; Wojenski, 2014). For instance, one participant from the Lambert and Fisher (2013) study stated: "I've felt empowered in this class, especially with the website assignment. Essentially we were the teacher or ultimate authority within our own site and academic discipline." (p. 11).

Supporting interaction

Primary study participants found that interaction in online classes is helpful and important for them as it keeps them engaged, encourages them to seek different opinions and share their own perspectives, and fosters their learning by information exchange, reading others' posts, and reflection on their learning (Archibald, 2011; Bokhari, 2016; Borup et al., 2012; Catron, 2012; Tolu, 2010; Wojenski, 2014). For example, one participant shared: "It was interesting to see what we had agreed on and the points we had seen differently. This helped me to focus on and rethink my ideas as I looked at the work from a slightly different angle" (Robinson, 2013, p. 303). Beyond multiple perspectives, interaction also helped them exchange their ideas. This encouraged them to think critically and reflect on their learning to form their understanding of the concept (Archibald, 2011; Bokhari, 2016; Mills et al., 2016; Robinson, 2013; Snyder (2014). For instance, one participant said "Listening, sharing, and reading others' ideas enabled students to understand concepts and to realise what you don't know...it was

probably more about that influential stuff, that I didn't realize what I didn't know. That was probably the best thing I got out of it” (Mills et al., 2016, p. 37).

Although students who participated in class “demonstrated more cognitive presence, felt more socially connected, and experienced a more positive intervention experience” (Wojenski, 2014, p. 90), an exception to this was reported in Capra’s (2014) and Theissen’s (2015) studies. Some students did not find the interaction in online classes so important for their learning. The main reasons for negative experiences were a) learning preferences; b) quality of interaction and responses; and c) timeliness of student responses. For example, one participant indicated that her or his grade depends on their peers:

My online learning experience is negative in that it has too much interaction with other students. I don’t know how much interaction you need with other people but I know that I just want to be given my assignments and be able to get them done without having to depend on others for my grade, whether that’s through a group project or waiting for someone to post on a discussion board (Theissen, 2015, p. 75).

In addition, a student from Capra’s (2014) study did not enjoy the class discussions because he found his peers responses repetitive:

It’s mandatory so people feel they have to do it. Then they try to answer in ways that make it look like the read and everything like that. There is about 30 kids in the class by the end of the post they all are pretty repetitive (Capra, 2014, p. 112).

This indicates that students expect to have “courteous and professional debate of issues, and contributing fresh new perspectives” in their online discussions (Brakhage, 2015, p. 120). Providing a discussion rubric focusing on the quality of online posts or responses could encourage students to provide meaningful responses (Brakhage, 2015; Theissen, 2015).

In addition, some students suggested the effectiveness of text-based interaction is enhanced when incorporated with synchronous sessions by adding an element of humanness to the interactions in their online courses, providing just-in-time interaction and immediate feedback, improving student's learning, making the course content clearer and easy to understand, and helping students express themselves as sounded they wanted (Borup et al., 2012; Brakhage, 2015; Catron, 2012; Clark et al., 2015; Finley, 2016; McDonald, 2013; Mills et al., 2016; Wheeler, 2015; Robinson, 2013; Wojenski, 2014). For example, one participant indicated that "I feel like I learned more with the Google+ interaction...you were able to see them and react to things" (Clark et al., 2015, p. 13).

Supporting sense of community

Due to the possible lack of face-to-face communication in online classes, "a sense of isolation can often inhibit student success" (Pinsk et al., 2014, p. 270). Primary study participants valued creating sense of community in online environments to create a positive learning climate, increase their confidence to interact with others, feel be part of the community, and perceive others as real (Borup et al., 2012; Kgatla, 2016). The synthesis of primary studies showed that sense of community could be fostered in several ways in online courses. One course design strategy reported by students was having ice-breaker activities asking students to introduce themselves along with a picture of themselves (Dzubinski, 2014; Lambert & Fisher, 2013; Scialdone, 2014; Synder, 2014; Wojenski, 2014). One participant shared:

Being able to have everyone post a picture and put a name to the face and things like that, I think it is important to get some sense of that. That's obviously the part that is missing when you are taking all online classes (Scialdone, 2014, p. 245).

In addition to ice-breaker activities, sense of community can be also supported through content-related interactions with others as well (Brakhage, 2015; Finley, 2014; Kgatla, 2016; Syndner, 2014). For instance, Kgatla (2016) pointed out that learners “were able to know each other by working together and commenting on peers learning activities/assignments which were submitted in the discussion forums” (p. 82). For example, one participant highlighted that “Really, the discussion board is the only place where I really feel connected to the other students” (Snyder, 2014; p. 52).

In addition to learning, content-related interaction in online courses help students develop sense of community. Specifically, feeling a “sense of ‘self’ within the context of the asynchronous learning environment” was perceived as one of the most crucial elements of feeling sense of community (Pinsk et al., 2014) as it helps perceive peers and instructors as real people, personally involved in the class, and feeling as a real class (Christen et al., 2015; Dzubinski, 2014; Lambert & Fisher, 2013; Pinsk et al., 2014; Scialdone, 2014). To foster the “sense of self” feeling in online courses, one strategy could be including video-communication (Borup et al., 2012; Clark et al., 2015; Finley, 2016; Huss & Eastap, 2013; Pinks et al., 2014). Some students indicated that since video-communication includes visual cues, it helps them humanize the instructor and other students in the class thereby perceiving them as real (Borup et al., 2012; Clark et al., 2005; Pinks et al., 2014). For example one participant mentioned that:

I’ve never felt more connected to an online class. I could actually talk to students and the professor. It was absolutely worth the time and effort. You spend so much time in the classes feeling alone and isolated and I actually felt like I was part of this class, especially when I watched the other students’ videos (Pinks et al., 2014, p. 272).

Even though most students agreed that video communication helps them learn more about their instructor and peers compared to text-based communication, some students indicated that it cannot replace the emotional expressions in a face-to-face class (Catron, 2012; Borup et al., 2012). In addition, students mentioned time as a barrier to using video communication in discussions since “It takes at least twice as long to make a video post because you have to know what you’re going to say before you start recording. When you type you can just stop and start as needed.” (Pinsk et al., 2014, p. 270-271). Moreover, some students reported that video-communication helped them develop sense of community but it was difficult to track other student’s comments or responses on their video. They indicated that synchronous video-communication would make it easier to track other comments and responses (Borup et al., 2012). In addition to providing easy communication, synchronous video-communication also help students be a part of a community, feel less isolated, get to know others in the course, and build a relationship with the tutor (McDonald, 2013).

Clarity in course design and expectations

Primary study students also perceived online course structure and clarity as important factors “regardless of learner level and context, the need for presentation of clear, concise objectives, instructions and general participation guidelines should be a cornerstone of online course development” (Kupczynski et al., 2010, p. 32). The factors related to clarity in course design included easy navigation in the course, clear instructions and expectations related to assignments, grading, and participating the course, and established time parameters (Archibald, 2011; Brakhage, 2015; Dzubinski, 2014; Finley, 2016; Huss & Eastep, 2013; Kupczynski et al., 2010; Lambert & Fisher, 2013; Lazarevic, 2011; Mills et al., 2016; Townsend, 2015; Wheeler, 2015). For instance, one student expressed how frustrating an online learning experience was due

to unclarity in an online course: “I was really frustrated in this class [course name omitted]. We had assignments that were really confusing. There were several things we needed to do but there weren't any guides that gave us details. Then if we didn't do them right, we got marked down” (Kupczynski, 2010, p. 31). A review of the studies showed that students found it helpful when their courses include a detailed syllabus including assignments and week-by-week schedule (Finley, 2016; Huss & Eastep, 2013; Kupczynski, 2010, Lazarevic, 2011; Wheeler, 2015).

Furthermore, some students also found it useful when their instructor posted videos explaining what to do in a particular week (Finley, 2016). These videos clarified the expectations but also helped them keep pace with the course. For example, a participant indicated that: One of the best tools that I've seen used more and more in the last year, year and a half - has been some form of a webcast, or podcast, or an audio lecture where you can actually pull up the instructor and they'll demonstrate what they're expecting for the week, and I found that extremely beneficial as I work through some of the more difficult materials (p. 120-121).

Instructor actions during course

Instructors' actions during an online course also play a significant role in students' online learning experiences. Based on students' responses in primary studies, online students are more likely to be satisfied with their learning experiences when their instructors a) are active and interactive in the course (e.g., asking exploratory questions); b) provide feedback (e.g., timely feedback, constructive feedback); and c) present in the course (e.g., self-disclosure, accessible and available). The following sections will discuss instructors' actions in each theme.

Being active and interactive in the course

As mentioned in the course design category, interaction in online courses was as an important factor for students in terms of their learning and sense of community. However, the

review of the primary studies showed that instructor's support and active participation in the course is essential for engaging and meaningful interaction (Bokhari, 2016; Brakhage, 2015; Capra, 2014; Catron, 2012; Finley, 2016; Huss & Eastep, 2013; McDonald, 2013; Wheeler, 2015). Students reported their "best learning experiences when the teacher was actively present and engaged in the class discussions as a fellow learner" (Brakhage, 2015, p. 122).

Students expressed their appreciation with their instructor's active involvement in the discussion forums when instructor asked exploratory questions (Bokhari, 2016; Borup et al., 2012; Finley, 2016; Townsend, 2015). Students reported that it does not only encourage them to participate in class, but it also helps them "drill down" their ideas (Kupzynski et al., 2010, p. 30) and makes them think outside of the box (Finley, 2016). For example, one student mentioned that:

They'll come in, and they'll read your post, and they'll put questions behind it. To make you think a little bit differently, or they may add what about this, or what about in this type of case, so that really make you kind of shift gears and not just use your opinion. It makes you really think about how to apply that, and really what would I do if I was in that situation (Finley, 2016, p. 125).

Even though some students thought that "It is the responsibility of the teacher to provide adequate topic related discussion material to support useful dialog and effective learning experiences" (Brakhage, 2015, p. 121), there were students who did not think that instructor involvement is necessary to make them think critically: "It doesn't really make a difference. So far to me, it has not...I don't think the instructor needs to be there to get people to think critically. I think it's all in the assignment" (Townsend, 2015, p. 86).

Another way to encourage student interaction in online environments is to provide subject matter expert knowledge by clarifying student misunderstandings or questions and providing prompting responses and additional resources (Finley, 2016; Kupzynski et al., 2010; Snyder, 2014). For example, one student expressed his appreciation by saying “.there are a couples of teachers that put a little of more time, to explain things. Then even if the student asks the question a million times they'll still answer it but then send a link to like that video and say, "Look this is where you can find this, but let me explain it in different in terms."” (Finley, 2016, p. 124-125). Finally, students reported satisfying learning experiences and better learning when the instructor provides their own perspectives and insights (Archibald, 2011; Snyder, 2014). Students also expressed that it does not only encourage them to participate in discussions but also helps them “to relate to your own life and that makes the information easy to understand.to relate the information provided to their own life” (Thiessen, 2015, p. 90).

Instructor active involvement is not limited to in-class activities, students also expect their instructors to create a positive climate to support interaction by incorporating etiquette strategies (Brakhage, 2015; Dzubinski, 2014; Lambert & Fisher, 2013; Townsend, 2015). For instance, one participant explained: “I would try to make sure the instructors know about online etiquette. I've come across a number of instructors who have made me unhappy because their response comes off with a rude vibe. I often try to avoid contact with them because of this” (Brakhage, 2015, p. 159). This also help instructors to set communication guidelines for “handling disagreements during online discussions” (Lambert & Fisher, 2013, p. 24).

Feedback

Feedback was as another important factor for students to support their learning and provide them with satisfying online learning experiences (Archibald, 2011; Berry, 2017;

Bokhari, 2016; Catron, 2012; Finley, 2016; Ice et al., 2008; Kgatla, 2016; Kupczynski, 2010; Mills et al., 2016; Snyder, 2014; Thiessen, 2015, Townsend, 2015; Wheeler, 2015). For instance, one student reported how frustrating it was when there was no feedback from their instructor: “I struggled with writing my final year portfolio because there was no constructive feedback on all my written assignments” (Kgatla, 2016, p. 95). When instructor feedback is detailed and constructive, it helps students construct their knowledge and improve their skills by providing direction on how the student is doing, what s/he did wrong, and what s/he needs to do to improve (Archibald, 2011; Berry, 2017; Bokhari, 2016; Catron, 2012; Finley, 2016; Ice et al., 2008; Kgatla, 2016; Kupczynski, 2010; Mills et al., 2016; Snyder, 2014; Thiessen, 2015, Townsend, 2015; Wheeler, 2015). For example, one student indicated that constructive feedback is more important than grades: “I don’t care about the grades as much as I care about learning, so when I get that feedback then I know what I’ve done, where I need to fix it next time, where my strengths are" as an example of how to motivate students” (Snyder, 2014, p. 42).

Besides constructive feedback, students expect to receive timely feedback on their assignments to have a sense of how they are doing in the class and refine their assignments (Brakhage, 2015; Huss & Eastep, 2013; Kgatla, 2016; Lambert & Fisher, 2013; Mills et al., 2016; Thiessen, 2015; Townsend, 2015). For example, one study participant stated that “My professor was very disorganized and would not give feedback before another assignment was due so you had no idea if you were supposed to complete the assignment the same or if you were supposed to be doing something different” (Thiessen, 2015; p. 80-81). Moreover, students were also satisfied with receiving video feedback from their instructor (Berry, 2017). In other words, students reported that video feedback made their instructor’s comments easy to understand and enhance the instructor presence (Berry, 2017). Moreover, students expect to receive group

feedback along with individual feedback to see the big picture (Dzubinski, 2014; Ice et al., 2018).

Instructor immediacy

Because of the lack of face-to-face communication in online courses, and students expect to perceive their instructors as real person in online courses to strength their online learning experience as well as humanize their online instructor. The review of primary studies determined a number of factors that enhance instructor immediacy in online courses. One factor was being accessible and available when students have questions or need instructor input (Dzubinski, 2014; Finley, 2016; Huss & Eastep, 2013; Lambert & Fisher, 2013; Mills et al., 2016; Snyder, 2014; Theissen, 2015). For instance, one student addressed how important having an accessible instructor is in order to complete the course saying, “I think the accessibility of the professor is what made this online learning experience all the better. Without being able to rely on the fact that my professor took an interest in my learning and willingly answered any and all questions I had, I may not have been able to finish the course” (Theissen, 2015, p. 93).

Another factor addressed by primary study students was checking with students throughout the class by asking how they are doing, and if they need any help with understanding the course materials (Berry, 2017; Christen et al. 2015; Dzubinski, 2014; Finley, 2016). Instructors can demonstrate caring behavior through e-mail, weekly announcements, discussion forums where students can share their difficulties and learning experiences (Berry, 2017). Students also reported that this helped to create a positive learning climate, made them think that their instructor cared about them personally and their learning.

Another factor that influenced instructor immediacy was self-disclosure by an instructor. Students reported that instructor self-disclosure strengthen their online learning experience

through sharing personal experiences and a photo of themselves, and communicating via video (Borup et al., 2012; Christen et al., 2015; Townsend, 2015). Self-disclosure related behaviors of instructors “could help students perceive their instructors as real people rather than merely an electronic persona” (Christen et al., 2015, p. 39). To illustrate, one participant claimed “It was just like being in a classroom, so you saw him and he gave similar examples. He shared things about his family. . . he shared those personal experiences, and so you felt like you knew him more” (Borup et al., 2012, p. 199).

Peer actions during course

Our review of primary studies showed that students’ online learning experiences not only depend on course design, and instructor actions and behaviors during the course, but also on students’ actions and behaviors during the course. As mentioned above, interaction in online courses is perceived as valuable to student learning and development of sense of community. Students’ active involvement in course discussions and being responsive to their peers’ inquiries through meaningful responses is also essential to their online learning experiences (Bokhari, 2014; Borup et al., 2012; Mills et al., 2016; Snyder, 2014; Townsend, 2015).

Contribution to collaborative learning activities was also perceived as an important factor that influences student online learning experience (Brakhage, 2015; Thiessens, 2015). Important negative factors in engagement with classmates in discussion boards in online classes were problems with the quality of their work, poor spelling, grammar, and lack of contribution to collaborative assignments. Respondents also cited the commonly encountered problem of inequitable contribution levels to the work required in collaborative group projects. It was also stated that the enforcement of a code of ethics ensuring professionalism and courtesy among

classmates facilitates effective learning and supports the formation of lasting friendships in some online classes (Brakhage, 2015, p. 117).

As one student stated “we had a student that barely participated and it made the project very difficult. This student did not participate in the discussions online and did not get their portion of their work turned in to everyone on time. This brought us all down” (Thiessen, 2015). As addressed above, students value feedback in their online courses. In addition to instructor, students also expect meaningful feedback from their peers. However, this does not mean having only negative things, they also expect to receive affirmation and approval in their peer’s feedback (Dzubinki, 2014).

Analytical Themes

As a final step of the synthesis procedure, the descriptive themes were aggregated into three analytical themes: a) accountability (e.g., clear course structure, clear instructions and expectations, checking for understanding); b) supporting learning process (e.g. setting a positive climate, self-disclosure, using welcoming tone); and c) being real (e.g., collaborative learning activities, responding student’s comments, students active involvement in discussion, providing individual support).

Based on the descriptive themes identified above, student online learning experience depends on the factors related to course design, instructors’ actions during course, and peers’ actions during course (See Figure 2). Next, we will discuss these factors within each analytical theme.

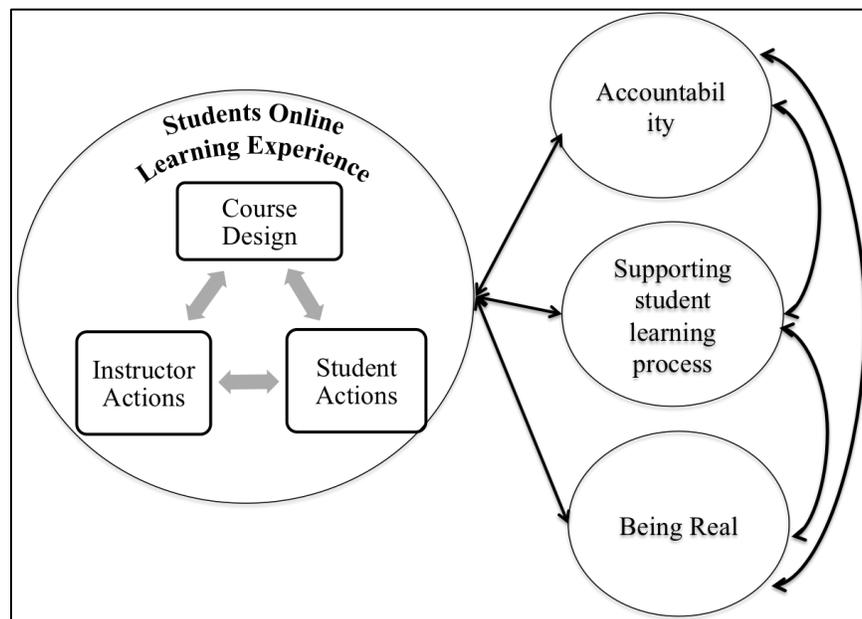


Figure 4. 2: Analytical Themes

Accountability

The synthesis of the primary studies showed that because of the lack of just-in-time and face-to-face interaction in online courses, accountability in online courses plays a significant role for students' online learning experiences. A further review of descriptive themes showed that accountability in online courses belongs to course design, instructors' actions during course, and peers' actions during course.

Accountability of course design comprises being explicit and transparent in course design, organization, and facilitation. This accountability can be achieved through setting curriculum, establishing time parameters, including important due dates and time frames, providing clear instructions on participating in course learning activities, communicating important course topics and goals, and selecting manageable content and learning activities.

Another crucial factor in accountability is the facilitating discourse role of the course instructor to clarify course design expectations and student understanding. According to the present descriptive themes, accountability of instructor includes being accessible and responsive

to students' questions regarding course design expectations and/or content-related questions. In addition to answering student inquiries in a timely manner, students also value their instructor's active involvement in the class discussion by checking their understanding, identifying areas of agreement/disagreement, assessing the efficacy of the process, and providing feedback to help students diagnose their misunderstanding. Finally, accountability of students includes active participation in class discussions and being responsive to their peers' inquiries and questions as well as helping them clarify their questions related to the course or course content.

Supporting learning process

Supporting learning process is another major analytical theme that emerged from the descriptive themes. As mentioned above, course design, instructor, and peers are accountable to the extent that they support the learning process and promote learning outcomes. The results revealed that students reported satisfying learning experiences in the courses where they construct their own knowledge through interaction (content-related and social), comprehension and reflection on their own learning, and by actively involving in collaborative and cooperative learning activities. To that end, course content and learning activities should be designed in a way that encourage students to reflect on their own learning through interaction, information exchange, and collaboration with their peers. Furthermore, while students valued interaction and working together with others, they also reported more satisfaction when their autonomy is encouraged. In this respect, they suggest including different forms of learning ranging from individual to collaborative. Furthermore, to support both student autonomy and learning process, learning activities should be in line with students' learning goals and relevant to the real-world, and provide opportunities for application in their professional practice. Likewise, learning materials are also important. To illustrate, the review of studies showed that students expected

having learning materials that are accessible and comprehensive, and delivered in a variety of formats where they can integrate different types of information, search more information,. Finally, providing flexibility to work in a self-paced manner within a given time frame is also important for student learning, as students would have more time to think and reflect on their learning.

Furthermore, instructor involvement in the course is important to facilitate and provide the direction of discourse. Students want to take the responsibility for their own learning as well as the scaffolding and guidance provided by their instructors. In addition to delivering the course content, students expect their instructors to actively involve in not only the course but also their individual learning experience. Accordingly, instructors can actively participate in the discussions where they check for understanding, answer student questions, confirm student understanding, and facilitate discussion to make sure students are on the task. Further, instructors can promote critical thinking and higher-order thinking skills by asking exploratory questions, sharing their own perspectives to allow students to reflect on their learning, and providing prompting responses to support students to reach a consensus in addition to providing detailed, timely, and constructive feedback, and being responsive to student questions. Finally, students also provided expectations from their peers to support their learning process as well as their autonomy. Peer-related expectations include active participation in the course, meaningful responses to peers' inquiries, participation in group work, and being responsive to other student inquiries.

Being real

Supporting sense of community in online classes is critical for both student learning and satisfaction. Similar to other themes, sense of community is also supported by course design,

instructors' actions during course, and peers' actions during course. The review of studies showed that self-disclosure and use of visual cues (e.g., video communication) were perceived as important for reducing sense of isolation, helping students get to know each other thereby encouraging social and content related interaction. Some example activities to increase interaction included ice-breaker activities that help students get to know each other, holding synchronous hours, and learning activities that encourage students for content-related interaction. Of note, for sustainable and quality interaction, students and instructors could provide affirmation and encouragement to create a positive climate and to make students feel they are welcomed, accepted, and respected.

Instructor-related factors included being active and responsive in the class, creating a positive climate to support interaction, using visual clues (e.g., video feedback, video announcement), being accessible and available to students, sharing caring behavior by checking with students individually, and self-disclosure (e.g., sharing personal experiences, sharing a photo of herself/himself). Finally, student-related factors included active participation in the course, being responsive to other students' inquiries, and self-disclosure.

Overall, the current thematic synthesis revealed 10 descriptive themes covered by three overarching categories, including course design, instructors' actions during course, and peers' actions during course. As a final step of the synthesis procedure, the descriptive themes were aggregated into three main themes, including accountability, being real, and supporting learning process. Based on both descriptive and analytical themes, designing and developing a meaningful online learning experience is a shared responsibility of course designers (if an instructor is not the course designer as well) instructors, and students.

Critical Appraisal Results and Credibility of Synthesis Findings

In order to increase the credibility of the current findings, we appraised included studies by looking at the transparency of. The results showed that reporting quality varied greatly due to the lack of the extent of the reported information among primary studies included in the current synthesis. First, there was missing information in the reporting, particularly qualitative research method used (e.g., case, phenomenology) (n= 19) and a rationale and/or explanation of why the selected qualitative method was chosen (n=22). This was mainly observed in mixed-methods studies. The choice of data analytic method and the rationale for the analytic choice were another area where the several studies did not explicitly stated (n=11).

Second, surprisingly, a majority of studies (n=19) did not explicitly state methods applied to enhance the quality of data sources. On the other hand, the majority of the included studies (n=19) reported what processes were applied to enhance the credibility, dependability, and trustworthiness of study findings. Finally, we found the amount of information provided in the included studies was varied in reporting practice by the type of type of publication and type of study. Unsurprisingly, we observed that dissertations provide more information than journal articles possibly due to the formatting and reporting requirements of the journal and word-limit.

As a result critical appraisal, we identified three studies to be considered as low reporting quality as they are missing some important information that is essential for transparency and credibility in qualitative research. We conducted an analysis for credibility for synthesis findings by examining whether synthesis findings were influenced by inclusion of low quality studies. The results showed that removing the low quality studies from the synthesis did not chance the overall themes as each theme derived from the factors emerged from multiple studies.

Discussion

This thematic synthesis aimed to synthesize the qualitative study findings focusing on students' perceptions about their online learning experiences through the lens of the CoI framework. Our search revealed 29 studies, including 15 qualitative and 12 mixed method studies. The qualitative evidence reported in these 29 studies was synthesized by using the thematic synthesis method: First, we conducted the first level synthesis to determine the descriptive themes. Next, descriptive were reviewed further and aggregated into analytical themes.

Aligning with previous research, the results of this synthesis showed that designing and developing a meaningful online learning experience is a shared responsibility of course designers (if different from an instructor) during the development phase and instructor and students during course (Akyol & Garrison, 2011; Capra, 2014; Garrison, 2007; Garrison & Cleveland-Innes, 2005; Shea & Bidjerano, 2010). In other words, in line with the nature of the CoI framework, the results showed that deep and meaningful learning in online education occurs as a result of a) online course structure (course design); b) guidance, modeling, and scaffolding by the instructor (instructor actions during course); and c) collaborative work among active and supportive participants in learning communities (peers' actions during the course).

From teaching presence perspective, the results of this thematic synthesis highlighted the importance of course design and facilitation as they influence creating a welcoming environment, encouraging students in collaborative learning activities, and social and cognitive interaction for an online learning experience to be effective (Akyol & Garrison, 2011; Capra, 2014; Garrison, 2007, 2009; Garrison & Cleveland-Innes, 2005; Huss & Eastep, 2013; Lambert & Fisher, 2013; Mills et al., 2016; Shea et al., 2005). From social presence perspective, the

results suggest that strong social presence is necessary to establish relationship, to create sense of community, and to build a safe and welcoming environment where students share their perspectives and seek others' perspectives. Similarly, strong social presence is crucial "to create the conditions for inquiry and quality interaction (reflective and threaded discussions) in order to collaboratively achieve worthwhile educational goals" (Garrison, 2007, p. 64). In other words, social presence should be more than social interactions or relationships and designed purposefully to support learning process (Garrison, 2007). From cognitive presence perspective, the results of this study suggested that strong teaching presence is essential to "move students through to resolution" through course design and facilitating discourse (Garrison, 2007, p. 66). Of note, the results of this synthesis also supported the nature of teaching presence in a way distributed between instructors and students (Garrison et al., 2000). All in all, aligning with the evidence presented in the meta-analyses (i.e., Richardson et al., 2016; Caskurlu et al., 2017), the results of this qualitative synthesis supported that indicators of all three presences were perceived as essential for students' online learning experiences (e.g., Richardson et al., 2017).

Finally, the results also showed that students value their online learning experience when online learning experiences support student autonomy through individualization and personalization of the learning experience. Theoretically, this point suggests that learners are inclined to control the pace of their learning process and learning or cognitive presence in an online learning experience where there are already sufficient levels of teaching and social presence supporting a strong sense of community. In other words, even though online learners may want to be challenged by well-designed and facilitated online learning experiences, they also want to control that challenge by processing at their own pace within a given time frame. Consequently, it is "important for students to monitor and regulate their learning in a community

of inquiry” (Akyol & Garrison, 2011, p. 189). All these insights may add to the conceptualizations of teaching, social and cognitive presence, in which the role and extent of learner autonomy or self-paced learning in an effective online learning community become more salient.

From a methodological perspective, in addition to synthesizing the primary study findings, we also reviewed the transparency of the reporting of the included studies because insufficient reporting makes difficult for readers to judge the credibility and validity of the primary studies (Campbell et al., 2011; Hannes & Macaitis, 2012; Heyveart et al., 2017). The critical appraisal results showed that majority of studies reported essential information (e.g., clear research purpose and /or questions, setting for data collection, participants characteristics, data collection and analysis procedure) needed to understand the content of these studies thereby support the credibility of our synthesis findings. Despite these, there were four main missing information areas identified across studies. For instance, type of qualitative research method used for research design research design as well as rationale for selection of the chosen research design was missing. This could be an issue to understand how researchers design their study as well as how they “explored their research questions and aims” (Tong, Sainsbury, & Craig, 2007, p. 351). Further, although most studies provided detailed information about data analysis process, limited number of studies explicitly stated the data analysis method used and its corresponding rationale. This may not be problematic as “rigorous analysis is marked by transparency regarding the process of sorting, choosing, and organizing the data” (Tracy, 2010, p. 841). Finally, even though most studies applied methods to enhance the credibility and dependability of their research findings (e.g., inter-coder reliability, member check, thick descriptions), most of them did not report methods to enhance the quality of data collection

instrument. Therefore, lack of information made us difficult to justify the reliability and validity of their data collection procedure.

Limitations, Delimitations & Suggestions for Further Research

The current results should be read carefully by paying attention the following points: a); the data are limited to the research studies reported in English thereby missing the studies in other languages that could provide different perspectives; b) we did not use critical appraisal for exclusion of low quality studies. Thus, some of the studies might be “questioned with regard to quality” (Bair, 1999, p. 16). However, in order to deal with inclusion of low quality studies, we conducted a sensitivity analysis to check whether those low-quality studies influenced the synthesis findings. The results showed that removing the low quality studies from the synthesis did not change the overall themes. In addition, including not only high-quality but also low-quality studies provided more and richer data. Finally, the focus is on only student perspectives might limit the insights gained to one perspective.

Consequently, future research might focus on synthesizing qualitative evidence focusing on instructor’s perceptions on how applying community of inquiry for course design and facilitation influence student learning process. Further, as a follow-up to the previous meta-analyses conducted by our research team, this study provided an accumulative understanding of how qualitative research contributes to our understanding of student online learning experiences. Another direction for future research might be conducting mixed-methods synthesis by using both qualitative and quantitative evidence to provide to examine how both qualitative and quantitative evidence contribute to our understanding of student online learning experience.

Conclusion

The results of this synthesis showed that there are numerous factors influencing student's online learning experiences. The quantitative synthesis provided research-based evidence on the prediction of three presences on student outcomes in fully online courses, however, they do not provide the voices of the participants as well as the moderating factors. Synthesizing the previous research through qualitative synthesis provided a deeper understanding of what students perceived about the factors that enhanced their online learning experiences.

In addition, this thematic synthesis also allowed us to produce collective evidence by looking at these factors across literature rather than the findings from a single study. Specifically, this thematic synthesis provided researchers, course designers, and instructors with a) research-based evidence about the factors related to the student's expectations and needs; b) how to design online courses to provide a satisfying and effective learning experience for students; and c) new conceptual insights into learners' level of involvement in an online learning community and its management. Course designers and instructors can use these results in course design and facilitation of learning to enhance student's learning experiences in fully online courses while researchers use them to scaffold on the existing theoretical or conceptual insights. Finally, we also hope findings from our study will stimulate the improvement in the quality of reporting practices of research design and findings and direct future research to advance our understanding of effective online learning environments. Similarly, the critical appraisal tool developed as part of this synthesis may prove beneficial to others looking to conduct their own thematic synthesis.

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APPENDIX A. CRITICAL APPRAISAL

Criteria	Question(s)	Code	YES–Evidence from the paper for Yes (Direct quote) NO–Reviewer’s rationale YES/NO review researcher’s note
Purpose of Study Description of the main purpose(s)/ aim(s)/objective(s) of the study and /or research question(s) guided research	1. Did author(s) provide clear research questions? If not, is there a clear purpose statement to guide the investigation?	Yes	
Research Design Description of what and how qualitative research design was used and justified.	2. Is a qualitative research design appropriate for addressing the research purpose? (This may include considering the qualitative component of a mixed-methods study)	No	
	3. Did author(s) specify their selected qualitative method? (e.g., case study, phenomenology, ethnography, grounded theory, action research, narrative inquiry, and other)	Yes	
	4. Did author(s) provide an explanation of why the selected	Yes	

	qualitative method was chosen?		
	5. Was the selected qualitative method appropriate to answer the research question(s)?	No	
Sampling Description of setting and what, how and why participants/ documents/events are selected	6. Did author(s) describe the setting/context for data collection?	Yes	
	7. Did author(s) describe the specific sample of the population being studied? (e.g., Administrators; Secondary science teachers; 4-6 th grade math students; History textbooks before 2010; etc.)	Yes	

	8. Did author(s) explain why the selected participants/documents/events were chosen?	Yes	
	9. Did author(s) describe their process for selection? (If so, was there any discussion on criteria for exclusion and inclusion?)	Yes	
	10. Did the author specify the sample size?	Yes	
Data Collection Description of how data collection carried out and justification of the procedure	11. Did author(s) specify their data collection method(s)? (e.g., <i>interviews, observation</i>)	Yes	
	12. Did author(s) provide an explanation of why the selected data collection methods were chosen?	No	
	13. Did author(s) provide any description of the data collection procedures? (e.g., If interviews were used, are there details on how they were	Yes	

	conducted)		
Data Analysis Description of analytic procedure to reach findings	14. Did author(s) specify the data analysis method(s) they used? (e.g., constant comparison, thematic analysis, cross-case analysis...)	Yes	
	15. Did author(s) provide justification or explanation of why they chose the data analysis method(s)?	No	
	16. Did author(s) provide description of data analysis procedure? (e.g., If thematic analysis is used, is it clear how the categories/themes were derived from the data?)	No	

Findings Description of “what” author(s) found in the study. These findings will serve as data in qualitative synthesis.	17. Were the findings explicit and clear?	Yes	
	18. Did author(s) provide verbatim evidence representing the participant’s voices? (e.g., <i>direct quotations or transcript excerpts</i>)	Yes	
Value of the Research Description of scholarly contribution to the relevant field and an implications for both practice and research	19. In the concluding sections, did the author(s) describe implications for teaching/learning/practice AND/OR implications for future research?	Yes	
	20. Did author(s) state the contribution to the field or how the study fills a gap in the existing literature?	No	
Trustworthiness & Reliability Descriptions for checking trustworthiness/reliability may include but are not limited to inter-rater reliability, member	21. Did the author(s) discuss methods used to enhance the quality of data collection instruments? (e.g., piloting interview protocols, getting expert feedback on survey	Yes	

checking, researcher bias, role of researchers, piloting, data triangulation, etc.	questions...)		
	22. Did author(s) describe methods used to enhance the reliability of their data analysis? (e.g., inter-rater reliability, member checking, clarifying researcher bias, data triangulation, etc.	Yes	

CHAPTER 5: DISCUSSION AND CONCLUSION

The overarching purpose of this dissertation is to provide research-based insights into the Community of Inquiry (CoI) framework through a factor analysis, a meta-analysis, and a qualitative synthesis. The overall results of this dissertation provided both research implications and research-based practical implications that influence student online learning experiences. This chapter briefly summarizes the main findings and contributions of each manuscript presented in this dissertation according to the key research goals and questions stated in the Introduction section. Finally, I discuss the potential avenues for future research and implications for practice.

Chapter 2 presented a factor analysis study examining the construct validity of the three individual presences (teaching, social, and cognitive presence) of the CoI. As each presence contributes to the development of the other two presences as well as the prediction of student outcomes (e.g., actual learning, perceived learning, and satisfaction), this confirmatory factor analysis study makes a significant contribution to the CoI literature by being the first study using the CoI instrument to examine the construct validity of each individual presence in online learning. In addition to confirmatory factor analysis, I also performed a chi-square difference test to examine the discriminant and convergent validity of the individual presences. The results revealed that the data fit very well with the (a) thirteen item-three factor teaching presence model, (b) nine item-three factor social presence model, and (c) twelve item-four factor cognitive presence model. Finally, the results of this study empirically supported the conceptualization of all three presences as proposed by the CoI framework. However, the results of this study raised some concerns related to conceptualization and operationalization of teaching presence and social presence. For teaching presence, as discussed in the previous research, the results of this study also raised question whether teaching presence consists of two factors (design and

organization, and combination of facilitation and direct instruction) or three factors (design and organization, facilitation, and direct instruction) (See Arbaugh & Hwang, 2006; Shea et al., 2003) due to the high standardized covariance value. Further examination through chi-square test and comparison of fit indices showed that two-factor model did not significantly contribute to the hypothesized three-factor model. Consequently, three-factor teaching presence model as proposed by the CoI framework was considered a better model. Likewise, for social presence, the results raised a question whether social presence consists of two (combination of affective expression and group cohesion, and open communication) or three factors (affective expression, open communication, and group cohesion). Further, comparison of fit indices and chi-square difference test showed that two-factor model did not significantly contribute to the proposed three-factor model. Therefore, three-factor social presence model was considered a better model as proposed by the CoI framework. In spite of the addressed issues related to the teaching presence and social presence constructs, examining the factor structure of the individual presences added another level of evidence to the construct validity of the CoI framework. The results of this study suggested larger scale studies including participants from different levels (e.g., graduate, undergraduate, certificate), institutions, and courses. Further, the results of this provided insights into the psychometric properties of the CoI instrument.

Next, as part of a research team, I examined the predictive validity of the CoI framework on student outcomes (i.e. satisfaction, perceived learning) through meta-analysis. To date a number of studies focused on the degree to which each presence predicts perceived student outcomes (e.g., Akyol & Garrison, 2011; Arbaugh, 2005, 2008; Gunawardena & Zittle, 1997; Khalid & Quick, 2016; Richardson & Swan, 2003; Strong, Irby, Wynn, & McClure, 2012; Swan & Shih, 2005), yet no study has synthesized the previous study findings. Therefore, our research

team has conducted three meta-analyses examining the magnitude of the relationship between presences of the CoI and student outcomes in fully online courses in a higher education setting, one study for each presence. Further, we conducted a moderator analysis to examine these relationships across context, disciplinary areas, course duration, and measures of presences. These meta-analyses allow us to look at these relationships from a holistic view. The meta-analysis presented in this dissertation as Chapter 3 specifically focused on social presence in relation to students' perceived learning and satisfaction, as social presence is the most common studied presence of the CoI.

Based on the inclusion and exclusion criteria, we identified 25 studies to be included in the meta-analysis. We retrieved 21 effect sizes for perceived learning and 14 for satisfaction from 25 studies. The results showed a positive correlation between social presence and perceived learning ($r = .510$) and social presence and satisfaction ($r = .557$). I^2 statistic results showed 92.77% for perceived learning and 86.68% for satisfaction) indicated that there were real difference effect sizes across studies. Because of the large variation among studies, we conducted moderator analysis to examine the factors that moderate these relationships. Course duration, discipline area, participants' characteristics (e.g., undergraduate, graduate), and the scale used to measure social presence served as a moderator. For the relationship between social presence and perceived learning, course length, subject area, and course duration were significant moderators. For the relationship between social presence and satisfaction, course length, subject area, and scale measuring social presence were significant moderators.

Further, the results of this meta-analysis provided insight into the measures of social presence. Based on these results it is difficult to say one scale is better than others, but we could say that the psychometric properties of the instrument is important as it influences the

relationship between the constructs. Further, based on the results of this meta-analysis, we suggested improving reporting practices. For example, in some cases instruments were not available or described fully. Similarly, of the 98 studies initially identified, 57 did not include the statistical information necessary to obtain effect sizes thereby resulting in their exclusion from the study. Finally, our initial idea was the use of course design and facilitation elements as moderators to examine research findings across studies when looking to practices in online course design and facilitation. However, since the vast majority did not report on the design elements and facilitation of the online courses, we were not able to use these elements as moderator. Consequently, the results of this meta-analysis provided statistical evidence on the relationship between individual presences and student outcomes and identified the moderators that explain the variation among primary studies because of systematic differences (e.g., course length, target audience). But quantitative evidence was not enough to explain the factors that influence this relationship. This led my next research to take a pure qualitative approach and synthesize qualitative evidence represented in Chapter 4 to go dig and deeper into the students online learning experiences.

In Chapter 4, I lead the effort for a thematic synthesis aimed at synthesizing the qualitative evidence thematically to determine the factors that influence students' online learning experiences from the lens of the CoI framework. Examining the research evidence from a qualitative lens provided a comprehensive understanding of what students perceived the elements as influencing their online learning experiences. After applying inclusion and exclusion criteria, 29 studies were included in the final pool. Following a three-stage procedure of thematic synthesis specified by Thomas and Harden (2008), we a) coded included studies; b) developed descriptive themes based on the codes; and c) generated analytical themes based on the

descriptive themes. The thematic synthesis revealed 10 descriptive themes covered by three overarching categories, including course design, instructors' actions during course, and peers' actions during course. As a final step of the synthesis procedure, the descriptive themes were aggregated into three main themes, including accountability, being real, and supporting learning process. Based on the evidence presented through both descriptive and analytical themes, designing and developing a meaningful online learning experience is a shared responsibility of course designer if instructor is not the course designer, instructor, and students. Because of the exploratory and integrative nature of qualitative synthesis, the results of this thematic synthesis provided evidence beyond what have been described in primary studies.

Integration of Results and Directions for Future CoI Research

The confirmatory factor analysis, the meta-analysis, and the thematic synthesis presented in this dissertation provided insights for both research into the Community of Inquiry framework and reporting practices.

The results of the confirmatory factor analysis study raised questions regarding the conceptualization of social and teaching presences. Further, the results suggested that these issues could be related to a) psychometric properties of the CoI instrument; b) nature of the online courses where the participated students enrolled in; c) design and facilitation of the online courses; and c) level of the participated students (e.g., graduate, undergraduate). Likewise, the results of the meta-analysis provided insights related to a) instruments used to measure social presence; b) course duration; c) target audience; and d) discipline area. Unfortunately, because of the lack of available information provided in the included studies, we were not able to further analyze the course design and instructor related factors that influence the relations between social presence and student outcomes. Finally, the results of the thematic synthesis provided

empirical evidence on how course design and facilitation related factors, including both instructors' and students' role in online courses influence student online learning experiences (e.g., satisfaction learning).

Together, the three manuscripts presented in this dissertation provided empirical evidence into the construct and predictive validity of the CoI framework. Specifically, a three-presence structure of the CoI frameworks as well as the structure of individual presences is valid. In addition, the operationalization of social, teaching, and cognitive presences work well, as each contributes to the development of other two presences and as well as to the enhancement of student outcomes (e.g., satisfaction and perceived learning) in fully online courses. Despite the strong construct validity of the CoI instrument and the operationalization of the three presences, there are other factors that influence the relationship between presences and student outcomes. These factors related to course context (e.g., course length, target audience, discipline), course design (e.g., transparency and clarity in course design, learning activities and resources), instructor facilitation and discourse (e.g., timely and constructive feedback, active participation in the course discussions), and students (e.g., commitment to group work, peer feedback, active participation in the course). Finally, given the validity and practicality of the current form of the CoI framework, the existence of these factors does not seem to point to a strong need for major revisions of the framework.

Directions for Future Research

Taken together, the three manuscripts provide direction for future research, including psychometric properties of the CoI instrument, course design and facilitation features, and level of participants (e.g., graduate, undergraduate).

Psychometric properties of the CoI instrument: First, the factor analysis study raised questions related to the conceptualization of both social presence and teaching presence. Likewise, the results of the meta-analysis showed that the scale used to measure social presence predict the relationship between constructs. This implies the need for future research examining the psychometric properties of the CoI instrument.

Nature of the discipline and design and facilitation of online courses: The results of the factor analysis indicated the issues related to conceptualization of social and teaching presence could be related to nature of the discipline (e.g., soft, hard, applied), course design (e.g., synchronous vs. asynchronous, including learning materials in different modalities), and facilitating discourse (e.g., being actively involved in the course, provide subject matter expert knowledge to give direction, scaffolding, feedback). Likewise, the results of the meta-analysis indicated that course design was a significant moderator that predicts the relationship between social presence and student outcomes. Finally, the thematic synthesis results provided qualitative evidence on what and how course design and facilitation, including both instructor- and student-related influence students' online learning experiences. In this direction, I recommend future experimental studies to examine the degree to which the factors determined as a result of the thematic synthesis impact the relationship between three presences and student outcomes (e.g., satisfaction, perceived learning).

Consequently, these directions informed my future research agenda from the following perspectives. First, concerns addressed regarding to the psychometric properties of the CoI instrument informed my research agenda to conduct a meta-analysis to examine the psychometric properties of the CoI instrument across previous validation studies (e.g., Arbaugh et al., 2008; Kozan & Richardson, 2014; Yu & Richardson, 2015). Furthermore, the meta-

analysis results provided statistical evidence of how social presence is related to student outcomes in fully online courses, while the thematic synthesis provided qualitative evidence of the factors that influence this relationship. In turn, my future research will focus on synthesizing both qualitative and quantitative evidence to provide a holistic view of how both qualitative and quantitative evidence contribute to our understanding of student outcomes in online from the lens of the CoI framework.

Suggestions for Reporting Practices

In addition to directions for future research, the research presented in this dissertation provides methodological implications for reporting practices of both qualitative and quantitative studies as well as qualitative synthesis in educational research.

Providing enough evidence: One limitation addressed in the meta-analysis was the number of studies. Unfortunately, we excluded a number of studies due to the lack of statistical information needed to obtain effect sizes. Likewise, we excluded a number of studies from the thematic synthesis because of lack of verbatim evidence from the study participants which is a key element of credibility of results in qualitative research.

Transparency in reporting: The meta-analysis showed that researchers should be more transparent with reporting. For instance, in that meta-analysis, we were aiming to use course design factors to examine whether they moderate the relationship between presence and student outcomes. However, since the majority of included studies did not provide such info, we were not able to use them as a moderator. Furthermore, appraising the reporting practices of qualitative research showed that there was missing information in the reporting, particularly the qualitative research method used (e.g., case study, phenomenology), rationale and/or explanation of why the selected qualitative method was chosen; the data analysis method; why the selected

data analysis method was chosen; and the methods applied to enhance the quality of data collection instruments (e.g., face validity, pilot). Corresponding to the suggestions made by previous research, more rigorous research design and transparent reporting is needed, specifically in qualitative research (Knafl & Howard, 1984; Noble & Smith, 2015). Since there is no agreed standard for judging the quality of qualitative research, conducting a methodologically sound qualitative research might be challenging, specifically for novice researchers (Noble & Smith, 2015). To this end, in addition to being used for appraising qualitative studies, I hope that this critical appraisal checklist guides researchers to plan and report more rigorous qualitative research studies.

Qualitative synthesis in educational research: Qualitative synthesis in education is becoming more common but it is not yet well established; there are a limited number of thematic syntheses available. Moreover, utilization of thematic synthesis is varied. The thematic synthesis presented in this dissertation followed the process proposed by Thomas and Harden (2008). I hope that the thematic synthesis presented in this dissertation will serve as an example of thematic synthesis in educational research.

Practical Implications

In addition to research implications, the overall results of the studies presented in this dissertation provided practical implications as well. First of all, in addition to the confirming the conceptualization of the individual presences, the confirmatory factor analysis study presented in Chapter 2 provided empirical evidence into the conceptualization of the CoI framework as well as the CoI instrument. Second, the meta-analysis presented in Chapter 3 provides research-based evidence into the predictive validity of the CoI framework on student outcomes. Finally, the thematic synthesis presented in Chapter 4 determined the factors that influence student online

learning experiences through the lens of the CoI framework. Altogether, the overall results of this dissertation provided empirical evidence into the construct and predictive validity of the CoI framework as well as provided empirical evidence on the design and facilitation aspects of online courses. Aligning with the social constructivism and Dewey's educational philosophy, the CoI framework focuses on creating an online learning community of inquiry where individuals construct their own knowledge through interaction with others. In other words, the CoI framework provides guidelines for research and practice to create a sense of community in online courses as well as to support student critical thinking and higher order thinking skills. The review of included studies in the meta-analysis and thematic synthesis showed that creating a meaningful online learning experience is a shared responsibility of course designers, instructors, and students. For instance, course designers consider the following when designing online courses: a) being clear, transparent and consistent in course design; b) designing learning activities that are relevant to real world, support student autonomy, encourage for interaction, and force students to search more information; and c) including learning materials that are in different modalities, comprehensive, and accessible. Online instructors can consider a) actively participating in the course; b) providing subject matter expert knowledge; c) giving direction to course discussions; d) providing timely, detailed, and constructive feedback; and e) projecting oneself as real (e.g., self-disclosure). Finally, online students can use the CoI framework to facilitate and support their own learning experiences as well as their peers. Example student behaviors include active participation in the course, being responsive to peers' inquiries, contributing to teamwork, providing constructive and meaningful feedback, and projecting oneself as real (e.g., self-disclosure). In addition, programs can use it as a program assessment tool to provide satisfying online learning experiences.

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