

Fostering Cognitive Presence in Online Courses: A Systematic Review (2008-2020)

Robert L. Moore
University of Florida, USA

Courtney N. Miller
Old Dominion University, USA

Abstract

Within the Community of Inquiry (CoI) framework, cognitive presence has been central to success in higher education settings. This systematic review examined 24 articles published between 2008-2020 that empirically analyzed cognitive presence in online courses. We share the patterns that emerged regarding the interplay between teaching and cognitive presence and social and cognitive presence. We also explore how the four phases of cognitive presence—triggering event, exploration, integration, and resolution—were evident within specific instructional activities. We conclude with implications for practice that will be helpful for course instructors and designers seeking to foster greater cognitive presence within their online courses.

Keywords: Cognitive presence, community of inquiry, online courses, practical inquiry model

Moore, R. L., & Miller, C.N. (2022). Fostering presence in online courses: A systematic review (2008-2020). *Online Learning*, 26(1), pp. 130-149. DOI: 10.24059/olj.v26i1.3071

There is a clear relationship between motivation, satisfaction, and learning within the context of online education (Brooker et al., 2018; Hsu et al., 2019). These relationships have gained particular relevance amidst the shift to online learning during the COVID-19 pandemic (Baber, 2020; Moore, 2020). The dramatic shift to emergency remote teaching (ERT) in 2020 (Hodges et al., 2020) highlighted the critical need to continually reflect on how online learning environments are being constructed. As we continue through this global pandemic, we have an opportunity to closely examine how we can more effectively integrate technology into learning environments in an equitable and just way (Adedoyin & Soykan, 2020; Hodges et al., 2020; Masonbrink & Hurley, 2020; Moore, 2020; Roitsch et al., 2021; Schuck & Lambert, 2020). Moreover, through this introspection, we can create more equitable online learning environments.

In this paper, we examine online learning environments through the Community of Inquiry (CoI) model (Garrison et al., 1999). CoI was developed to address unique barriers in developing higher-order learning in online learning environments. Three interconnected presences make up the CoI model: social presence, teaching presence, and cognitive presence. For our paper, we focus on the third presence, cognitive presence, which has been linked to success within higher education settings (Abe, 2020). This model suggests that the most successful online learning environments emphasize self-regulated learning and self-reflection. They also involve linkages between past understanding and newly acquired knowledge, social interactions and coordinated efforts between peers, and direct application of knowledge to learners' daily lives (Cercone, 2008; Garrison, 2007; Ke, 2010; Kilis & Yıldırım, 2018).

While CoI creates a valuable framework for examining online educational experiences, other factors can further enhance online learning. Kozan and Caskurlu (2018) posited that CoI could expand to include additional presences, including autonomy presence, distributed teaching presence, emotional presence, instructor presence, instructor social presence, teacher engagement, and learning presence. Within these presences, different categories point to the importance of characteristics such as intrinsic motivation (autonomy presence), outcome and activity emotions (emotional presence), open communication and emotional expression (instructor social presence), and motivating and supporting learners (teacher engagement); all of which share common threads of motivation and satisfaction within communities of inquiry and online learning (Kozan & Caskurlu, 2018).

The purpose of this systematic review was to examine the empirical research of cognitive presence in online courses and understand the contexts and implications for practice that emerged from these studies. The review focuses on articles from 2008–2020, as 2008 was when the validated CoI instrument was developed (Arbaugh et al., 2008). To guide our review, we used the following research questions:

1. How has cognitive presence been examined in online courses?
2. How can instructors foster cognitive presence within online courses?

In the literature review section, we provide an overview of the three presences that make up the CoI model and cover the components that comprise cognitive presence, the focus of this paper. Also, in the literature review, we discuss the phases of the Practical Inquiry Model (PIM; Garrison et al., 2001), which guides the learner through the phases of cognitive presence. We conclude that section with a brief overview of how the three presences intersect and a discussion about the ways that instructors might consider fostering cognitive presence in their classrooms.

Our methods section documents the process we used to systematically consider articles for inclusion in this study. Finally, in the results and discussion section, we synthesize our findings around context, the PIM, and implications for practice.

Literature Review

Community of Inquiry Model

The Community of Inquiry (CoI) framework, introduced by Garrison et al. (1999), examines the critical elements of a community of inquiry and how these elements overlap to create an educational experience. Garrison et al. (1999) sought to establish key indicators of cognitive presence, social presence, and teaching presence and how these elements contribute to student success (Fiock, 2020; Garrison, 2016). As can be gleaned from the name itself, CoI emphasizes the importance of community and collaboration within an educational context, especially online learning. It emphasizes the interactions among students, instructors, and peers within the higher education context and how these interactions contribute meaningfully to an educational experience. In initial studies of CoI, the transcript coding method was utilized to analyze transcripts and code them within the categories and elements within the CoI framework (Arbaugh et al., 2008). The CoI instrument was developed to study online communities of inquiry with a more descriptive approach. The COI instrument is 34-questions that collects data on both the categories and elements of CoI within the context of various courses and universities (Arbaugh et al., 2008; Stenbom, 2018; Stenbom et al., 2016). The CoI survey was validated (Swan et al., 2008) and applied in a multitude of studies across the educational landscape to further understand the dynamics of online and blended learning environments. Sadaf et al. (2021) found in their recent systematic review of cognitive presence and the CoI that most research on CoI is either using the survey instrument or a coding of discussion forum transcripts.

The first presence in CoI is teaching presence, which describes the role of instructors in course design, organization, and delivery and the instructions that guide social and cognitive presences to desired learning outcomes (Anderson et al., 2001). Garrison (2007) further defines teaching presence as a significant factor for students' satisfaction, perceptions of learning, and sense of community. Examples of teaching presence include direct instruction, course/instructional design, and facilitating discussion and collaboration throughout a course. Teaching presence rests primarily on the role of the instructor and includes their ability to design, facilitate, and encourage learning through a variety of methods (Fiock, 2020).

The second presence, social presence, is an important aspect of online learning and is particularly essential for high-quality asynchronous discussion forums (Akcaoglu & Lee, 2016). In addition to discussion forums, video-based platforms have been explored for their ability to develop social presence in online courses (Clark et al., 2015; Gurjar, 2020; Lowenthal et al., 2020; Lowenthal & Moore, 2020). This presence focuses on the fundamental social relationships among members of a learning community and the social climate that contributes to mastery of learning objectives (Moore, 2016; Rourke et al., 1999). Social presence is the ability to present oneself (in this case, through digital mediums) and establish personal and purposeful relationships (Garrison, 2007). The three most important aspects of social presence are effective communication, open communication, and group cohesion (Garrison, 2007). Without the interaction created through social presence, the resultant collaboration and knowledge construction needed for cognitive presence cannot exist within a course (Kreijns et al., 2014). Key categories of social presence include students' ability to express emotion, work together as a group, and freely express themselves within the context of the community (Garrison et al., 1999).

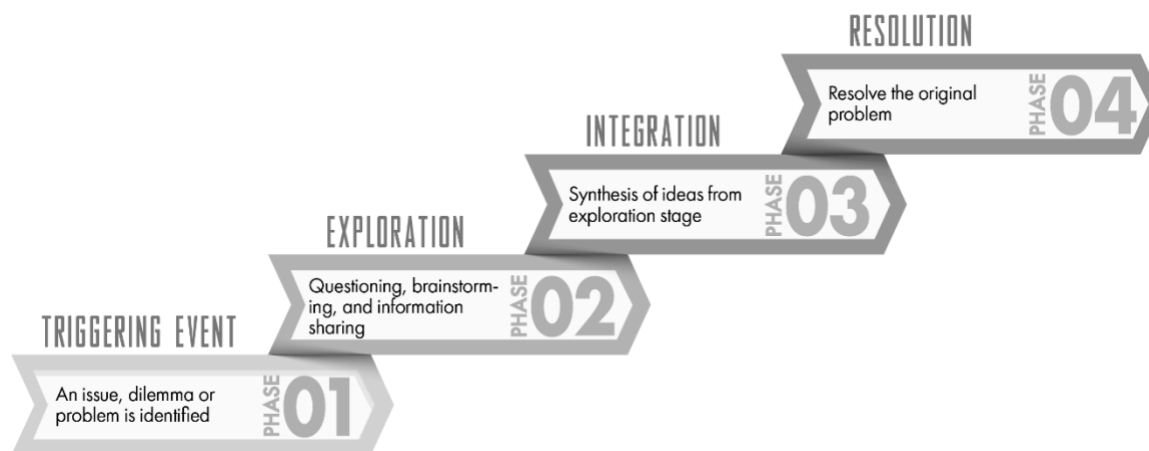
The third presence (and focus of this paper) is cognitive presence, which is defined as the exploration, construction, resolution, and confirmation of understanding through collaboration and reflection in a community of inquiry (Garrison, 2007). Cognitive presence is grounded in critical thinking literature (Garrison et al., 1999; 2001) and operationalized through the cycle of practical inquiry, in which participants move deliberately from understanding the issue to exploration, integration, and application (Garrison, 2007; Gibson et al., 2012). Cognitive presence is of particular interest in online courses, in which the community established within the virtual arena is paramount (Abe, 2020; Fiock, 2020). Whereas cognitive presence in in-person classes can be communicated via facial expressions, body language, and other live indicators of understanding, it can be more challenging to ensure that students are engaged virtually (Moore, 2016). Online and blended learning offer a variety of tools to help foster cognitive presence, such as asynchronous online discussion (Galikyan & Admiraal, 2019), video communication (Seckman, 2018), and other activities that guide the learner through the four phases of the Practical Inquiry Model (PIM) (Fiock, 2020; Sadaf & Olesova, 2017). Schrire (2004) suggests the PIM as an effective way to analyze the cognitive dimension within a discussion forum. Cognitive presence is a central dimension of the PIM that describes the learning phases from the initial practical inquiry to eventual knowledge construction and problem solving (Garrison et al., 2001).

Practical Inquiry Model

The four phases of the Practical Inquiry Model are: a triggering event, exploration, integration, and resolution (Figure 1; Garrison et al., 2001; Garrison, 2007; Gibson et al., 2012; Moore et al., 2019).

Figure 1

Four Phases of Practical Inquiry Model (adapted from Garrison et al. [2001])



In the initial “triggering event” phase, the learning cycle is initiated by a problem or dilemma, which, in the course context, is typically introduced by the instructor. In a discussion forum, this would be the initial prompt the instructor has posed to learners, and students are first tasked with scoping and understanding the prompt (Chen et al., 2019). At the second phase of exploration, students move on to brainstorming and other activities in which they gather information relevant to the problem or task at hand. In many discussion forums, this is the phase

in which students spend the most time. One example of this in practice would be asking students to brainstorm a solution to a problem of practice (Chen et al., 2019). At the integration phase, after gathering an appropriate body of information, students selectively synthesize and integrate different components while filtering out irrelevant information. It is at this stage where higher levels of cognitive presence are demonstrated. An example of this could be a discussion forum activity in which a designated student must summarize other students' posts over the past week and share their synthesis. Another example might be asking students to post replies that specifically call out areas of agreement or disagreement. In the final stage, resolution, cognitive presence is typically the most difficult to reach, in part due to the educational context (Kovanović et al., 2015; Moore, 2016; Moore et al., 2019). In this phase, the desired outcome is for students to reach a resolution to the original problem. However, if this is a new subject domain for learners, it may not be possible to attain this outcome within the relatively short duration of the discussion forum. It is also common to see the resolution of the original problem launch a new learning cycle, with an accompanying new triggering event (Kovanović et al., 2015).

Interaction of Teaching, Social and Cognitive Presences

To achieve an optimal educational experience, all three presences must be accounted for within a course. It is at the intersection of the presences that specific learning outcomes can be observed, as the presences are interconnected. The intersection of social presence and cognitive presence is important, as students are not online simply for purely social reasons (Garrison, 2007). In further exploring the relationship between the three presences, studies have found that social presence is a mediator between teaching presence and cognitive presence, and teaching presence causally influences both social and cognitive presence (Garrison et al., 2010; Kreijns et al., 2014; Shea & Bidjerano, 2009). The connection between social and cognitive presence can lead to an environment that facilitates interaction between learners, content, and instructors (Song & Yuan, 2015). Additionally, Garrison et al. (2010) suggest that the central role of teaching presence is establishing and maintaining social and cognitive presence. The learner navigates the learning environment (created through teaching presence) and engages with peers and content (social presence) to develop higher-order thinking skills (cognitive presence) (Gibson et al., 2012). Teaching presence brings the social and cognitive presences together and accounts for learners' needs and capabilities (Garrison & Anderson, 2003; Kreijns et al., 2014).

Instructional Approaches

Different strategies have been used to encourage cognitive presence, one of which is using discussion forums (Abe, 2020; Brooker et al., 2018; Chen et al., 2019; Fiock, 2020; Galikyan & Admiraal, 2019; Junus et al., 2019; Moore, 2016; Sadaf & Olesova, 2017). Sadaf and Olesova (2017) focused their study on the how the type of question posed by the instructor could influence the student's levels of cognitive presence. They found that framing the question around a case-based discussion resulted in students demonstrating higher levels of cognitive presence. In this scenario, the instructor is taking the lead in presenting a prompt that makes students think critically and more importantly, articulate their thought processes. The implementation of small group vs. whole-class dynamics has also been explored as an instructional approach to foster cognitive and social presence (Akcaoglu & Lee, 2016). In this approach, the students can delve deeper into a topic because they have focused their discussions within a smaller group. This can lead to a richer discussion and co-construction of knowledge. The role of facilitation has been explored, as knowledgeable facilitators providing appropriate prompting can engage learners in higher-level learning (Baber, 2020; Fiock, 2020). Additionally,

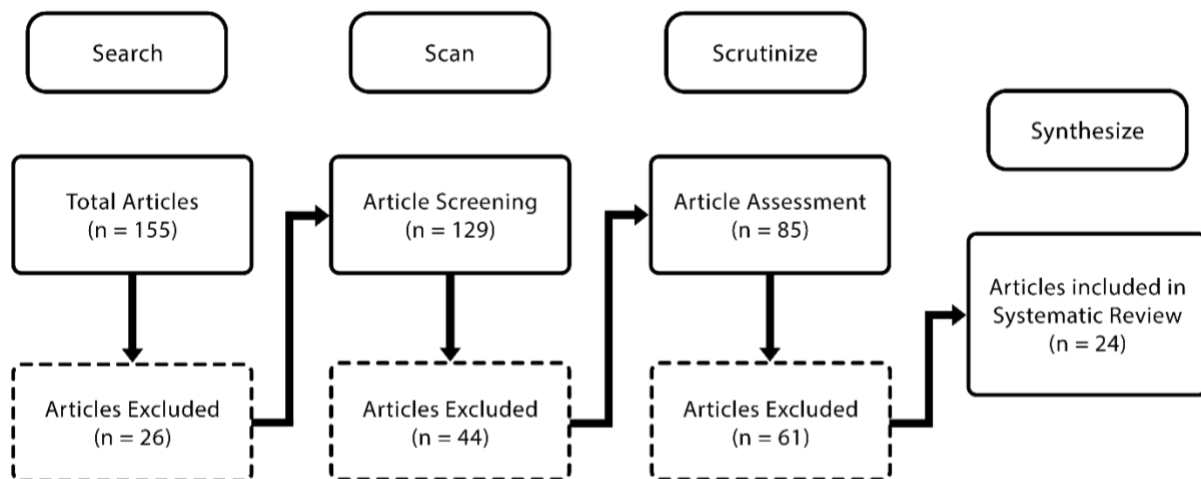
researchers have compared the merit of synchronous and asynchronous interaction as a part of CoI (Clark & Grove, 2015; Molnar, 2017). Others have examined the use of video in both synchronous and asynchronous capacities to encourage participation (Clark & Grove, 2015; Guo & Chen, 2019; Gurjar, 2020; Lowenthal et al, 2020).

These various studies have demonstrated that context and instructional aims are key determining factors in how cognitive presence can be fostered within the online learning environment. The course objectives will vary but the goal of identifying ways to engage learners with both the content and each other is a universal objective for instruction. As instructors are considering how to best structure their course, they have a variety of options to consider. And as the studies mentioned above highlight, there are a lot of options to consider. Thus, we have synthesized the literature focusing on ways that cognitive presence has been fostered in online courses. We narrowed our review to include studies that provide insight on techniques that instructors can use to develop their learner’s cognitive presence. We have distilled the literature into themes, which we discuss in the results section, that will be useful for instructors considering how they may approach the challenge of fostering cognitive presence within their online courses.

Methods

This systematic review was guided by the PRISMA principles (Liberati et al., 2009), and we adapted the principles to complete four phases of our selection and synthesis of the literature (Figure 2). In this section, we discuss the selection and filtering process that we used and thus create a level of transparency that adds trustworthiness to the study. To aid in that transparency, we used PRISMA as it allows for a clear and concise way to present our process so that others may replicate or update the review. This method aids in establishing the trustworthiness of the study (Page et al., 2021).

Figure 2
Article Selection Process (adapted from Liberati et al. [2009])



Search

In the first phase, we conducted our search using the Academic Search Premier and Education Source databases. Our search terms were combinations of “online engagement,” “motivation,” “satisfaction,” “develop*,” “foster*,” and “cognitive presence.” We restricted our search to peer-reviewed journal articles published in English between 2008-2020. The initial search returned 155 studies, and 26 duplicates were removed.

Scan

In the second phase, we reviewed abstracts and removed an additional 44 studies that were either irrelevant or unobtainable, leaving 85 articles for full-text screening.

Scrutinize

In the third phase, we read each of the 85 articles and determined if they fit the inclusion and exclusion criteria in Table 1. To be included in the study, an article needed to match all the inclusion criteria. These inclusions were based on the focus of our research study. This process left 24 articles.

Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">• Article was peer-reviewed	<ul style="list-style-type: none">• Article was book chapter, conference proceeding, or not a peer-reviewed source
<ul style="list-style-type: none">• Article was empirical	<ul style="list-style-type: none">• Article was not empirical
<ul style="list-style-type: none">• Article was published between 2008-2020	<ul style="list-style-type: none">• Article did not focus on cognitive presence in an online course
<ul style="list-style-type: none">• Article presented a strategy or technique for fostering cognitive presence	

Synthesize

In the following section, we synthesize the 24 articles included in this review. Where appropriate, we have added additional context through citations.

Results and Discussion

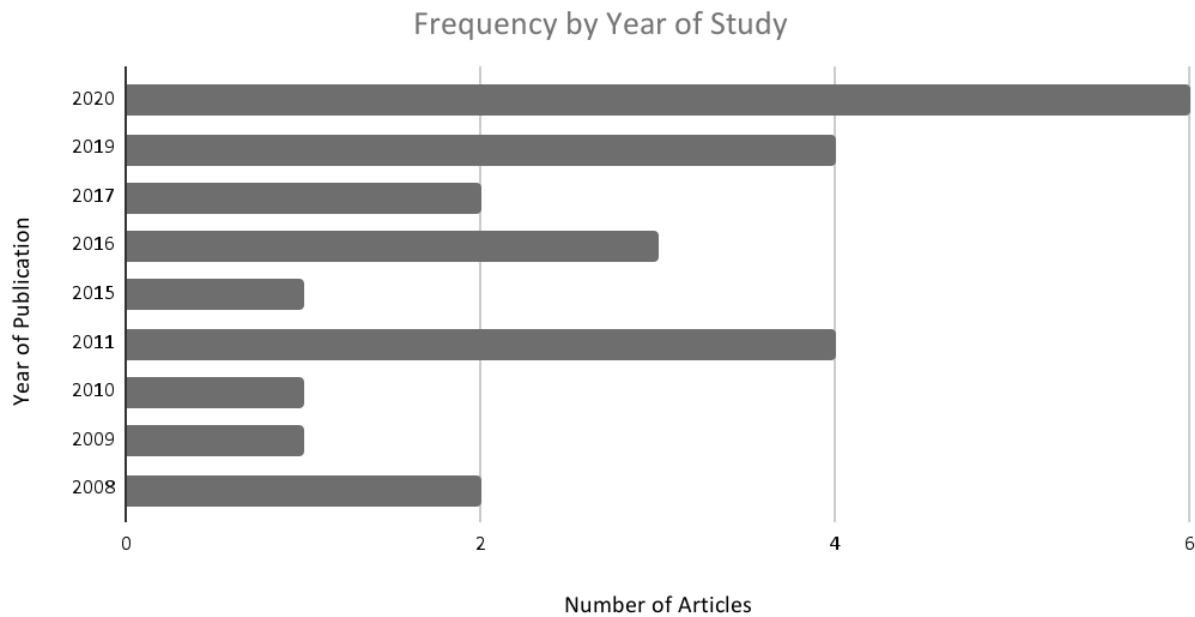
Research Question #1: How Has Cognitive Presence Been Examined in Online Courses?

For our first research question, we were interested in understanding the contexts in which cognitive presence has been examined. We were particularly curious to explore whether there were any patterns in the empirical research that may be helpful for contextualizing our understanding of cognitive presence. In this section, we look specifically at the publication dates, educational level of learners, instructional contexts, scope of study, methods, relationship between presences, and PIM.

Publication Date

We searched for articles between 2008-2020 and found that there were publications in each of those years, except for 2012-2014 and 2018 (Figure 3). Most years had three or fewer articles, with the most popular years being 2011, 2019 and 2020. Reviewing the year of publication and factors such as method of assessment, scope of study, or learner audience did not reveal any trends in terms of direction of research.

Figure 3
Frequency of Publications by Year



Educational Level of Learner Audience

Most studies focused on graduate-level students, followed by undergraduate students, and then adult learners (Table 2). Of the 24 studies, five (Joo et al., 2011; Morueta et al., 2016; Patwardhan et al., 2020; Shea et al., 2010; Shea & Bidjerano, 2008) did not specify audience by grade level, but by course type, content, or other criteria.

Table 2
Articles by Learner Audience

Learner Audience	Articles
Graduate students	(Akyol et al., 2011; Akyol & Garrison, 2008; Bissessar et al., 2020; Chen et al., 2019; Gašević et al., 2015; Ice et al., 2011; Kucuk & Richardson, 2019; Kumar et al., 2011; Leader-Janssen et al., 2016; Rolim et al., 2019)
Undergraduate students	(Cho & Tobias, 2016; Choo et al., 2020; Molnar & Kearney, 2017; Poluekhtova et al., 2020; Shea & Bidjerano, 2009)
Both graduate and undergraduate students	(Pillai & Sivathanu, 2019)
Teachers	(Sağlam & Dikilitaş, 2020)
Adult learners	(DuBois et al., 2019; Saadatmand et al., 2017)

Instructional context

We found that the articles were situated within one of four instructional contexts: university system, single course, multiple courses, and at the program level (Table 3).

Table 3

Articles by Instructional Context

Context	Studies
Online university system	(Ice et al., 2011)
Single course	(Akyol et al., 2011; Akyol & Garrison, 2008; Bissessar et al., 2020; Chen et al., 2019; DuBois et al., 2019; Gašević et al., 2015; Joo et al., 2011; Molnar & Kearney, 2017; Morueta et al., 2016; Rolim et al., 2019; Saadatmand et al., 2017; Sağlam & Dikilitaş, 2020)
Multiple courses	(Cho & Tobias, 2016; Patwardhan et al., 2020; Pillai & Sivathanu, 2019; Shea et al., 2010; Shea & Bidjerano, 2008, 2009)
Program level	(Choo et al., 2020; Kucuk & Richardson, 2019; Kumar et al., 2011; Leader-Janssen et al., 2016; Poluekhtova et al., 2020)

Scope of Study

Another theme worth mentioning that contributes to both of our research questions is the scope of the study. Most of the literature fell into two groups: studies to test the effectiveness of CoI strategies, and studies that sought to review CoI in general. We will discuss the studies on CoI strategies in the next section and will focus on the second group here.

A large portion of the literature (Bissessar et al., 2020; Choo et al., 2020; Ice et al., 2011; Joo et al., 2011; Kucuk & Richardson, 2019; Leader-Janssen et al., 2016; Morueta et al., 2016; Patwardhan et al., 2020; Pillai & Sivathanu, 2020; Poluekhtova et al., 2020; Saadatmand et al., 2017; Sağlam & Dikilitaş, 2020; Shea et al., 2010; Shea & Bidjerano, 2008, 2009) looked at CoI in a holistic fashion, utilizing the CoI survey (and variations thereof) to measure cognitive presence in courses. While some studies viewed how students experienced and perceived CoI (Bissessar et al., 2020; Leader-Janssen et al., 2016; Poluekhtova et al., 2020; Saadatmand et al., 2017; Shea & Bidjerano, 2008;), other studies sought to determine the interplay between other various factors. Overarching themes included the study of CoI and course satisfaction (Choo et al., 2020; Ice et al., 2011; Kucuk & Richardson, 2019; Patwardhan et al., 2020; Sağlam & Dikilitaş, 2020), CoI and enrollment (Ice et al., 2011), the different presences within CoI (Joo et al., 2011; Kucuk & Richardson, 2019; Pillai & Sivathanu, 2020; Shea et al., 2010; Shea & Bidjerano, 2009), CoI and engagement (Kucuk & Richardson, 2019), CoI and course design (Patwardhan et al., 2020), and cognitive and social presence within higher cognitive tasks (Morueta et al., 2016).

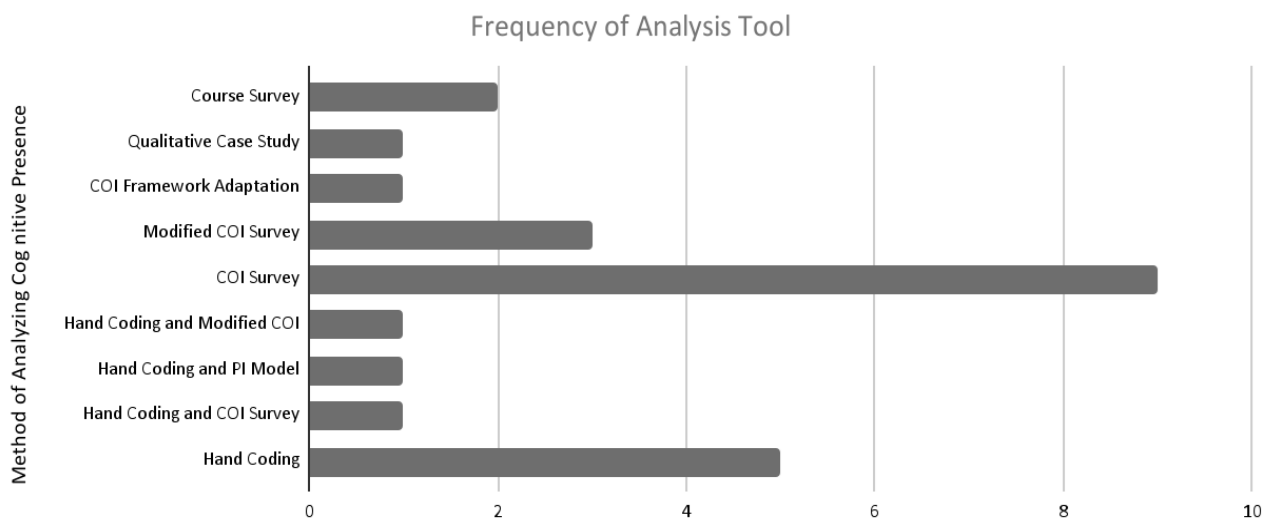
Methods

A few notable themes related to methods of analysis emerged as the data was reviewed (Figure 4). Most studies used a quantitative approach, while Bissessar et al. (2020) utilized a qualitative case study approach. The CoI instrument was the most frequently used, either in its original form (Akyol et al., 2011; Cho & Tobias, 2016; Ice et al., 2011; Kucuk & Richardson, 2019; Leader-Janssen et al., 2016; Patwardhan et al., 2020; Sağlam & Dikilitaş, 2020; Shea & Bidjerano, 2008, 2009) or adapted (Joo et al., 2011; Kumar et al., 2011; Saadatmand et al., 2017). Choo et al. (2020) created their own survey built around the CoI framework but did not specifically indicate that the CoI instrument was used. In some cases, the CoI survey (or a

modified form) was used in combination with other forms of measurement, such as hand coding (Akyol & Garrison, 2008; DuBois et al., 2019).

Hand coding was a common theme of measurement. While Chen et al. (2019) utilized both hand coding and the Practical Inquiry (PI) Model, more authors (Gašević et al., 2015; Molnar & Kearney, 2017; Morueta et al., 2016; Rolim et al., 2019; Shea et al., 2010) used hand coding on its own. Less commonly seen was the use of final course surveys (Pillai & Sivathanu, 2019; Poluekhtova et al., 2020).

Figure 4
Articles by Analysis Used



One final trend worth noting is that there is some commonality among the types of measurement tools being used based on scope of study. Studies that looked at multiple courses and the entire online university tended to use the CoI survey (Cho & Tobias, 2016; Ice et al., 2011; Patwardhan et al., 2020; Shea & Bidjerano, 2008, 2009). Studies that evaluated a single course used almost equal parts hand coding (Gašević et al., 2015; Molnar & Kearney, 2017; Morueta et al., 2016; Rolim et al., 2019) or some version of the CoI survey (Akyol et al., 2011; Joo et al., 2011; Saadatmand et al., 2017; Sağlam & Dikilitaş, 2020) At the program level, methods were split between using the CoI survey (Kucuk & Richardson, 2019; Leader-Janssen et al., 2016), adapted CoI (Kumar et al., 2011), survey adapted from the COI framework (Choo et al., 2020) and final course survey (Pillai & Sivathanu, 2019; Poluekhtova et al., 2020).

Community of Inquiry Presences

The CoI is about the interplay of three presences to create an educational experience. It is not surprising that the articles that highlight cognitive presence would also discuss the other presences of teaching and social presence. Several studies focused specifically on the relationship between cognitive presence and one other presence. The relationship between cognitive and social presence was the most common relationship (DuBois et al., 2019; Kucuk & Richardson, 2019; Morueta et al., 2016; Sağlam & Dikilitaş, 2020), while Akyol and Garrison (2008) explored the relationship between cognitive presence and teaching presence. Other

articles focused more broadly on the relationships between the three presences. In the study conducted by Sağlam and Dikilitaş (2020), a positive correlation was found between all three presences. This finding builds off the work of prior researchers who found that teaching and social presence contributed to the observed levels of cognitive presence (Shea et al., 2010; Shea & Bidjerano, 2009). Kucuk and Richardson (2019) linked cognitive presence to engagement measures of emotional, cognitive, and behavioral.

Another theme that emerged from the studies was how the presences were linked to outcomes such as achievement or learner motivation and satisfaction. Specifically, cognitive presence and teaching presence were linked to student learning and satisfaction (Akyol & Garrison, 2008), and cognitive presence was found to be a predictor of student satisfaction (Joo et al., 2011). Bissessar et al. (2020) examined the relationship between the three presences and learner outcomes, and Sağlam and Dikilitaş (2020) looked at the three presences and learner satisfaction.

Practical Inquiry Model

As previously mentioned, cognitive presence is operationalized through four sub-phases including (a) a triggering event (defining and understanding the problem), (b) exploration (exploring the issue through discussion and critical reflection), (c) integration (constructing meaning from ideas developed through exploration), and (d) resolution (applying new knowledge in a real-world context) (Akyol et al., 2011; Bissessar et al., 2020; Hsu et al., 2019; Sadaf & Olesova, 2017; Sağlam & Dikilitaş, 2020).

The demonstration of the different phases varied across the studies. Bissessar et al. (2020), found that student feedback on facilitators showed more triggering events, whereas other studies found the exploration phase to be the most commonly coded (Chen et al., 2019; Molnar & Kearney, 2017). While two studies found more instances of integration and resolution phases (Akyol et al., 2011; Akyol & Garrison, 2008), Bissessar et al. (2020) found integration to be the least frequently observed phase. Chen et al. (2019) found that students were offering more solutions when they were actively engaged in their thinking and presentation of arguments. In a comparison of synchronous and asynchronous discussions, Molnar and Kearney (2017) found that more evidence of the resolution phase appeared in the synchronous version.

Research Question #2: How Have Instructors Fostered Cognitive Presence in Online Courses?

In our second research question, we examined how instructors fostered cognitive presence in online courses. The discussion forum was a common tool used to foster cognitive presence, and we found that the facilitation of these discussion forums reached different learning outcomes for the studies. We also saw that overall course structure was used to foster cognitive presence.

Discussion Forum Facilitation

A common theme among many of the studies was the use of discussion forums (Akyol et al., 2011; Akyol & Garrison, 2008; Chen & Chang, 2019; Cho & Tobias, 2016; DuBois et al., 2019; Gašević et al., 2015; Kumar et al., 2011; Molnar & Kearney, 2017; Rolim et al., 2019). How the discussion forum is integrated into the course influences the development of cognitive presence within the course. The instructor plays a critical role in this—whether it is by creating activities and designing the course to allow for peer facilitation or by being an active participant within the discussion forum (Shea et al., 2006; Shea & Bidjerano, 2008, 2009). Below, we

discuss how the studies explored what role, if any, facilitation within the discussion forum can play in the demonstration of cognitive presence.

Peer Facilitation

Several studies highlighted how students were tasked with facilitating discussions (Akyol et al., 2011; Akyol & Garrison, 2008; Chen et al., 2019; Rolim et al., 2019). In these studies, the instructors provided support and a structure, but the responsibility for engaging with classmates within the discussion forum was tasked to specific students. In other words, the designated students served as moderators for the forum. In Rolim et al. (2019), students served as an expert on a topic and the rest of the class were in the role of researchers. Chen et al. (2019) found that when students were using facilitation techniques such as summarizing, social cues, and providing information to their peers, they were able to demonstrate the exploration stage.

Instructor Facilitation

Other studies focused on the role of the instructor in the facilitation of discussions (Bissessar et al., 2020; Cho & Tobias, 2016; Gašević et al., 2015; Leader-Janssen et al., 2016; Saadatmand et al., 2017). The role of the instructor varied and demonstrated different ways that cognitive presence can be fostered within a course. The instructor could serve in a more traditional role where they are posing discussion prompts and then facilitating the branching conversations and discussion (Bissessar et al., 2020; Cho & Tobias, 2016; Gašević et al., 2015; Rolim et al., 2019; Saadatmand et al., 2017). While this is a common approach to instructor facilitation, impact on student learning has been mixed. Cho and Tobias (2016) found that instructor participation within the discussions did not significantly increase student learning.

Another way that instructors facilitated discussions was through the coordination of synchronous sessions and/or activities (Kumar et al., 2011; Molnar & Kearney, 2017; Saadatmand et al., 2017). By bringing the learners together at the same time, the instructor sought to leverage learner-learner interaction techniques to foster cognitive presence. Additionally, studies provided examples of how instructors used social media interactions (DuBois et al., 2019; Saadatmand et al., 2017), peer and online mentoring (Sağlam & Dikilitaş, 2020), and groups/subgroups for collaboration (Kumar et al., 2011; Molnar & Kearney, 2017) to foster cognitive presence.

Design Considerations

One of the challenges that learners face in online environments is their need to self-regulate. The studies we examined addressed this challenge by providing suggestions for ways to design courses that can foster the development of cognitive presence. Gašević et al. (2015) suggest that providing detailed participation guidelines helps learners to demonstrate higher levels of cognitive presence. Additionally, Choo et al. (2020) suggest that assessments for peer-support learning can aid in students demonstrating cognitive presence. And Saadatmand et al. (2017) suggest that instructors take a holistic approach to how they integrate and use technology within their course. Instead of focusing on just one area, instructors should seek to provide multiple opportunities for students to engage with each other and the content. Saadatmand et al. (2017) further found that the integration of principles of problem-based learning helped to foster the learner-learner interaction and learner-context interaction that is critical for cognitive presence.

Implications for Practice

In our study, we found that several studies provided useful implications for practice, specifically around how to design course activities and create opportunities for student engagement, which can in turn foster cognitive presence. Discussion forums are a popular

instructional tool within online learning environments, but the forum itself doesn't create cognitive presence (Moore et al., 2019; Sadaf & Olesova, 2017; Shea et al., 2010; Shea & Bidjerano, 2009). And while Shea et al. (2010) points out that reaching the final stages of integration and resolution are optimal, the research shows that it is not common to reach those final stages, particularly the resolution stage. But there are ways that instructors can get students to engage in higher levels of cognitive presence. One of those ways is by using the PIM to frame questions and using a case-based discussion approach (Sadaf & Olesova, 2017). Instructors need to be intentional in how they are designing and structuring their courses to ensure there is optimal engagement between learners and the content (Moore, 2016; Oyarzun et al., 2020). Simply creating discussion forum assignments will not be enough to have students reach the integration and resolution stages of cognitive presence. And failing to be strategic in the design of the discussion forum—including prompts, guidelines, and expectations for the forum – will be a missed opportunity to engage learners in rewarding online discussions. Specific approaches, such as providing scaffolded guidelines for student response (Rolim et al., 2020), can help raise the amount of engagement students may experience. In addition, studies that directly compare the effectiveness of instructional approaches (Cho & Tobias, 2016; Gašević et al., 2015) can further guide practitioners in thoughtful and intentional design of activities that foster CoI.

The different presences overlap. For example, one approach to foster cognitive presence could be designing activities intended to increase social presence. A common issue in online courses is the sense of isolation or the sense of separation that learners might feel from being physically distant from other students. When efforts are made to cut down on the transactional distance, a greater sense of community is fostered, which can lead to more engagement and participation (Gurjar, 2020; Moore, 2014, 2016). Technology can offer a potential solution to addressing the transactional distance in online courses (Moore, 2016). Tools such as PollEverywhere, VoiceThread, and Flipgrid have all been shown to engage learners (Guo et al., 2019; Lowenthal & Moore, 2020; Moore et al., 2018; Oliver et al., 2017; Saçak & Kavun, 2020). Flipgrid, a free tool, integrates with many learning management systems and offers a robust tracking of student engagement, participation, and opportunities to allow the type of creativity that can be indicative of the latter stages of cognitive presence. Lowenthal and Moore (2020) explored student perceptions using Flipgrid for discussions and found that students enjoyed the activity and felt a deeper connection with their peers, despite being fully online.

In addition to tools for engagement, utilizing social platforms for interaction can contribute to the sense of community. The use of social media platforms such as Facebook (Dubois et al., 2019) and Twitter (Saadatmand et al., 2017) can take interaction out of the classroom and into a more “social” atmosphere. Because of this, learners may be able to embrace the aspects of communication and group cohesion that is not inherent in a more formalized classroom setting (Garrison, 2007).

A final note for practitioners to consider is how they might continue to contribute to the literature as they implement activities that foster CoI. This systematic review attempted to capture specific examples that were a part of the selected studies. However, many of the articles did not provide great specificity or examples of instructional approaches deployed. As more research is conducted around cognitive presence and CoI, practitioners can provide best practice recommendations to be adopted and applied to online courses.

Conclusion

We conducted a systematic review to examine the empirical research focused on cognitive presence in online courses. The distribution of publication years suggests that the Community of Inquiry model is still a relevant and oft-studied model in the context of online learning, and interest on the topic continues to grow. As we have seen a global shift to online learning resulting from a global pandemic, it is essential that we consider the needs of learners in technology-mediated environments (Moore, 2020; Roitsch et al., 2021). Suggestions for providing clear participation requirements, identifying multiple ways to integrate technology, and not simply relying on unstructured discussion forums were all useful considerations for course designers and instructors seeking to foster the development of cognitive presence. In addition, depending on the instructional context, students may not be that far developed in their thinking, as they may still be grappling with the initial exploration stages. Because of this, instructors should not be overly concerned if they are not able to see high levels of the integration and resolution stages within their course discussions. Instead, instructors should seek ways to align course objectives with an appropriate level of cognitive presence. We suggest that instructors review how they are leveraging their course management system, Web 2.0 technology tools such as PollEverywhere, Flipgrid and VoiceThread, and experiment with different approaches that can improve social presence which in turn will help foster cognitive presence in their online courses.

Declarations

The authors declare no conflicts of interest.

As a literature review, this work did not seek primary data collection from human subjects. Therefore, no ethics board approval was sought.

Research reported in this publication was supported by the University of Florida Clinical and Translational Science Institute, which is supported in part by the NIH National Center for Advancing Translational Sciences under award number UL1TR001427. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

- Abe, J. A. A. (2020). Big five, linguistic styles, and successful online learning. *The Internet and Higher Education*, 45. <https://doi.org/10.1016/j.iheduc.2019.100724>
- Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive Learning Environments*, 1–13. <https://doi.org/10.1080/10494820.2020.1813180>
- Akcaoglu, M., & Lee, E. (2016). Increasing social presence in online learning through small group discussions. *The International Review of Research in Open and Distributed Learning*, 17(3), 1–17. <https://doi.org/10.19173/irrodl.v17i3.2293>
- Akyol, Z., & Garrison, D. R. (2008). The development of a Community of Inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks*, 12(3–4), 3–22.
- Akyol, Z., Vaughan, N., & Garrison, D. R. (2011). The impact of course duration on the development of a community of inquiry. *Interactive Learning Environments*, 19(3), 231–246. <https://doi.org/10.1080/10494820902809147>
- Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. (2008). Developing a community of inquiry instrument: Testing a measure of the Community of Inquiry framework using a multi-institutional sample. *Internet and Higher Education*, 11(3–4), 133–136. <https://doi.org/10.1016/j.iheduc.2008.06.003>
- Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID-19. *Journal of Education and E-Learning Research*, 7(3), 285–292.
- Bissessar, C., Black, D., & Boolaky, M. (2020). International online graduate students' perceptions of CoI. *European Journal of Open, Distance and E-Learning*, 23(1), 61–83. <https://doi.org/10.2478/eurodl-2020-0005>
- Brooker, A., Corrin, L., de Barba, P. G., Lodge, J., & Kennedy, G. (2018). A tale of two MOOCs: How student motivation and participation predict learning outcomes in different MOOCs. *Australasian Journal of Educational Technology*, 34(1), 73–87. <https://doi.org/10.14742/ajet.3237>
- Cercone, K. (2008). Characteristics of adult learners with implications for online learning design. *AACE Journal*, 16(2), 137–159.
- Chen, Y., Lei, J., & Cheng, J. (2019). What if online students take on the responsibility: Students' cognitive presence and peer facilitation techniques. *Online Learning*, 23(1), 37–61. <https://doi.org/10.24059/olj.v23i1.1348>
- Cho, M.-H., & Tobias, S. (2016). Should instructors require discussion in online courses? Effects of online discussion on Community of Inquiry, learner time, satisfaction, and achievement. *The International Review of Research in Open and Distributed Learning*, 17(2), 123–140. <https://doi.org/10.19173/irrodl.v17i2.2342>
- Choo, J., Bakir, N., Scagnoli, N. I., Ju, B., & Tong, X. (2020). Using the Community of Inquiry framework to understand students' learning experience in online undergraduate business courses. *TechTrends*, 64(1), 172–181. <https://doi.org/10.1007/s11528-019-00444-9>
- Clark, C., Strudler, N., & Grove, K. (2015). Comparing asynchronous and synchronous video vs. text based discussions in an online teacher education course. *Online Learning*, 19(3), 48–70. <http://dx.doi.org/10.24059/olj.v19i3.668>
- DuBois, B., Krasny, M. E., & Russ, A. (2019). Online professional development for environmental educators: strategies to foster critical thinking and social interactions.

- Environmental Education Research*, 25(10), 1479–1494.
<https://doi.org/10.1080/13504622.2018.1564247>
- Fiock, H. (2020). Designing a community of inquiry in online courses. *The International Review of Research in Open and Distributed Learning*, 21(1), 134–152.
<https://doi.org/10.19173/irrodl.v20i5.3985>
- Galikyan, I., & Admiraal, W. (2019). Students' engagement in asynchronous online discussion: The relationship between cognitive presence, learner prominence, and academic performance. *The Internet and Higher Education*, 43.
<https://doi.org/10.1016/j.iheduc.2019.100692>
- Garrison, D. R. (2003). *E-Learning in the 21st century: A framework for research and practice*. Routledge.
- Garrison, D. R. (2007). Online community of inquiry review: social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, 11(1), 61–72.
<https://doi.org/10.1128/JB.05513-11>
- Garrison, D. R. (2016). *Thinking Collaboratively: Learning in a Community of Inquiry*. Routledge/Taylor & Francis Group.
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, 15(1), 7–23. <https://doi.org/10.1080/08923640109527071>
- Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education*, 13(1–2), 5–9.
<https://doi.org/10.1016/j.iheduc.2009.10.003>
- Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *Internet and Higher Education*, 13(1–2), 31–36.
<https://doi.org/10.1016/j.iheduc.2009.10.002>
- Gašević, D., Adesope, O., Joksimović, S., & Kovanović, V. (2015). Externally-facilitated regulation scaffolding and role assignment to develop cognitive presence in asynchronous online discussions. *The Internet and Higher Education*, 24, 53–65.
<https://doi.org/10.1016/j.iheduc.2014.09.006>
- Gibson, A. M., Ice, P., Mitchell, R., & Kupczynski, L. (2012). An inquiry into relationships between demographic factors and teaching, social, and cognitive presence. *Internet Learning*, 1(1), 7–16.
- Guo, C., Chen, X., & Hou, Y. (2019). A case study of students' participation and knowledge construction in two online discussion settings. *Proceedings of the 2019 4th International Conference on Distance Education and Learning - ICDEL 2019*, 45–49.
<https://doi.org/10.1145/3338147.3338177>
- Gurjar, N. (2020). Reducing transactional distance with synchronous and asynchronous video-based discussions in distance learning. *Proceedings of the SITE 2020 Annual Conference*, 268–272.

- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *EDUCAUSE Review Online*. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- Hsu, H.-C. K., Wang, C. V., & Levesque-Bristol, C. (2019). Reexamining the impact of self-determination theory on learning outcomes in the online learning environment. *Education and Information Technologies*, 24(3), 2159–2174. <https://doi.org/10.1007/s10639-019-09863-w>
- Ice, P., Gibson, A. M., Boston, W., & Becher, D. (2011). An exploration of differences between Community of Inquiry indicators in low and high disenrollment online courses. *Journal of Asynchronous Learning Networks*, 15(2), 44–69.
- Joo, Y. J., Lim, K. Y., & Kim, E. K. (2011). Online university students' satisfaction and persistence: Examining perceived level of presence, usefulness and ease of use as predictors in a structural model. *Computers & Education*, 57(2), 1654–1664. <https://doi.org/10.1016/j.compedu.2011.02.008>
- Junus, K., Suhartanto, H., R-Suradujono, B. S. H., Santoso, H. B., & Sadita, L. (2019). The community of inquiry model training using the cognitive apprenticeship approach to improve students' learning strategy in the asynchronous discussion forum. *The Journal of Educators Online*, 16(1), 1–17. <https://doi.org/10.9743/jeo.2019.16.1.7>
- Ke, F. (2010). Examining online teaching, cognitive, and social presence for adult students. *Computers & Education*, 55(2), 808–820. <https://doi.org/10.1016/j.compedu.2010.03.013>
- Kilis, S., & Yıldırım, Z. (2018). Investigation of community of inquiry framework in regard to self-regulation, metacognition and motivation. *Computers & Education*, 126(June), 53–64. <https://doi.org/10.1016/j.compedu.2018.06.032>
- Kozan, K., & Caskurlu, S. (2018). On the Nth presence for the Community of Inquiry framework. *Computers & Education*, 122(May 2017), 104–118. <https://doi.org/10.1016/j.compedu.2018.03.010>
- Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2014). Community of Inquiry: Social presence revisited. *E-Learning and Digital Media*, 11(1), 5–18. <https://doi.org/10.2304/elea.2014.11.1.5>
- Kucuk, S., & Richardson, J. C. (2019). A structural equation model of predictors of online learners' engagement and satisfaction. *Online Learning*, 23(2), 196–216. <https://doi.org/10.24059/olj.v23i2.1455>
- Kumar, S., Dawson, K., Black, E. W., Cavanaugh, C., & Sessums, C. D. (2011). Applying the community of inquiry framework to an online professional practice doctoral program. *The International Review of Research in Open and Distributed Learning*, 12(6), 126. <https://doi.org/10.19173/irrodl.v12i6.978>
- Leader-Janssen, E. M., Nordness, P. D., Swain, K. D., & Hagaman, J. L. (2016). Students' perceptions of an online graduate program in special education for emotional and behavioral disorders. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 39(4), 246–258. <https://doi.org/10.1177/0888406416637411>

- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *PLoS Medicine*, 6(7), 1–28. <https://doi.org/10.1371/journal.pmed.1000100>
- Lowenthal, P., Borup, J., West, R. E., & Archambault, L. M. (2020). Thinking beyond Zoom: Using asynchronous video to maintain connection and engagement during the COVID-19 Pandemic. *Journal of Technology and Teacher Education*, 28(2), 1–9.
- Lowenthal, P., & Moore, R. L. (2020). Exploring student perceptions of Flipgrid in online courses. *Online Learning*, 24(4), 28–41. <https://doi.org/10.24059/olj.v24i4.2335>
- Masonbrink, A. R., & Hurley, E. (2020). Advocating for children during the COVID-19 school closures. *Pediatrics*, 146(3), 1–4. <https://doi.org/10.1542/peds.2020-1440>
- Molnar, A. L., & Kearney, R. C. (2017). A comparison of cognitive presence in asynchronous and synchronous discussions in an online dental hygiene course. *Journal of Dental Hygiene : JDH*, 91(3), 14–21.
- Moore, R. L. (2014). Importance of developing community in distance education courses. *TechTrends*, 58(2), 20–24. <https://doi.org/10.1007/s11528-014-0733-x>
- Moore, R. L. (2016). Interacting at a distance: Creating engagement in online learning environments. In L. Kyei-Blankson, J. Blankson, E. Ntuli, & C. Agyeman (Eds.), *Handbook of Research on Strategic Management of Interaction, Presence, and Participation in Online Courses* (pp. 401–425). IGI Global. <https://doi.org/10.4018/978-1-4666-9582-5.ch016>
- Moore, R. L. (2019). Welcome to Normalton: Leveraging effective e-learning principles for adult learners. *International Journal of Designs for Learning*, 10(1), 155–165. <https://doi.org/10.14434/ijdl.v10i1.25610>
- Moore, R. L. (2020). Developing lifelong learning with heutagogy: contexts, critiques, and challenges. *Distance Education*, 41(3), 381–401. <https://doi.org/10.1080/01587919.2020.1766949>
- Moore, R. L., Blackmon, S. J., & Markham, J. (2018). Making the connection: Using mobile devices and poll everywhere for experiential learning for adult students. *Journal of Interactive Learning Research*, 29(3), 397–421.
- Moore, R. L., Oliver, K. M., & Wang, C. (2019). Setting the pace: examining cognitive processing in MOOC discussion forums with automatic text analysis. *Interactive Learning Environments*, 27(5–6), 655–669. <https://doi.org/10.1080/10494820.2019.1610453>
- Morueta, R. T., Maraver López, P., Hernando Gómez, Á., & Harris, V. W. (2016). Exploring social and cognitive presences in communities of inquiry to perform higher cognitive tasks. *The Internet and Higher Education*, 31, 122–131. <https://doi.org/10.1016/j.iheduc.2016.07.004>
- Oliver, K. M., Moore, R. L., & Evans, M. A. (2017). Establishing a virtual makerspace for an online graduate course: A design case. *International Journal of Designs for Learning*, 8(1), 112–123. <https://doi.org/10.14434/ijdl.v8i1.22573>
- Oyarzun, B., Martin, F., & Moore, R. L. (2020). Time management matters: Online faculty perceptions of helpfulness of time management strategies. *Distance Education*, 41(1), 106–127. <https://doi.org/10.1080/01587919.2020.1724773>

- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ*, *10*(1), n160. <https://doi.org/10.1136/bmj.n160>
- Patwardhan, V., Rao, S., Thirugnanasambantham, C., & Prabhu, N. (2020). Community of Inquiry (CoI) framework and course design as predictors of satisfaction in emergency remote teaching: Perspectives of hospitality management students. *Journal of E-Learning & Knowledge Society*, *16*(4), 94–103.
- Pillai, R., & Sivathanu, B. (2019). An empirical study on the online learning experience of MOOCs: Indian students' perspective. *International Journal of Educational Management*, *34*(3), 586–609. <https://doi.org/10.1108/IJEM-01-2019-0025>
- Poluekhtova, I. A., Vikhrova, O. Y., & Vartanova, E. L. (2020). Effectiveness of online education for the professional training of journalists: Students' distance learning during the COVID-19 pandemic. *Psychology in Russia. State of the Art*, *13*(4), 26–37.
- Roitsch, J., Moore, R. L., & Horn, A. L. (2021). Lessons learned: What the COVID-19 global pandemic has taught us about teaching, technology, and students with autism spectrum disorder. *Journal of Enabling Technologies*, *15*(2), 108–116. <https://doi.org/10.1108/JET-12-2020-0053>
- Rolim, V., Ferreira, R., Lins, R. D., & Găsević, D. (2019). A network-based analytic approach to uncovering the relationship between social and cognitive presences in communities of inquiry. *The Internet and Higher Education*, *42*, 53–65. <https://doi.org/10.1016/j.iheduc.2019.05.001>
- Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *International Journal of E-Learning & Distance Education*, *14*(2), 50–71. <http://www.ijede.ca/index.php/jde/article/viewArticle/153/341>
- Saadatmand, M., Uhlin, L., Hedberg, M., Åbjörnsson, L., & Kvarnström, M. (2017). Examining learners' interaction in an open online course through the community of inquiry framework. *European Journal of Open, Distance and E-Learning*, *20*(1), 61–79. <https://doi.org/10.1515/eurodl-2017-0004>
- Saçak, B., & Kavun, N. (2020). Rethinking Flipgrid and VoiceThread in the context of online collaborative learning theory. In E. Alqurashi (Ed.), *Handbook of Research on Fostering Student Engagement With Instructional Technology in Higher Education* (pp. 211–228). IGI Global. <https://doi.org/10.4018/978-1-7998-0119-1.ch012>
- Sadaf, A., & Olesova, L. (2017). Enhancing cognitive presence in online case discussions with questions based on the Practical Inquiry Model. *American Journal of Distance Education*, *31*(1), 56–69. <https://doi.org/10.1080/08923647.2017.1267525>
- Sadaf, A., Wu, T., & Martin, F. (2021). Cognitive presence in online learning: A systematic review of empirical research from 2000 to 2019. *Computers and Education Open*, *2*, Advance online publication. <https://doi.org/10.1016/j.caeo.2021.100050>
- Sağlam, A. L. G., & Dikilitaş, K. (2020). Evaluating an online professional learning community as a context for professional development in classroom-based research. *The Electronic Journal for English as a Second Language*, *24*(3), 1–17.

- Schrire, S. (2004). Interaction and cognition in asynchronous computer conferencing. *Instructional Science*, 32(6), 475–502.
- Schuck, R. K., & Lambert, R. (2020). “Am I doing enough?” Special educators’ experiences with emergency remote teaching in spring 2020. *Education Sciences*, 10(11), 1–15. <https://doi.org/10.3390/educsci10110320>
- Seckman, C. (2018). Impact of interactive video communication versus text-based feedback on teaching, social, and cognitive presence in online learning communities. *Nurse Educator*, 43(1), 18–22. <https://doi.org/10.1097/NNE.0000000000000448>
- Shea, P., & Bidjerano, T. (2008). Measures of quality in online education: An investigation of the community of inquiry model and the net generation. *Journal of Educational Computing Research*, 39(4), 339–361. <https://doi.org/10.2190/EC.39.4.b>
- Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster “epistemic engagement” and “cognitive presence” in online education. *Computers & Education*, 52(3), 543–553. <https://doi.org/10.1016/j.compedu.2008.10.007>
- Shea, P., Hayes, S., Vickers, J., Gozza-Cohen, M., Uzuner, S., Mehta, R., Valchova, A., & Rangan, P. (2010). A re-examination of the community of inquiry framework: Social network and content analysis. *The Internet and Higher Education*, 13(1–2), 10–21. <https://doi.org/10.1016/j.iheduc.2009.11.002>
- Shea, P., Sau Li, C., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *Internet and Higher Education*, 9(3), 175–190. <https://doi.org/10.1016/j.iheduc.2006.06.005>
- Song, M., & Yuan, R. (2015). Beyond social presence: Increasing cognitive presence through meaningful interaction. *Global Learn 2015*, 731–736.
- Stenbom, S. (2018). A systematic review of the Community of Inquiry survey. *The Internet and Higher Education*, 39(June), 22–32. <https://doi.org/10.1016/j.iheduc.2018.06.001>
- Stenbom, S., Jansson, M., & Hulkko, A. (2016). Revising the community of inquiry framework for the analysis of one-to-one online learning relationships. *International Review of Research in Open and Distance Learning*, 17(3), 36–53. <https://doi.org/10.19173/irrodl.v17i3.2068>
- Swan, K., Richardson, J. C., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-Mentor*, 2(2), 1–12.