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EXAMINING RELATIONSHIPS BETWEEN STUDENT PERCEPTIONS OF COMMUNITY OF INQUIRY AS A PREDICTOR OF COGNITIVE AND BEHAVIORAL ENGAGEMENT MEDIATED BY SELF-EFFICACY

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A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

BY THE COMMITTEE CONSISTING OF

Dr. Theresa Cullen, Chair

Dr. Sara Beach

Dr. Michael Howard Crowson

Dr. Teresa DeBacker

Dr. Ji Hong

Abstract

Online learning was growing in demand prior to the COVID-19 pandemic. However, due to the pandemic, more are seeing the need to increase the understanding of design strategies that improve student experiences. This study hypothesized a relationship between the Community of Inquiry (CoI) framework, representing the design strategies for learning effectiveness in online courses, and cognitive and behavioral engagement with student self-efficacy as a mediating variable between the constructs of CoI and cognitive engagement. Participants for this study were undergraduate students enrolled in an online course from universities all over the United States. The study used a hypothesized model and path analysis. While the model was a poor fit for the data, results of this study indicate a significant positive relationship between cognitive presence and cognitive engagement, cognitive presence and self-efficacy, teacher presence and behavioral engagement, and social presence and behavioral engagement. Results of this study suggest design strategies specifically related to the constructs in Community of Inquiry will have a positive impact on cognitive and behavioral engagement. However, it was found that self-efficacy did not play a mediating role between CoI and cognitive engagement.

Keywords: Community of Inquiry, online learning, online education, student self-efficacy, learning effectiveness, student engagement, cognitive engagement, behavioral engagement, cognitive presence, social presence, teaching presence

Dedication

I am dedicating this work to my writing supervisors, Turbo and Harley. Turbo, you've put in 11 years of service to this project. I appreciate your patience, dedication, and loyalty. Harley, while you've only been a part of this project for three years, you've kept me on track and made sure I put the work in, even falling asleep next to me on late writing nights. Thank you both. Lastly, this work is dedicated to my husband, Travis, whose name should be equally printed on the title page and diploma. Travis, you've been such a massive part of this journey, from waiting in the parking lot while I took night classes, to going with me to testing in other cities and states, to driving me to my proposal defense when we both had the flu. We've joked that the story of our lives so far has been you waiting for me in a parking lot, but it's a small representation of the support, love, and dedication you have shown me throughout this journey. I hope one day I can equally return the favor. I absolutely could not have done it without you.

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I would also like to acknowledge my family, for their never-ending support and guidance. Each of my family members has exemplified and taught me the characteristics I needed for success in my academic program and career. My father, Pat, is easily the smartest, most accomplished person I know, and yet the number one characteristic he taught me is humility. My mother, Jo, has also gifted me with many positive characteristics. She has taught me about strength of character and to always advocate for myself and my pursuits. My grandmother, Kathy, served as my copyeditor (free of charge!) throughout my academic career and was my inspiration for pursuing my Master's degree and later my Ph.D. She's taught me about drive and perseverance. My grandfather, Kenny, has supported me in everything that I've done and has taught me about hard work and work ethic.

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Chapter 1: Introduction

Online education is a prevalent and growing educational practice in higher education (Allen, Seaman, Poulin, & Straut, 2016). There is a great deal of research comparing online education's effectiveness to the effectiveness of face-to-face education (Anderson, 2008; Clinefelter & Aslanian, 2017; Allen, Mabry, Mattrey, Bourhis, Titsworth, & Burrell, 2004; Means, Toyama, Murphy, & Baki 2013). However, researchers have found that online education versus face-to-face isn't necessarily a matter of effectiveness; rather, it is a matter of a student's preference (Clinefelter & Aslanian, 2017). Students and institution leaders are demanding online education options, and there has been significant growth in online course offerings over the past few years (Allen & Seaman, 2013; Allen, Seaman, Poulin, & Straut, 2016; Clinefelter & Aslanian, 2017). Knowing that there are a large number of students that prefer online education (Clinefelter & Aslanian, 2017), it is important to examine the quality of online education and understand instructional strategies specific to that context rather than focus on comparing it to face-to-face contexts.

Instructional strategies need to address the target learner population, in this case, undergraduate education. Undergraduate students make up the largest percentage (83%) of students taking online courses (Allen et al., 2016). The Commission on the Future of Undergraduate Education (2017) created a report to capture three years of meetings and surveys of a multitude of stakeholders in higher education. The report outlines priorities in addressing the future of undergraduate education including strengthening the student educational experience, increasing completion, and controlling costs. In a climate of low enrollment and budget cuts, higher education administrators have a responsibility to direct their institutions in a way that addresses a variety of these and other important needs. In making these decisions, instructional

technologists and other stakeholders have to provide recommendations that can support the needs of administrators. Administrators are already using online education as a way of meeting the needs of students and of the university (Kelderman, 2018). It is possible that high-quality online offerings can increase enrollment and decrease costs for institutions. Moreover, when this study was originally proposed, the concern was high quality online education due to the preference of students and increase of demand. However, as this study was in its final stages, we have seen online education in a very different place with the COVID-19 pandemic. Now, it is more than just a need to understand how to provide high quality learning for students that prefer online education options; there is now a need to understand how to provide positive learning experiences for students that have no other choice due to the pandemic.

Problem Statement

If there is a push for more online offerings with a concern for quality and a need to understand practices to support student outcomes and satisfaction, then there is a need to expand the understanding of all aspects of learning effectiveness in an online learning context for undergraduate education to inform instructional decision making and teacher development. This chapter discusses what it means to understand learning effectiveness in online learning, the significance of online education and learning effectiveness concerns, and the research focus and conceptual framework for this study.

Online, traditional, and blended or hybrid educational formats will and should be offered to meet the demands and needs of a diverse student population. Ultimately, the decision comes back to financial and enrollment concerns; however, students should be offered choices in their learning format and each of those should be providing the students with the best that format has to offer. Research foci in online education needs to turn to what makes learning effective in

online education. The primary concern in research when it comes to understanding the effectiveness of online education originates from the question of interaction. Arguments that face-to-face education is more effective, or just a concern about whether or not online education is effective, comes down to interaction. It is assumed that because students in a face-to-face class are seeing their instructor and seeing other students, there is more interaction, and therefore learning effectiveness.

Traditional, face-to-face teaching practices have years of research, and those practices often overlap with online education. The assumption maybe that in a face-to-face course there is more interaction and therefore more learning. However, are learning and interaction the same thing? To understand the direction of research in online education means to examine how we understand interaction in a learning context and the unique characteristics of online learning. It is important to note here, that online delivery can occur in two time settings, which can affect the interactions in the class: asynchronous and synchronous. Asynchronous online education occurs when students and teachers can access and use the course content without time or place restrictions (Simonson, Smaldino, & Zvacek, 2015; Vai & Sosulski, 2016). Conversely, synchronous online education occurs at the same time, but not face-to-face (Vai & Sosulski, 2016). This is achieved through text-based communication, such as discussion boards, or through video conferencing communication (Giesbers et al., 2014).

Interaction

While interaction in online learning can be applied to many types of interaction, such as student interaction with the content, this section specifically focuses on interaction between students and student-teacher interaction that facilitates higher order thinking when engaging with the content of the course. Assuming that face-to-face instruction is more interactive than online

learning and leads to more effective learning is an overly generalized assumption. Unfortunately, there are more than enough instances of face-to-face classes in which an instructor is inaccessible, and a student might not speak to anyone in the class the entire semester (Thompson, 2017). Similarly, there are experiences of group work in an online class in which there is significant interaction but little perception of learning or student satisfaction. Therefore, it cannot be assumed that interaction is equivalent to learning effectiveness. If interaction is not equivalent to learning effectiveness, then it is important to explore the unique attributes of online education learning in order to better understand how to create online learning effectiveness with interaction being one contributor.

What would be the need of researching or understanding online education if educators could simply use the same practices they employ in traditional education? For example, constructivist research says it is important to understand the prior knowledge of students in order to appropriately scaffold instruction (i.e. Bada & Olusgen, 2015). This is an appropriate teaching technique for face-to-face, online, and blended education. The essential factor that can confound this approach is the difference in the medium in both teaching and material delivery. What might occur in a face-to-face classroom, such as an instructor asking everyone to list and discuss what they know about a class on the first day, can easily be translated into an online context. Moreover, even verbal communication and teaching techniques such as lecturing techniques, using presentation tools, small group communication, and discussion facilitation will follow the same rules in a synchronous video chat.

Even technology-focused teaching techniques such as media creation and web technology integration such as collaboration tools (e.g. Google Docs, whiteboard tools, student created blogs) would not be different for online versus a face-to-face context. Moreover, there is a need

to identify best practices that fall outside of traditional teaching and learning in order to improve how college professors are prepared to teach undergraduates in all modalities. The following are the drilled down differences between online and face-to-face that would need to be understood in terms of learning effectiveness for online education: asynchronous communication, written communication, teacher immediacy or "in the moment teaching" in online learning, and a need for self-directed learning.

Asynchronous communication is probably the most obvious difference between face-to-face and online education (Kreijns, Van Acker, Vermeulen, Van Buuren, 2014), although some instructors might try to reduce this instance through online activities that require synchronous communication such as video chat or a discussion post to occur at a certain time. Regardless, asynchronous communication is still a widely prevalent aspect of online education, generally seen in the form of discussion forums and instructor announcements (Kreijns et al., 2014).

Online education depends heavily on written communication, both from the instructor and the student. Special attention should be paid to how to communicate effectively through writing, as well as when it would be better to create a video or hold a video conference if written communication isn't enough to help students. Moreover, it is important to consider how instructors can provide students with choice when it comes to providing communication either written or verbal, such as using an audio or video feedback tool on assignments (Ice, Curtis, Phillips, Wells, 2007; Watt, Walther, & Nowak, 2002). This requires a greater level of intentionality on the part of the instructor as opposed to a face-to-face teaching in which students are inherently given the choice in these communication methods. Further, written communication is likely the primary method for course discussion, requiring that the instructor

provide essential guidelines to students about how to use written communication in a discussion board in an effective way for learning.

One of the more obvious differences, and possibly a disadvantage of online learning is the lack of teacher immediacy or “in the moment teaching”. Although this author wouldn’t argue that there is a total lack of this opportunity, it is far easier to facilitate in a face-to-face class than in an asynchronous online course. Online learning requires instructors to anticipate questions, miscommunications, and problems to a greater extent than in face-to-face instruction. There is no way to know if a student is confused or having trouble in the same way a confused look communicates this need in a face-to-face course (Ice et al., 2007; Anderson et al., 2001). Educators have to be incredibly proactive in providing support, reaching out to students, and giving students an opportunity to provide feedback at any time in their studies (Richardson & Swan, 2003).

In addition to the complexities of teaching discipline-specific content online, instructors also have the unique challenge of scaffolding self-directed learning in an online context. Some students might be used to the accountability and sometimes passive nature of sitting in a classroom and “receiving information”; however, this type of consistency and routine does not inherently exist in an online classroom. Online learning requires a level of self-directed learning skills (Kim, Olfman, Ryan, & Eryilmaz, 2014), and stakeholders in online education cannot be complacent in their assumptions about how much of these skills students bring to the course. Therefore, intentional structuring must occur within the design and facilitation of an online class in order to help students develop and hone their self-directed learning skills in the online course (Kim, et al., 2014). For example, an instructor might create scaffolding to support students in being successful on an exam. The structure devices might be a study guide accompanied by

discussion posts that center around discussion guide items. The instructor might create study groups or require students to create their own, be it virtual or face-to-face. The instructor might also create a checklist for exam success and have the students create schedules for how and when they are going to study for the exam.

In addition to the unique attributes of online learning, it is important to pay attention to the type of student and the level of the online course. For example, a graduate student trying to finish a degree is more likely to have the motivation and study skills necessary to be successful in an online course (Cao, 2012; Artino & Stephens, 2009). As graduate students, they might also have had experience with online courses in the past. However, universities offer online courses to undergraduate students as well, and this population of students is vastly different from the graduate student population. Much of the literature cited in online education research has been focused on graduate students. However, approximately 83% of all students taking at least one online course are undergraduates, and 73% of those undergraduates are taking their courses at a public institution (Allen et al., 2016). The large number of online undergraduate students enrolled at public institutions may be due to the fact that public colleges attempt to integrate online courses as part of the learning environment option for both on and off campus students (Allen et al., 2016).

Typical undergraduate students have less college experience and less sophisticated study strategies than graduate students (Cao, 2012). Therefore, undergraduate and graduate students should be viewed in research as different types of learners and may require different approaches to learning design. First, an undergraduate online class might be a lower-level class that is offered to offset large classrooms and physical space needs. Therefore, it might be assumed that more first-year undergraduate students have little to no online learning experience (Artino &

Stephens, 2009). Second, undergraduate students are new to the college experience and are less likely to know where to seek out resources or what might be available (Bunn, 2004). Instructors have to consider scaffolding basic college understanding in these courses such as writing centers, tutoring, and library services (Bunn, 2004; Artino & Stephens, 2009). Moreover, teacher evaluation will be based on the perceptions of students regarding the design and faculty engagement in online learning, and using a framework for thoughtful student focused design may improve their overall perception. These concerns of learning effectiveness and designing to a target learner population become more amplified when considering the growing changes in higher education and the demands for online course offerings.

Significance of the Problem

Education and the demands on education as we know it are changing dramatically (Turbot, 2017; Heick, 2017). We can look to technological advances (Heick, 2017), economic changes such as financial changes in colleges and universities (Green, 2018), workforce changes that demand higher levels of education (Goldstein, 2018), and learner preferences (Seaman, Allen, & Seaman, 2018; Allen & Seaman, 2017) as potential contributing factors towards the change in education. As education changes, stakeholders will play an important role in what education means for the 21st century (Jaschik & Lederman, 2018).

Online education continues to be one of the more prevalent changes in how institutions are thinking about course offerings and learning environments (Jaschik & Lederman, 2018). In 2012, a total of 4,559,494 undergraduate students were taking at least one online course; by 2016 5,253,997 undergraduate students were taking at least one online course (Seaman, Allen, & Seaman, 2018). Therefore, in order to understand the significance of research in online education, it is important to understand the stakeholders that play a role in how online education

is chosen, implemented, facilitated, and even used. However, because the students are the users and consumers of online education it seems most appropriate to start with the most important of the stakeholders: the student.

Although many factors and stakeholders will influence the overall decision making, implementation, design, and facilitation of an online course, the author would argue the most important stakeholder is the student—in particular, the learning needs of the student. More students are requesting online education offerings from their institutions (Seaman, Allen, & Seaman, 2018; Allen & Seaman, 2017). Therefore, other stakeholders need to take into consideration the students' goals in continuing their education. A student's goal may be to finish a degree or obtain new skills for a job promotion (Clinfelter & Aslanian, 2017). Many times, students see online education as their only option because of work and family commitments. (Allen, Seaman, Poulman, & Straut, 2016). Even traditional students are choosing online to help balance work, extracurricular activities, and heavy course loads (Clinefelter & Aslanian, 2017). Traditional students between the ages of 18-22 may have underdeveloped time management skills and no online learning experience (Lawanto, Santoso, Lawanto, & Goodridge, 2017). This is something that will need to be considered when designing online courses.

The instructor's role in an online education course will vary by institution and program. This variance is due to the choices in who is designing the instructional materials for the course, who is making decisions on the scope and sequencing, and who is facilitating the course as well as to what degree they have control over changing the course (Heuer & King 2004; Easton, 2003). Some institutions can afford to buy instructional materials appropriate for online learning or hire instructional designers to create courses. Some scenarios of online learning offerings

involve one instructor creating a template or master course that is shared with the other instructors of the course.

Administrators could be anyone from a research university president to the chair of a department at a community college. Understanding learning effectiveness in online learning can affect these decisions whether the context is a large university or a small community college. Administrators will be concerned about the economic and efficiency benefits of online education (Newton, 2018). Depending on the level of administration, implementation and structure is another important consideration. In general, administrators have pushed for online education programs due to the enrollment demand and flexibility in meeting enrollment needs (Newton, 2018). While there is debate about whether or not online education is more financially beneficial for an institution (Haynie, 2014), the enrollment benefits outweigh any possible cost (Newton, 2018).

Over the years online education has seen a dramatic increase in course offerings, enrollment, and demand for more courses (Allen & Seaman, 2018; Allen et al., 2016) . Therefore, due to the demand and the various stakeholders, it is important to understand the learning effectiveness of online education. Evaluating online education, through rubrics such as Quality Matters (2018), has become a common practice in higher education institutions. However, a rubric might not paint the full picture of learning effectiveness in a course, focusing mostly on the design of course materials at the start of the course while not taking into account the experiences of students throughout the course, which include peer dynamics and instructor facilitation. As stakeholders in online education seek to understand learning effectiveness in online course offerings, they will need to consider a research framework that addresses the

unique attributes of online learning as well as structures that take learner preference and the target learning audience into account.

Research Foci and Conceptual Framework

In 1999, the Community of Inquiry (CoI) framework was developed to explore cognitive, social, and teaching presence in online education to facilitate higher order thinking skills (Garrison et al.). Cognitive presence refers to deep learning in a course; social presence refers to student-student interaction and engaged conversation; and teaching presence refers to the design, facilitation, and direction of the online course. Seminal studies in Community of Inquiry research were conducted on two graduate-level online courses (Anderson et al., 2001; Rourke et al., 1999).

There are limitations in the current research in CoI: (1) Few studies focus on undergraduate education. (2) Most studies focus on information technology content areas; more research is needed to understand the impact of the different elements of CoI in other disciplines. (3) Some research does not explicitly identify the format of the online course (i.e. online only, blended, or computer supported face-to-face course), only that communication happened through computer mediated conferencing. Therefore, further research is needed in undergraduate online education to expand upon the applicability and generalizability of the Community of Inquiry framework.

Some studies have started the process of expanding in this area; however, they also have their limitations. Shea & Bidjerano (2009) surveyed more than 2,000 college students at the undergraduate and graduate level; however, the data was not separated by these classifications, so the predictor of a particular construct or sub construct specific to undergraduate students is unknown. Arbaugh, Bangert, and Cleveland-Innes (2010) found discipline-specific differences of

CoI in their study across seven disciplines and two institutions (n=1500). Researchers found higher perceptions of CoI in what they define as applied disciplines (such as human resources or business ethics courses) versus lower perceptions of CoI in pure disciplines focused on knowledge acquisition (such as accounting).

The category of design and organization (or instructional design) is a process that takes place well before the start of the course and then proceeds to adapt throughout the course to better the environment for that particular learner group. Anderson et al. (2001) believed this to be a limitation in their study in teaching presence. The data collected in their study only reflects observations in the transcripts, not the "behind the scenes" decision making. Research in this area should be expanded to understand the decisions educators intentionally make to facilitate cognitive and social presence in an online class.

Garrison (2003) mentions in his article that more emphasis in research needs to be on cognitive presence. Since the publication of that article, several studies focus on the cognitive presence element of CoI. However, because the elements of CoI are interrelated, and all are required for learning effectiveness, it is difficult to separate CoI as the connectivity is essential to the reflective inquiry process (Garrison, 2003).

There is also the potential for additional subconstructs of the CoI framework to be discovered in extensive undergraduate online education research. Given the differences in undergraduate student and graduate student characteristics, the constructs need to be specifically examined for undergraduate students. Research in this area would need to also focus on the potential for a change in the emphasis of certain subconstructs from graduate to undergraduate education.

The framework includes three interrelated constructs: cognitive presence, social presence, and teaching presence. Cognitive presence refers to the internal and external processes that occur in higher order learning. Garrison (2003) argues that cognitive presence can be measured through a model he calls practical inquiry, a four stage process that illustrates reflection through internal and external processes. Practical inquiry (sometimes used interchangeably with cognitive presence) starts with a triggering event (external process), then exploration (internal process), integration (internal process), and finally resolution (external process). Garrison and Anderson (2003) argue that the external processes occur through collaboration and discourse while the internal processes occur through personal reflection, making an online learning environment an ideal environment for fostering cognitive 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.,1999 p. 89). Teaching presence includes both the design of the course as well as how the course is facilitated (Garrison et al., 2000).

The community of inquiry seeks to capture an understanding of students' perceptions of community in an online course; however, there are other factors that can influence students' experiences in a course and the decisions they make. According to Bandura (1977), self-efficacy predicts behavior, effort, and persistence towards a particular task. He further argues that persevering through mastery activities will increase self-efficacy. Self-efficacy comes from four main sources of information "performance accomplishments, vicarious experiences, verbal persuasion, and physiological states" (Bandura, 1977, p.191). However, self-efficacy in regard to a task will be different depending on how much one trusts that source of information. Bandura (1977) argues that people make behavioral changes based on how they perceive the success of a

particular event. Therefore, if a person believes he/she did not do well at something (even if he/she did fine) then the person will make a choice to behave differently or the same based on that perception. Our perceptions and judgments might not accurately reflect the actual results of the task. Therefore, in order for researchers to understand how to create a change in behavior, they have to understand a person's expectations in approaching a given task. However, personal judgments can also serve us in helping to set and persist in goals and goal setting. Individuals will use their personal judgments (now personal standards) as an evaluative tool in goal setting and achievement (Bandura, 1977). Therefore, the goals a person creates can tell us about their self-efficacy.

Ultimately, educators and other stakeholders are interested in the degree that students participate in a course to know how effectively the course has been designed. Therefore, engagement, both cognitive and behavioral, are examined to understand how the other theoretical constructs (community of inquiry and self-efficacy) influence these factors. While behavioral engagement examines the amount of participation in an online course, cognitive engagement seeks to identify the quality of engagement in a course (Ben-Eliyahu, Moore, Dorph, & Schunn, 2018).

Research Questions

Due to the demand of online education (Allen & Seaman, 2013; Allen, Seaman, Poulin, & Straut, 2016; Clinefelter & Aslanian, 2017) and the lack of research in both undergraduate online education and learning effectiveness in online education, it is important to explore research questions that add to these areas of online education in order to better understand the factors that aid in both the facilitation and design of online education. This study explores the following research questions, which connect the conceptual framework with overarching

concerns of learning effectiveness specific to the unique attributes of online learning and how the target learner population (undergraduate online students) (undergraduate online students) might change the emphasis on certain aspects of design and facilitation of online courses in the following model:

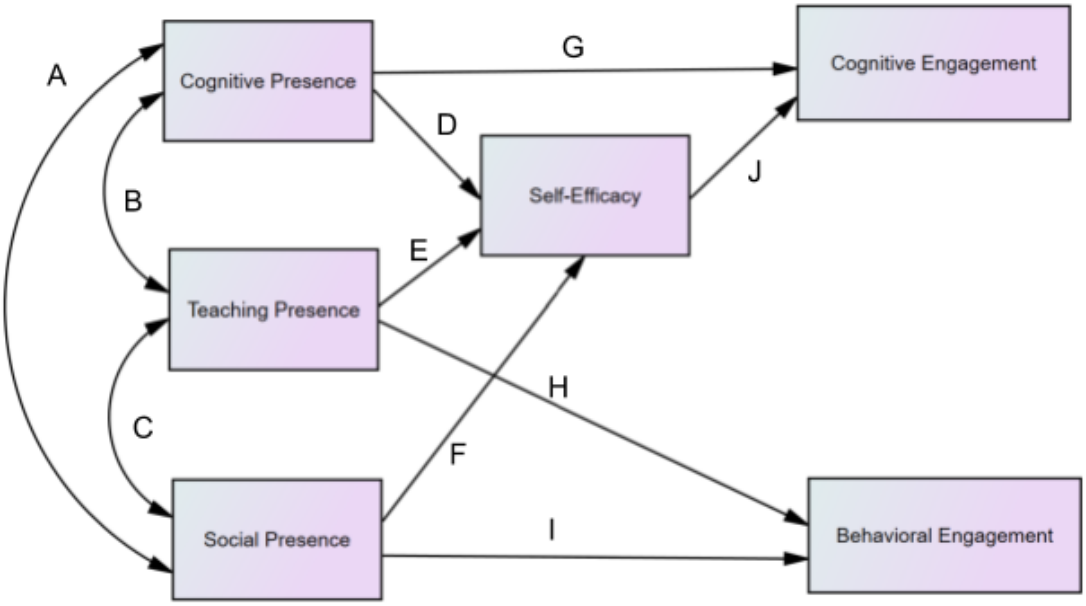

Figure 1.1 Path Diagram of Hypothesized Model 1

Research Questions

1. To what extent do undergraduate students' perception of the factors of Community of Inquiry predict cognitive and behavioral engagement?
2. To what extent do undergraduate students' self-efficacy act as a mediator between student perceptions of cognitive presence, teaching presence, social presence, and cognitive engagement?
3. What factor of Community of Inquiry predicts cognitive engagement the most?
4. What factor of Community of Inquiry predicts behavioral engagement the most?

Chapter 2: Literature Review

Learning Theories Overview

While there are learning theories specific to online learning, the task of understanding online learning requires starting with understanding the learning theories that preceded the development of online learning. Effective teaching and learning starts with the effective application of practices founded upon learning theories. Moreover, one must understand the origins of learning theories to see how these theories provide a foundation for understanding online learning.

It does not matter where learning occurs, face to face or online; basic tenets of learning theory and instructional design still apply. In order to understand the learning that occurs in an online environment, one must first understand the theoretical foundations of learning research and approach. Behaviorism was followed by cognitivism, enhanced by technology and medical advancements allowing researchers to essentially peer into the minds of their subjects through MRI technology. Constructivism and constructionism became a natural evolution from cognitivism, with constructs such as social cognitivism serving as a bridge between the frameworks. Both conceptual frameworks, constructivism and constructionism, have philosophical underpinnings centered around social connections, meaning-making, and reflective dialogue. These learning theories underpin features of the Community of Inquiry framework and help to explain the complexity of the interactions of its components.

Initial research in behaviorism was conducted on both animals and humans. However, humans added an extra element that behaviorism did not address—cognition. While behaviorism

has more to do with unconscious reactions, cognitivism seeks to address how people learn through cognitive processes (thinking). Psychologists such as Jean Piaget wanted to know how humans learn throughout their lifetimes and how cognition develops over time. His theories in developmental psychology are still used today. Cognitive learning theories can be grouped into several categories including (but not limited to) those that focus on processes of attention, memory, transfer, and social influences on learning (Bransford, Brown, & Cocking, 2000; Anderson, 2015).

Other research in cognition has focused on the social and personal elements of cognition (Bransford, Brown, & Cocking, 2000; Anderson, 2015). Researchers wanted to address learners' prior experience in a subject area. Learners do not enter into a learning environment as blank slates; they typically have some level of assumption or prior experience with a subject also known as prior knowledge. Prior knowledge became a big consideration in cognitivism, as well as how students make connections between prior knowledge and the new knowledge or skill they are learning (Bransford, Brown, & Cocking, 2000; Anderson, 2015). Starting with social cognitive theory, originated by Albert Bandura (1977), research in learning began to take motivation and social interaction into account to explain the factors of the learning process. The concept of adding in human interaction began a new movement in learning research.

Both constructivism and constructionism address the social and motivational aspects of learning theory (Ormrod, 2012; Steffe & Gale, 1995). Both are philosophical stances that have connections with cognitivist theory and research (Ormrod, 2012). In fact, some theories sit on the gray line between cognition and constructivist approaches. For example, psychologists Lave and Wenger's (1991) situated cognition theory addresses both cognition issues of transfer in cognition as well as the social and meaning-making aspects of constructivism.

Constructivism stems from the works of psychologists John Dewey and Jean Piaget, which focus on the development and learning process of a human in direct connection with those that are within that human's personal vicinity (Steffe & Gale, 1995). In constructivism, humans learn by observing and communicating with others. Constructivism has several pedagogical approaches such as experiential learning, anchored instruction, and authentic learning. It's argued that experiential learning, or learning by doing and experiencing, is more impactful, and the skills are retained better than studying how to do something in a book but never actually doing it (Kolb, 1984). All of the mentioned approaches put an emphasis on doing and context specifically in relation to social interaction when developing effective learning experiences.

Similarly, a constructionist approach focuses on meaning-making from an entirely student-centered approach (Steffe & Gale, 1995). Pedagogical approaches include project and discovery-based learning. Again, the emphasis is on doing and context, although constructionism doesn't necessarily emphasize the need for social interaction in learning. Constructionism focuses on helping students build mental models (also a cognitive approach) which allow them to critically evaluate situations and problems (Steffe & Gale, 1995).

These theories have provided the foundation of teaching and learning research and theory regardless of format (face-to-face, online, or blended/hybrid). Next, it is important to understand a little bit of the history of online learning to better appreciate how foundational learning theories tie into understanding learning effectiveness in an online context.

A Brief History of Online Learning

The history of distance education, which includes online learning, can be traced back well before the advent of the Internet or modern communication technology. Distance education started as early as the 17th century in the form of correspondence courses, also referred to as

extension courses (Dabbagh & Bannan-Ritland, 2005; Casey, 2008; Siemens, Gaševič, & Dawson, 2015). Typically in these courses (not unlike many traditional face-to-face courses) the student was very teacher-dependent in identifying the scope, sequence, and objectives in the course, and the student was required to complete guided readings and tests (Dabbagh & Bannan-Ritland, 2005; Siemens, Gaševič, & Dawson, 2015). The degree of student independence and autonomy is still a factor in all learning environments, be they traditional or face-to-face (Dabbagh & Bannan-Ritland, 2005).

Radio and television provided another avenue of information dissemination as technology evolved (Siemens, Gaševič, & Dawson, 2015). Lectures were given over radio broadcasts (Siemens, Gaševič, & Dawson, 2015), and the advent of college based radio stations arose in the early 1920s (Casey, 2008). Contributing factors to the growth of distance education include the need for geographic flexibility, the growing demand for higher education, and advances in technology (Casey, 2008). Many of these options are being revisited to provide public education options to households without the internet. In fact, Mexico is providing both television and radio school options for students that don't have internet or television respectively (Rivers, Suarez, & Gallón, 2020). By 1964, distance education had grown so much in popularity that colleges were investigating best practices and instructional strategies for the learning environment (Casey, 2008). However, many point out that regardless of these advances, students still experienced a lack of motivation and disconnection from the learning community (Dabbagh & Bannan-Ritland, 2005). By the 1980s, the popularity of distance education was catalyzed by businesses looking to implement training without the hindrance of employee location (Casey, 2008).

Also referred to as computer-assisted instruction, distance education involving the use of telecommunication technology began as early as the 1960s; however, the rise in popularity didn't

start at a large scale until the introduction of the World Wide Web in the 1980s (Rudestam & Schoenholtz-Read, 2010; Casey 2008; Harasim, 2000; Siemens, Gaševič, & Dawson, 2015). By the 1980s, networked computing made its way into the K12 classroom, and some of the first research in online education began by evaluating electronic pen pals in the development of K12 student writing (Harasim, 2000). Some of the first learning management systems (i.e. WebCT, Blackboard, Desire to Learn, etc.) were also instrumental in this growth, creating a space for teachers to organize and facilitate instruction; until now most schools offer some form of virtual instruction (Casey, 2008). Although undergraduate and graduate courses have been offered fully online since the 1980s (Harasim, 2000), there is still much to understand regarding learning in an online environment.

Current Theories, Frameworks, and Models in Online Learning

Current theories and models in online learning have had less of a linear and scaffolded approach compared to the major commonly accepted theories in learning. Teaching online requires a significantly different set of skills, as well as pedagogical understanding, than teaching a course face-to-face (Baran, Correia, & Thompson, 2013). Although the foundations of learning still apply, the approach must be different due to the difference in the learning environment.

It seems that many researchers in online education have attempted to develop their own theories or models that explain or prescribe practices for online learning effectiveness (see Chickering & Gamson, 1987; Siemens, 2004; Anderson, 2008; Picciano, 2017; Barab, Kling, & Gray; 2004; Garrison et al., 2001). Unfortunately, many of these theories or models have not had significant followings, and little substantial research exists to continue to support the effectiveness or validity of such theories. Moreover, when authors elaborate on these theories or models, little is done to specifically address the unique attributes of online learning. The

following sections of this document will review the major theories, specifically focusing on the ones that contribute to the theoretical focus of this study: the Community of Inquiry.

Seven Principles Of Good Practice

In 1996, Chickering and Ehrmann expanded upon Chickering and Gamson's (1987) original synthesis of research in teaching practices in undergraduate education to apply the principles to online education. Chickering and Ehrman (1996) argue good principles include encouraging "contact between students and faculty," developing "reciprocity and cooperation among students," using "active learning techniques," giving "prompt feedback," emphasizing "time on task," communicating "high expectations," and respecting "diverse talents and ways of learning" (pp. 5-6). These practices have been identified as practices used by successful online educators in many empirical studies. However, when examining this model, one can see that in general, these are good practices for teaching yet do not address the specific attributes of online learning. One can see the influences of some of these practices in the Community of Inquiry as they transition into the unique attributes of online learning such as "contact between students and faculty" and "reciprocity and cooperation among students" in the subconstructs of CoI, teaching and social presence.

Online Learning Communities

Barab, Kling, and Gray (2004), critiquing the design and pedagogical differences between group collaboration and learning communities, established a framework for creating and sustaining virtual learning communities. The majority of learning designers tend to focus on the content and interaction within a course, but not necessarily on how a course is facilitating community and learning through socializing (Barab et al., 2004; Barab, Schatz, & Scheckler, 2004). It is important to note here, the framework of "online learning communities" examines all

online communities that serve any information distribution function and discussion forums exclusively (such as wikis or web forums such as reddit), meaning that it doesn't serve as an appropriate tool for understanding holistic factors in both motivation and design characteristics for specific learning environments. Research in online learning communities has focused primarily on organic virtual communities, workplace-centered communities (Ardichvili, 2008), and professional development communities—specifically those in education (Barab, Schatz, & Scheckler, 2004; Tang & Lam, 2014; Barab, Thomas, & Merrill, 2001). This work acknowledged the importance of social presence and connections in online learning design. We will see more specifics of social presence for online learning design in the Community of Inquiry.

Computer-Supported Collaborative Learning

Computer-Supported Collaborative Learning (CSCL) is a collection of research that focuses on group dynamics and learning in online education through the support of technology, and unlike many other areas of online learning research, CSCL has an expansive history of research and multiple areas of foci (see Zheng, Huang, & Yu, 2014; Sung, Yang, & Lee, 2017; Lee, O'Donnel, & Rogat, 2015; Reis, et al., 2018; Sadeghi & Kardan, 2016). CSCL clearly follows constructivist principles of learning as it is focused on knowledge sharing and creation (Sung, Yan, & Lee, 2017). Essentially, this scope of research is quite broad as it focuses on how people learn in groups with the aid of technology, and the context of research can range from traditional face-to-face classroom teaching, to informal work-based learning environments, to asynchronous online education (Zheng, Huang, & Yu, 2014; Goggins, 2014).

Thus far, research in CSCL and future research focuses on a blended or flipped approach rather than a true asynchronous online learning class. Asynchronous refers to when students and

teachers can access and use the course content without time or place restrictions (Simonson, Smaldino, & Zvacek, 2015; Vai & Sosulski, 2016). However, when evaluating learning effectiveness in asynchronous online education, instances that require collaborative learning might benefit from evaluation using existing research in CSCL. Arguments in favor of CSCL cite general (not context specific) benefits of collaborative learning including immediate feedback from peers, deep learning through teaching others, higher levels of engagement with materials, enhanced confidence and motivation, and decreased fear of asking "stupid" questions because the learners are asking peers rather than an instructor (Sadeghi & Kardan, 2016). All of these components also play an important role in social presence in the Community of Inquiry as does another line of research: online collaborative learning.

Online Collaborative Learning

Online Collaborative Learning (OCL) attempts to focus on the theory to practice aspects of knowledge building and examines learning through social discourse and community (Harasim, 2012; Yücel & Usluel, 2016). This model of online learning aims to push learners through intensive engagement to improve higher order thinking and problem-solving skills (Reeves, Herrington, & Oliver, 2004). This term "Online Collaborative Learning" appears to overlap in existing literature with computer-supported collaborative learning (Zhu, 2012; Yücel & Usluel, 2016) and online cooperative learning (Nam & Zellner, 2011). This approach attempts to address the role of technology as a piece of the learning process and environment as well as the range of ages of online learning participants (Harasim, 2012).

Studies in OCL show that design and implementation are important aspects of the success of the course as it is dependent upon well structured collaborative opportunities (MacDonald, 2003; Reeves, et al., 2004; Zhu, 2012; Nam & Zellner, 2011) as well as tasks driven by

assessment (MacDonald, 2003). Simply put, students will engage in collaborative activities and demonstrate good collaborative strategies when they are tied to explicit assessment items (MacDonald, 2003). Research focusing on OCL is primarily based on content analysis of discussion boards and student surveys (Zhu, 2012).

This construct generally encompasses any sort of group work or collaborative experience in online learning and draws heavily on popular cited constructivist literature (MacDonald, 2003; Reeves, et al., 2004; Zhu, 2012; Nam & Zellner, 2011; Harasim, 2012; Yücel & Usluel, 2016). The research in this area tends to focus on student satisfaction and attitudes in online learning and factors of collaborative environments (given there is collaboration), but it does not provide a framework for quality or analysis of online learning in regard to higher order thinking. It is this aspect that Community of Inquiry does a better job of showing the relationships and key design elements of supporting higher order thinking through collaboration (i.e. cognitive presence and social presence).

Multimodal Model

Developed by Picciano (2017) the multimodal model is an elaboration of the author's original "Blending with Pedagogical Purpose Model". This model attempts to address many concerns voiced by other authors (Anderson, 2008) in which a distance learning or online learning model does not address instances of face-to-face interaction. Picciano goes on to argue that face-to-face interaction can happen at a variety of degrees within the class, such as a flipped-class in which classes are held at traditional meeting times, yet contain an online component, all the way to a 100% online class for truly distance education students. In order to address the spectrum of online learning that can happen in a formal learning context, Picciano modifies the model to address this need. The model contains seven pedagogical goals divided into "modules":

content, social/emotional, self-paced/independent study, dialectic/questioning, evaluation/assessment, collaboration/student generated, content/peer review, and reflection. This model is more descriptive rather than prescriptive; it allows the practitioner to take various pedagogical goals and make choices based on those goals to create instruction with a variety of modalities. This model would work well in an online course design process to identify the elements of the learning experience. However, the uniqueness and flexibility of this model also make it difficult to use as a foundational model or metric for online learning effectiveness research.

Anderson's Model Of E-learning

Similar to CSCL, Anderson's (2004) model attempts to describe the interactions between learners and technology as well as the potential options for the technology enhanced learning. Unlike CSCL, Anderson's model of e-learning also includes independent learning. Anderson argues that instructors and instructional designers need theories to aid in the decision making process of identifying resources and strategies that are most efficient for the needs of the learner and learning environment. Moreover, Anderson argues that educational theory must be context specific and should consider both the strengths and limitations of said context.

This complex model can be broken down into a few basic categories: modes, actors, tools, time, pedagogical approach, and options for interaction. This model represents more of a decision-making tool for focusing an educator's or instructional designer's approach to online education depending on the factors of the learning environment. It does not attempt to address the learning effectiveness, social presence, or quality of the online experience. Anderson's model is best used as a design and facilitation planning tool, rather than an evaluative or conceptual foundation like CoI can.

In fact, Anderson argues that an instructor can trace interactions through the model and "plan for and ensure that an appropriate mix of student, teacher, and content interaction is uniquely designed for each learning outcome" (2004, p. 63). However, without an additional evaluative tool post planning and facilitation, this model hardly ensures learning effectiveness. Anderson addresses this weakness at the end of the model description, arguing that this is not exactly a theory of online learning, and that the variables will need to be matched with evaluations that assess learning outcomes, academic achievement/completion, and learner satisfaction.

All of these theories describe characteristics of good course design and teaching. However, learning effectiveness does not occur without considering learning design, facilitation, interaction, asynchronous communication, and deep engagement through cognitive and social presence. These perspectives influence and help to create a deep understanding in online courses specifically and influence the features measured by the Community of Inquiry.

Theoretical Foundations of Community of Inquiry

The Community of Inquiry (CoI) is a model originally developed by Garrison, Anderson, and Archer (2000) to conduct consistent quantitative content analyses in online discussion transcripts (specifically university courses) to assess learning effectiveness in an online class. The authors noticed a significant lack in current research on the learning outcomes of online education as well as a need to define the required characteristics of a successful higher education experience (Garrison et al., 2000). It has since been used as a framework for online teaching effectiveness in practice and as a framework to conduct other forms of both qualitative and quantitative research (Garrison et al., 2000; Rourke, Anderson, Garrison, & Archer, 1999; Anderson, Rourke, Garrison, & Archer, 2001).

Authors of the Community of Inquiry argue that characteristics of text-based communication, and specifically asynchronous communication, inherently lend themselves to deep learning and critical thinking because it provides the learner with time to reflect, versus the fast and spontaneous demands of oral communication (Rourke et al., 1999; Garrison et al., 2000; Garrison, 2003). This was an important consideration as they examined the shift from primarily oral communication interactions in a face-to-face teaching and learning context to the primarily text-based communication interactions in an online format (Garrison et al., 2000). The authors examined the limitations and advantages brought forth by text-based communication because that is the primary (and sometimes only) form of communication used in online education (Garrison et al., 2000).

The advantages of text-based communication are not present if they are not well facilitated and structured (Garrison et al., 2000; Garrison, 2003). Authors of the Community of Inquiry framework argue that limitations of written communication in computer-mediated conferencing can be overcome in a number of ways through an intentional and active support of each of the three elements of the Community of Inquiry: cognitive presence, social presence, and teaching presence (Garrison, et al., 2000, Rourke et al., 1999; Anderson et al., 2001; Garrison, 2003).

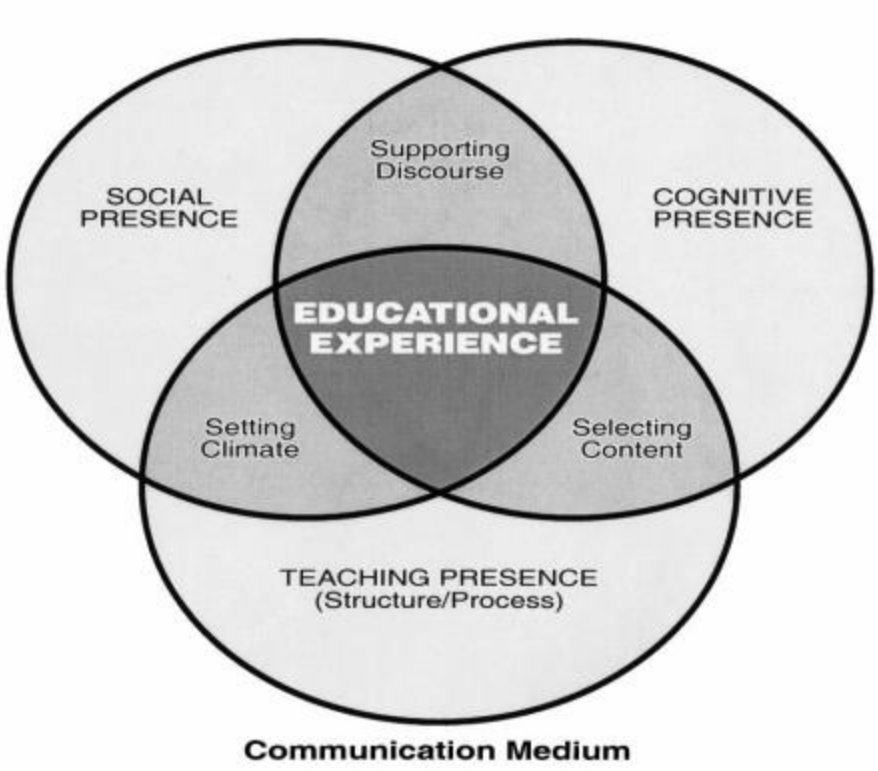

Figure 2.1 Community of Inquiry Framework. *Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. The Internet and Higher Education, 2(2), 87–105.*

The framework consists of three interwoven constructs; each construct has its own categories and underlying frameworks (see figure 2.1) (Garrison et al., 2000; Rourke et al., 1999; Anderson et al., 2001; Garrison, 2003). These constructs are cognitive presence, social presence, and teaching presence. When developing the categories and indicators of each construct, the authors also focused on strategies to maintain each element throughout an online course (Rourke et al., 1999; Garrison et al., 2000; Anderson et al., 2001; Garrison, 2003).

The elements of Community of Inquiry are deeply interwoven with one another for effective learning (Garrison, 2003); they will be discussed separately here for organization and understanding. Moreover, the authors developed a structure in writing and publishing this

framework with a keystone article that provided an overview of the framework (Garrison et al., 2000). This was followed by two seminal studies and in-depth analysis of the social and teaching presence aspects (Rourke et al., 1999; Anderson et al., 2001), and later an in-depth overview of cognitive presence (Garrison, 2003).

Cognitive Presence

Cognitive presence is a construct referring to the deep learning, or higher order thinking skills, that occurs in online education. Cognitive presence as a construct in CoI, as well as CoI as a theoretical framework, has gone through several iterations to get to the construct that is measured today. To prevent confusion, a discussion about this evolution and overlapping terminology is first discussed to clarify understanding throughout the later sections.

The founding author of this construct terminology, Randy Garrison, began much of his early research in exploring self-directed learning and critical thinking in online learning (Fabro & Garrison, 1998; Garrison, 1997; Anderson & Garrison, 1995; Garrison, 1992; Garrison, 1991). Consequently, the seminal article introducing the Community of Inquiry and its three subconstructs is titled “Critical Inquiry in a Text-based Environment: Computer Conferencing in Higher Education” (Garrison et al.,1999). In his early works, Garrison explored Dewey’s (1933) reflective inquiry and Brookfield’s (1989) modified version of Dewey’s model. Finding that while both included important aspects of critical thinking, they did not account for the social aspects of critical thinking (Garrison, 1991; Anderson & Garrison, 1995). Garrison then proposed an updated model that he called the practical inquiry model (Garrison, 2003; Garrison, 1991). In CoI literature, by a variety of authors, a reader will sometimes find cognitive presence, practical inquiry, critical inquiry, and reflective inquiry used interchangeably, particularly dependent on the date of the publication. For clarity, it is helpful to remember that cognitive

presence is the construct while practical inquiry is the model used to measure this construct. In creating the practical inquiry model, researchers attempted to address the limitations of how critical thinking occurs within the simulated context of discussion in online education, rather than the critical thinking that occurs in authentic problem-solving situations (Garrison, 2003). They argue that critical thinking is a complex process that moves through multiple phases, experiences, and contexts (Garrison et al., 2000; Garrison, 2003).

While cognitive presence refers to the overarching construct of how learners are engaging and thinking about the content of the course, the practical inquiry model (the model used to measure cognitive presence) refers to the actual process which students move through as they think about the content of the course and the discussions they have with others. The practical inquiry model relies heavily on Dewey's (1933) original reflective inquiry construct (Garrison et al., 2000; Garrison, 2003); the relationship between these constructs will be discussed in a later section.

Garrison describes cognitive presence as the "intellectual climate" (p3, 2003) and describes three interwoven cognitive and motivation constructs related to cognitive presence: reflective inquiry, self-directed learning, and metacognition. He argues that asynchronous, written communication is ideal because it allows the learner to be both reflective and interactive at the same time. Further, Garrison (2003) connects cognitive presence with its constructivist underpinnings in Dewey's (1933) reflective inquiry, arguing that if the goal is to foster cognitive presence in an online course, one must design the course to be reflected upon, rather than passively consumed. Before expanding on reflective and practical inquiry, the underlying constructs must be addressed: self-directed learning and metacognition. These constructs provide the construct foundation for the operationalized process that is practical inquiry.

Constructs Of Cognitive Presence. Self-directed learning is argued to be more explicit and necessary in online teaching than traditional teaching (Garrison, 2003). Further, Garrison assesses that self-directed learning deals with issues of self-control and regulation, constructs that also appear in reflective inquiry. Self-directed learning is an approach that is framed by both internal and external processes (Garrison, 1997).

The next subconstruct of cognitive presence is metacognition, which plays a key role in intellectual growth and higher order thinking (Garrison, 2003; Kim & Lim, 2019; Akyol & Garrison, 2011; Dewey, 1933). Associated with the constructs self-awareness, reflection, and critical thinking, metacognition is a higher order thinking process that acts as a moderator between lower level cognitive processes such as recall and problem-solving (Akyol & Garrison, 2011; Tobias & Everson, 2009). This process creates an awareness of knowledge known and the ability to access knowledge needed in order to evaluate or problem solve (Akyol & Garrison, 2011; Kim & Lim, 2019). Building off of the work of Flavell (1987) and Pintrich, Wolters, and Baxter (2000), Garrison and Akyol (2011) establish three dimensions of the metacognition construct under the Community of Inquiry, arguing this analysis is specific to the online learning context under a constructivist pedagogy. These dimensions are knowledge of cognition, monitoring of cognition, and regulation of cognition (Akyol & Garrison, 2011) and have been used by researchers to better understand deeper learning in an online context (Snyder & Dringus, 2014; Kim & Lim, 2019).

In developing these dimensions, Garrison and Akyol (2011) specifically outline how their construct of metacognition is operationalized in the practical inquiry framework and how to focus on the relationship between cognitive and teaching presence to facilitate effective learning experiences. It is argued that metacognition requires both internal and external processes that

require articulation of one's ideas, which are then confirmed and facilitated through collaborative discussion (Akyol & Garrison, 2011; Flavell, 1987; Schraw, 1998; Wade & Fauske, 2004; Garrison & Akyol, 2015; Kim & Lim, 2019). Learners must work through discussions, hearing alternative perspectives, internally reconciling these perspectives with their own, and then following with more questions and discussions (Akyol & Garrison, 2011; Wade & Fauske, 2004). Researchers argue that metacognition is the cognitive tool that mediates reflection and action within the practical inquiry model, and that the dimensions of metacognition are observable through student communication in a course (Akyol & Garrison, 2011; Garrison & Akyol, 2015; Snyder & Dringus, 2014; Kim & Lim, 2019).

Reflective Inquiry And Practical Inquiry. As mentioned above, the practical inquiry model derives its theoretical foundations from constructivism and Dewey's (1933) reflective inquiry model. Dewey argues that the combination of thought or mental reasoning (internal) combined with action (external) resulted in the phenomenon of inquiry (Dewey, 1933; Dewey 1938; Schön, 1992; Rogers, 2002). Dewey (1993) argues that reflection isn't merely a series of thoughts, but rather consecutive thoughts, with each current thought a consequence of a prior thought (hence reflective inquiry). Thought is also abstract, as it is unknown what thought is and how it happens. As Dewey (1938) discusses this phenomenon, he argues that the observations and measurements of thought can only be applied to practice and external activities as a result of thought (Schön, 1992; Rogers, 2002). Inquiry, therefore, is the culmination of both of these internal and external activities. This conclusion resulted in the observation that inquiry is also social in nature and requires "communities of inquiry" (Schön, 1992) driven by discussion as the external demonstration of reflective or consecutive thinking (Dewey, 1933; Rogers, 2002).

So how does reflective inquiry relate to Garrison's cognitive presence construct? The practical inquiry model can be broken into three layers: context (or reality), the experiences that occur during the critical thinking process, and the categories of cognitive presence. First, researchers examine the two realities in which deep learning occurs. These two realities are the shared world, the reality in which the online discussions take place with other individuals, and the private world, the reality in which the individual reflects on the course content and discussions (Garrison et al.,1999; Garrison, 2003). Second, there are two axes of experience, the perception/conception axis and the deliberation/action axis. Each point on the axis serves as a checkpoint for the critical thinking process. Third, in reviewing the research and developing the categories for coding, researchers found four categories of cognitive presence: triggering event, exploration, integration, and resolution (see figure 2.2) (Garrison et al., 2000). In analyzing discussion transcripts, researchers looked for indicators of cognitive presence through the four phases.

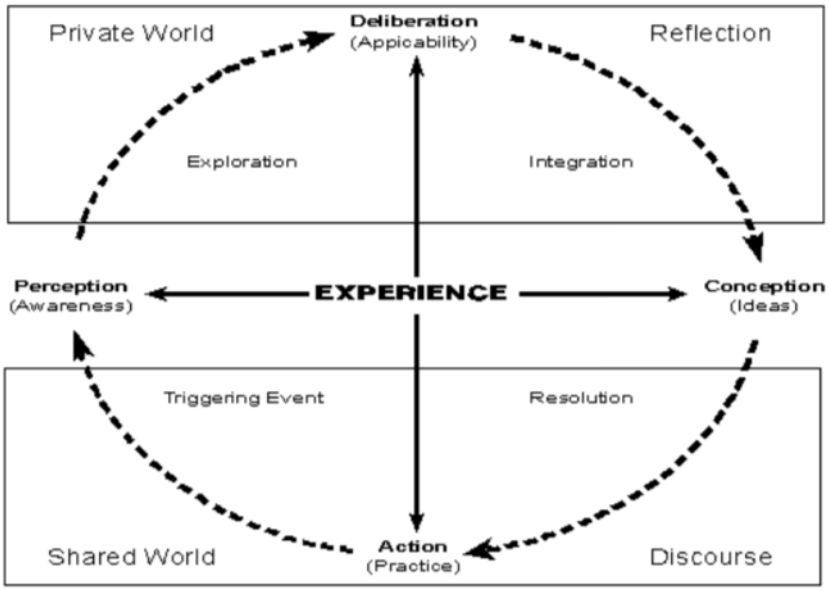

Figure 2.2 Practical Inquiry Model. *Garrison, D. R. (2003). Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self-direction and metacognition. Elements of quality online education: Practice and direction, 4(1), 47-58.*

It is clear that the attempt in synthesizing multiple, overlapping constructs into a single construct of cognitive presence leaves some questions unanswered and vagueness in descriptions and models (Garrison & Akyol, 2015). Some researchers have attempted to rectify these questions by parsing out additional constructs in the Community of Inquiry framework. One such group of researchers advocate a fourth construct (in addition to the main three that are cognitive, social, and teaching presence) called learning presence (Shea & Bidjerano, 2010).

With cognitive presence being the focus element of a successful higher education experience and the primary indicator of learning effectiveness, it is important to examine how to create and maintain cognitive presence within an online course. This is why it is important to discuss and consider the other constructs within the Community of Inquiry framework. Studies have found that the more comfortable students are in a discussion, the higher levels of cognitive presence they report (Shea & Bidjerano, 2009). The authors argue that creation and sustainability of cognitive presence are facilitated through the encouragement of communication, specifically social presence (Garrison et al., 2000).

Social Presence

Social presence primarily refers to the student-to-student interaction in the course (Garrison et al., 2000; Rourke et al., 1999). To create a community of learners and to facilitate cognitive presence, the authors recognize that students in a course need to be comfortable with expressing themselves deeply and meaningfully (Rourke et al., 1999). In fact, argument and critical thinking in a course are more indicative of a close social group; whereas, an overly polite, dry discussion is more indicative of an impersonal group (Rourke et al., 1999).

Rourke, Anderson, Garrison, and Archer (1999) explored social presence more thoroughly in their seminal study. In this study, they discuss literature in text-based

communication revealing the necessary characteristics of deep and meaningful conversation (Rourke et al., 1999). The review of literature has two important conclusions. First, early works by communication theorists indicate challenges in written communication as it lacks nonverbal and social cues. Later, research in online communication indicates that only shallow or dry messages are well supported by computer-mediated conferencing (CMC) (see Short, Williams, & Christie, 1976; Sproull & Keisler, 1986; Daft & Lengel, 1986). Second, more recent research specifically within the context of education has found CMC to support affective, interpersonal communication. Content analysis in several studies reveal the use of humor, social introductions, and emotional expressions encourage rapport and personal connection in a variety of learning contexts (See Kanuka & Anderson, 1998).

Rourke et al. (1999) examined transcripts from two graduate-level 13 week online courses. A week of discussion posts was analyzed from each of the courses; there were 14 people (including the instructor and moderators) in the first class and 17 people (including the instructor and moderators) in the second class. Researchers used AtlasTi to code the transcripts twice. The codes were then turned into frequency counts and analyzed with the three categories of social presence to determine social presence density. The primary purpose of this study was to develop and test the codes as an instrument for future content analysis. Rourke et al. (1999) initially developed codes, then categories as indicators of social presence in online education based on the literature. These categories are emotional expression, open communication, and group cohesion. However, after conducting a content analysis of online discussion transcripts, researchers re-coded and categorized the indicators of social presence to be affective responses, interactive responses, and cohesive responses.

Affective responses are indicated by the use of emoticons, humor, and self-disclosure. The ability to express emotion is reduced when nonverbal cues and social cues are removed from communication. However, the limitations of written communication can be supplemented by other means of emotional expression (Rourke et al., 1999). Humor such as banter, teasing, and joking was successful in "conveying goodwill and reducing social distance" (Rourke et al., 1999, p. 52). Moreover, evidence in research supports self-disclosure as a way to reduce social isolation that can often result from a lack of human connection when using CMC (see Gorham & Christophel, 1990; Cutler, 1995).

Interactive responses are indicated by using the thread feature of a discussion to reply directly to someone's comment, quoting someone directly, and by referring specifically to someone else's statement in a discussion (Rourke et al., 1999). All of these indicators allow the conversation to move forward in an interactive and meaningful way (Rourke et al., 1999). They also show an interest in maintaining a conversation and provide interpersonal support (Rourke et al., 1999). Through these responses, complimenting and recognizing others in the discussion, participants in the discussion build interpersonal trust (Rourke et al., 1999).

Cohesive responses are indicated by using terms like “we” or “us” to indicate group cohesion, greetings to one another and small talk (also referred to as phatic communication), and referring to one another by name (Rourke et al., 1999). Group cohesion terms, greetings, and using small talk, such as asking about personal matters or thoughts on a sports game help create interpersonal connections (Rourke et al., 1999). Moreover, studies on referring to one another by name found connections to support positive student outcomes (see Christenson & Menzel, 1998; Gorham, 1988; Gorham & Zakahi, 1990; Sanders & Wiseman, 1990; Kelly & Gorham, 1988; Eggins & Slade, 1997).

Many of the indicators of social presence discussed are derived from teacher immediacy literature, in which a teacher is building open communication and rapport with students (Rourke et al., 1999). Therefore, to create social presence, the instructor is tasked with modeling and facilitating the elements of social presence within an online course. Social presence is driven by the instructor's active participation in the discussions in the course (Cho & Tobias, 2016). It is important to note that there is a balance of social presence for optimal levels of cognitive presence to occur, and therefore it must be facilitated appropriately (Rourke et al., 1999).

When examining the relationship between cognitive presence and social presence, research has found that with reflective scaffolding, in which course instructors actively scaffold their questioning and course design to support ill-structured problem solving (Archibald, 2010) through metacognition and reflective strategies, students show higher indicators of cognitive and social presence through this reflection and collaboration (Kim & Lim, 2019). Social presence is an important aspect of the student experience in online education as students are able to interact with a variety of peers and improve their ability to manage group dynamics (Annand, 2011). Further, social presence has shown to support co-constructed knowledge by facilitating a community of shared experiences that require the student to collect and synthesize information for the group which provides additional scaffolding into deep learning (Annand, 2011). Students that perceive others in the course as "real" indicate higher levels of perceived social presence and report greater levels of satisfaction with the instructor and positive perceptions of the quality of their learning (Lowenthal, 2009; Richarson & Swan, 2002; Russo & Benson, 2005). The relationship between cognitive presence and social presence is built and maintained by the pillar of support in the Community of Inquiry model: teaching presence.

Teaching Presence

Teaching presence is described by the authors as the “binding element” between cognitive and social presence (Garrison et al., 2000, p. 96). Neither social nor cognitive presence is an automatic occurrence; both need to be structured and facilitated explicitly through teaching presence (Yang, 2016). Beyond supporting cognitive and social presence, teaching presence matters because it is the thing that establishes the community of inquiry as an intentional learning experience. Community of Inquiry specifically examines the effectiveness of learning environments, and while one could certainly research and evaluate informal learning environments, this model traditionally is used for intentional learning design (i.e. formal courses). Moreover, teaching presence, as an operationalized construct, establishes the essential roles as an online instructor in order to effectively support student learning (Shea, Li, & Pickett, 2006). The first element in this approach is the decision-making process in the design and structure of the course. The second is the facilitation of social and cognitive presence throughout the course. The third is direct instruction in the online course.

Anderson, Rourke, Garrison, and Archer (2001) thoroughly explored these three elements of teaching presence in their seminal study to create an instrument for measuring teaching presence as an intervention in online courses. They first derived the three approaches described above from existing literature, then described indicators of each of the three categories. Then the researchers performed a content analysis of transcripts from two graduate-level online courses to understand the degree of teaching presence as well as the proportion of each of the three categories.

More recent studies have refined these categories and re-evaluated the term "direct instruction." Shea & Bidjerano (2009) suggest, based on a number of studies, to redefine the teaching presence categories into instructional design, organization, and direct facilitation, rather

than direct instruction (see Shea, Pickett, & Pelz, 2003; Shea, Li, Swan, & Pickett, 2005). The researchers argue the responsibilities of the instructor for direct facilitation are to: "provide valuable analogies, offer useful illustrations, present helpful examples, conduct supportive demonstrations, supply clarifying explanations" (Shea & Bidjerano, 2009, p. 552).

Addressing The Unique Attributes Of Online Education. Now that we've explored the constructs and subconstructs of the Community of Inquiry, let's take a look at how this is the most appropriate construct to address the unique attributes of online education. Although many factors in learning are addressed throughout this model, using these constructs in a vacuum does not fully capture the learning experiences in this particular context. Because the role of the educator has to be examined and changed in an online learning context, the dynamics of learning change in an online context as well. While reviewing the attributes discussed earlier: asynchronous learning, written communication, in the moment teaching, and self-directed learning, the following will explore how the Community of Inquiry framework works to pull together traditional learning theories into an interrelated construct to address these unique attributes.

The Community of Inquiry framework has been used both as a way of evaluating the effectiveness of online learning as well as a way to develop and design online learning environments. One such aspect to address is the momentum lost through asynchronous communication. While students often choose online learning as a flexible option when they are unable to attend a face-to-face class on a consistent basis, instructors can still establish guidelines that can help students develop understanding collaboratively. Moreover, many models of learning focus on the synchronous aspects of face-to-face learning, whereas the community of inquiry model allows for the asynchronous context. Another piece of momentum that is lost

through asynchronous learning environments is the ability for instructors to have “in-the-moment-teaching”; however, effective CoIs should establish that both students and teachers will take on the instructional role in the course (Garrison & Anderson, 2003; Armellini & Stefani, 2016).

The prevalence and reliance on written communication is another aspect unique to online learning. Written communication serves as the primary vehicle for communicating in an online course (Rourke et al., 1999; Cho & Tobias, 2016). Each construct in the Community of Inquiry framework examines how written communication plays a role in the development of an effective learning experience. As mentioned previously, many studies of CoI focused on the analysis of discussion boards as students work through the stages of practical inquiry using teaching and social presence as the vehicle to move the conversations into deeper levels of cognitive presence (Stein, et al., 2007) . However, the framework can also be used as a tool to develop communities to intentionally foster an effective learning environment; these specific factors are mentioned in the discussion of each construct above.

Lastly, students in an online context require a far greater ability of self-directed learning (Garrison, 2003). In particular, learners that have not developed sophisticated learning strategies, often found in undergraduate courses, will require more scaffolding to develop these skills. This is another aspect specifically addressed in the CoI framework, through analyzing a learner’s awareness and control in an online context.

All of the individual constructs of the Community of Inquiry have been discussed above; however, as mentioned previously, the constructs co-vary and create important relationships worth discussing. Understanding these relationships will be particularly important when

examining the relationships between CoI, self-efficacy, cognitive engagement, and behavioral engagement.

Proposed Model: Underlying Constructs and Relationships

Currently, research does not specifically analyze all of the discussed constructs in a single model. However, through understanding current literature and reasoning, a model and subsequent research questions can be derived, given that the objective is to understand the predictive nature of the community of inquiry and the relationship between self-efficacy, cognitive, and behavioral engagement, the study used a quantitative design. Prior research in CoI (e.g. Arbaugh, 2008; Shea & Bidjerano, 2009a; Kozan, 2016) using predictive and mediating variables have been measured using quantitative methodology through structural equation modeling and have resulted in an instrument that has been found to be statistically valid and reliable (Arbaugh, 2008; Shea & Bidjerano, 2009a; Kozan, 2016). Primarily, confirmatory factor analysis and exploratory factor analysis were used to validate survey items in CoI studies (Kozan & Richardson, 2014; Kovanović et al., 2018). Moreover, in a reflection of the CoI research, leading authors Garrison and Arbaugh (2007) describe the qualitative research in CoI as descriptive, while the future of the research needs to move to quantitative methodology to be more predictive.

Path Analysis was used to address the research questions in this study to evaluate the direct, indirect, and total effects in the model. Paths A, B, C, G, H, and I all represent direct effects in the proposed model. Prior research has already validated the covariances between the Community of Inquiry subconstructs as described (Arbaugh et al., 2008; Swan et al., 2008; Garrison, Cleveland-Innes & Fung, 2010). Paths E, F, and J represent the indirect effects of teaching presence and social presence on cognitive engagement mediated by self-efficacy.

Additionally, Paths D and J represent a partial indirect effects of the relationship between cognitive presence and cognitive engagement mediated by self-efficacy. Structural Equation Modeling (SEM) is the best method for analyzing complex relationships like those represented in the hypothesized model (see figure 2.3).

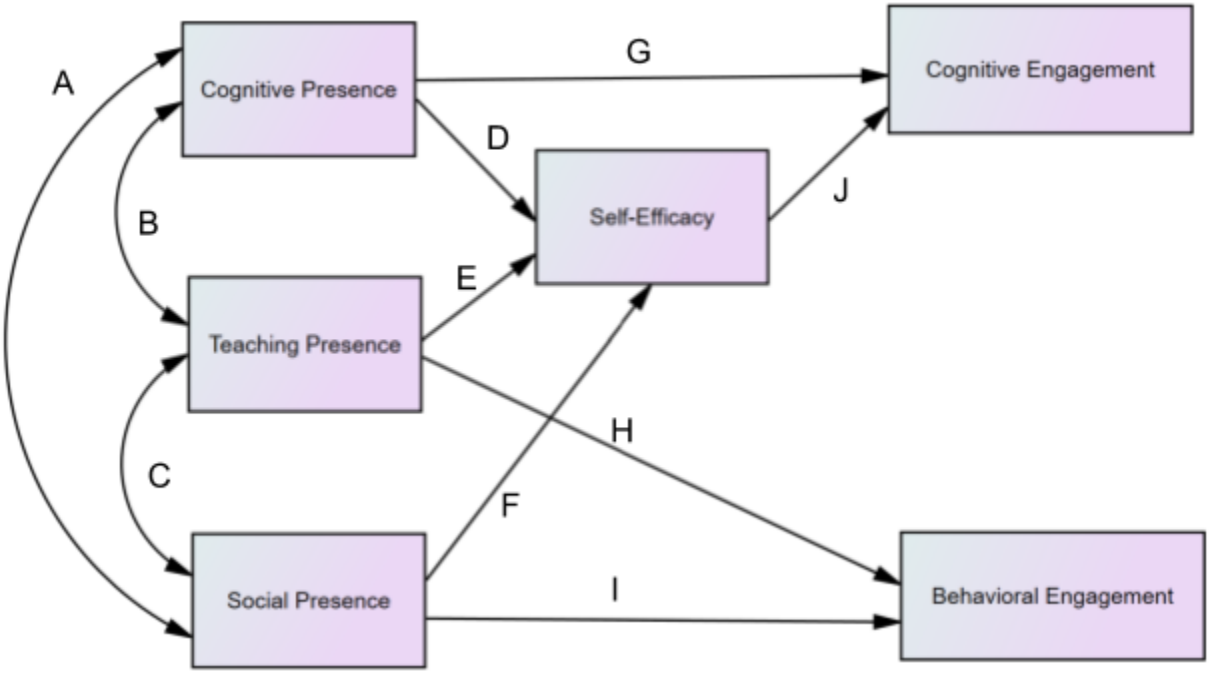

Figure 2.3 Path Diagram of Hypothesized Model

Relationships Between CoI Constructs

Overall, while the original model of Community of Inquiry shows a Venn Diagram of overlapping elements and contexts (see figure 1.1); the connections between social, teaching and cognitive presence are more interdependent (Garrison, Cleveland-Innes, and Fung, 2010). Cognitive presence is the basic element of higher education success and learning effectiveness (Garrison et al., 2000; Garrison, 2003). Social presence is the support for cognitive presence, and

its relationship is reciprocal as described in the paragraphs above (Rourke et al., 1999; Garrison et al., 2000). Meanwhile, teaching presence is the pillar of support for both cognitive and social presence; without teaching presence the two would be in danger of failing (Garrison et al., 2000; Rourke et al., 1999; Anderson et al., 2001). Studies of CoI have supported this claim; Shea & Bijerano (2009) found student reported levels of cognitive presence (n=2159) were influenced by the instructor's ability to facilitate teaching and social presence.

Cognitive Presence And Social Presence (Covariance A). Research into the relationship between cognitive presence and social presence reveal some interesting hypotheses as to why students perform better with discussion posts, what specific factors contribute to learning performance and cognitive engagement, and how instructors can intentionally facilitate communication in their courses in order to increase cognitive presence and deeper learning in the course (Armellini & Stephani, 2016; Garrison & Anderson, 2003; Garrison & Vaughan, 2008). Essentially, the more comfortable and engaged students feel in an online course, the more likely they are to participate in the discussion posts, the more deeply they become involved in the discussions of the content, and the better they perform within the course (Goggins & Xing, 2016).

Social presence is often embedded throughout the cognitive presence messaging in a course (Armellini & Stephani, 2016); therefore, when examining cognitive presence in research, one cannot ignore the impact and significance of social presence. For example, Richarson and Swan (2016) found that social and cognitive presence overlapped in conversations between students on discussion boards. Students would direct both social and cognitive questions towards each other and tutors without separation. In this study, teachers in a graduate program were the participants and would ask questions about how their classes were going and how they motivate

their students to do XYZ. Students moved seamlessly between discussions that are social focused and cognitive focused. However, social and cognitive presence begin as facilitated through teaching presence.

Cognitive Presence And Teaching Presence (Covarience B). Although the focus of education is on learning effectiveness and the student experience (e.g. cognitive presence and community), it is important to start at the beginning. As described previously, teaching presence in the CoI framework focuses on the teacher's role in the online course as a designer, director, and facilitator of social and cognitive presence. This facilitation should be used as a vehicle to move students through the practical inquiry model over and over as students develop skill and content knowledge (Deris, Zakaria, & Mansor, 2012). Stein et al. (2007), demonstrates this well through their content analysis of discussion posts in an online course (See Figure 2.4 and 2.5). In this figure, the conversation is coded social presence (SP), teaching presence (TP), and the four parts of the Practical Inquiry Model (Te, Ex, In, and Re). Notice that in each conversation, social presence is the initial catalyst, then teaching presence and social presence move through the conversation interchangeably as a way to move learners through the Practical Inquiry Model.

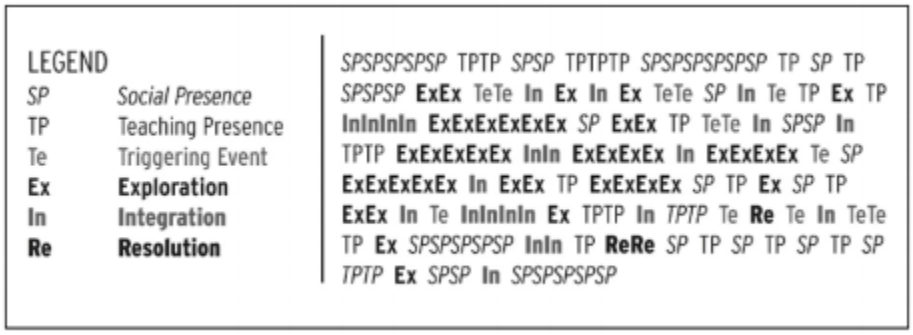

Figure 2.4 Flow of social, teaching, and cognitive presence in chat one. *Stein, D. S., Wanstreet, C. E., Glazer, H. R., Engle, C. L., Harris, R. A., Johnston, S. M., Simons, M.R. Trinko, L. A. (2007). Creating shared understanding through chats in a community of inquiry. The Internet and Higher Education, 10(2), 103–115.*

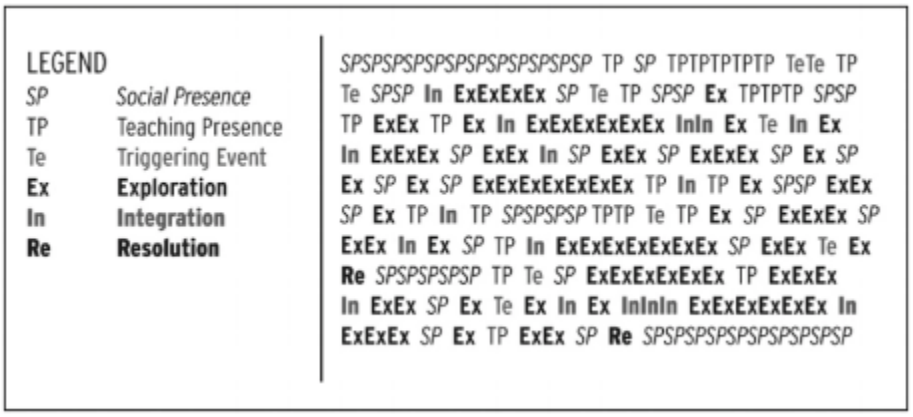

Figure 2.5 Flow of social, teaching, and cognitive presence in chat two. *Stein, D. S., Wanstreet, C. E., Glazer, H. R., Engle, C. L., Harris, R. A., Johnston, S. M., Simons, M.R. Trinko, L. A. (2007). Creating shared understanding through chats in a community of inquiry. The Internet and Higher Education, 10(2), 103–115.*

Teaching Presence and Social Presence (Covariance C). When looking at the relationship between social presence and teaching presence, researchers found that students that report higher levels of social presence within a course also report higher levels of satisfaction with the instructor (Ice, Curtis, Phillips, & Wells, 2007; Richardson & Swan, 2003) and attribute quality feedback to their online success (Kupczzynski, Ice, Wiesenmayer, & McCluskey, 2010). However, it is important to note that social presence must be guided through teaching presence with significant intentionality. Students indicate frustration, dissatisfaction, and less perceptions of success in an online context that does not present clear guidelines and objectives (Kupczzynski, Ice, Wiesenmayer, & McCluskey, 2010).

Relationships Between CoI Constructs and Self-efficacy

While CoI examines course design, interactions, and relationships in an online course, one must acknowledge that students are human beings, they themselves contribute to the course interactions, and their feelings about these interactions matter. Moreover, students enter into

online courses with preconceptions and prior motivational structures that can influence how they interact in an online course.

Self-efficacy is a motivational construct that refers to one's perceived ability of the completion of a specific task in the future (Bandura, 1977; Bandura, 1997; Bandura, 1982, Zimmerman, 2000). It is argued that self-efficacy in academic motivation drives the judgements persons make when it comes to the tasks they choose, the amount of effort they choose to put into those tasks ahead of time, the strategies they choose to use to complete a task, how much they will persist at a task, and the emotional reaction they have when approaching a task (Bandura, 1977; Zimmerman, 2000; Alivernini & Lucidi, 2011). There are four sources of information that shape a person's self-efficacy towards a task. These are performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1977). A common misconception is that one success at a task or positive experience improves self-efficacy; however, research shows that self-efficacy is shaped by multiple experiences from these sources of information (Zimmerman, 2000). It is for this reason I will use a self-efficacy scale that will capture a more generalized understanding of a student's perceptions of self-efficacy rather than focusing on a specific online learning task.

Performance accomplishments refer to previous times a person is successful at a task and experience with success at similar tasks can also help shape strong self-efficacy (Bandura, 1977). Further, if a student has experienced success through persistence, this can help shape strong self-efficacy and strategy choices. For example, if a student taking an online class has experienced falling behind on discussion posts, then set an alarm half-way through the semester to remind him/her to post, and experienced success with this strategy, then he/she may have strong self-efficacy with a future online course due to the choice in employing this strategy again. Bandura

(1977) argues people make behavioral changes based on how they perceive the success of a particular event. Therefore, if a person believes he/she did not do well at something (even if he/she did fine) then the person will make a choice to behave differently or the same based on that perception. Our perceptions and judgments might not accurately reflect the actual results of the task. Therefore, in order for researchers to understand how to create a change in behavior; they have to understand a person's expectations in approaching a given task.

Vicarious experience is self-efficacy developed through observing someone else's elses experiences with a task (Bandura, 1977). For example, a student may be taking an online class with a professor in the next semester while a friend is taking the same class in the current semester. The friend may mention their success, frustration, or failure with the class and this feedback may shape the student's self-efficacy in the class the next semester.

A similar construct is verbal persuasion (Bandura, 1977), in which the person's self-efficacy is shaped by the influence of others. Verbal persuasion can be either good or bad; if someone does not know the person's goals or capabilities then the impact on the person's self-efficacy is flawed. For example, a student may see a review of a professor online and notice that many people report struggling to succeed in the professor's online class and they suggest not taking the class. This review can shape the self-efficacy of the student, even if the student has no experience in online learning or with taking a course from this professor.

Lastly, emotional arousal occurs when a person's emotional response experiences shape his/her self-efficacy regarding a task (Bandura, 1977). For example, someone that is frequently nervous to present face-to-face in front of a class may select to only take online classes that do not require face-to-face presentations, and therefore self-efficacy in regard to being successful in the class will grow stronger.

Self-efficacy can play a role in how people perceive their success of one task based on experiences of another similar task (Zimmerman, 2000). For example, a student that has had positive experiences with a blended class might feel more confident in success with a fully online class than a student with no experience with experience with computer supported courses.

Cognitive Presence and Self-efficacy (Path D). Literature in self-efficacy suggests a positive relationship between student's perceptions of cognitive presence and self-efficacy as a mediating variable of cognitive engagement (see Zimmerman, 2000; Bandura, 1977; Ben-Eliyahu et al., 2018; Greene et al., 2004). While some studies in Community of Inquiry suggest a fourth presence for (learning presence) to represent self-efficacy and self-regulation, other studies have found positive correlations between self-efficacy alone and cognitive presence (see Lawson, 2019). For example, a student's self-efficacy will determine his/her strategies and efforts in the course (Zimmerman, 2000) and that will in turn affect how he/she perceives cognitive presence in the course, such as how interesting and challenging the course is (Kilis & Yildirim, 2018). Then based on these factors, the students will make a choice regarding how cognitively engaged they will be, how hard they work on the course and what resources they will use (Greene et al., 2004). Therefore, self-efficacy is the mechanism that determines the choice, based on cognitive presence as a factor, and cognitive engagement is the outcome of this choice. If we look back to the previously quoted Ben-Eliyahu et al. (2018) argument and replace motivation with self-efficacy and self-regulation with cognitive presence (both constructs have been linked to these respective counterparts—see descriptions in earlier sections), then the same argument would be made based on their assertions. "Motivation as a pre-existing learner

characteristic that produces engagement and self-regulated learning as the type of engagement process" (2018, p. 8).

Teaching Presence and Self-efficacy (Path E). Next, the proposed model hypothesizes a positive relationship between teaching presence and self-efficacy as well as behavioral engagement. As students indicate a positive teaching presence in the course, they may also indicate higher levels of self-efficacy and behavioral engagement. Students may feel positively towards the teaching presence in the course as it relates to their confidence in the course (see Pellas & Kazanidis, 2014). As discussed previously, students' perceptions of learning and community are influenced by their perceptions of teaching presence (Shea, Li, Swan, & Pickett, 2005). Students specifically point out key factors in facilitation such as addressing misconceptions and creating a positive learning environment (Shea et al., 2005) these factors help move the conversation along in online discourse and in activity facilitation so that the students feel like they are having meaningful educational experiences (Deris, Zakaria, & Mansor, 2012). Research has also found that teaching presence plays a role in both instructor and learner (students teaching students) scaffolding for problem solving (Swan, 2004). In order to understand the effects of teaching presence on student self-efficacy, more research is needed.

Social Presence and Self-efficacy (Path F). In addition to their shared theoretical foundations in social cognitive theory (see Bandura, 1986 and Goggins & Xing, 2016), social presence and self-efficacy are hypothesized in this model to correlate. While the research on this relationship is minimal, Goggins and Xing (2016) examined the effects of collective efficacy (Bandura, 1997) as it relates to their construct of social presence, defined through Social Cognitive Theory as cognitive factors, environmental factors and human behavioral factors (Goggins & Xing, 2016). The literature also leads us to believe that there will be a positive

relationship between social presence, self-efficacy, and behavioral engagement (Zimmerman, 2000; Bandura, 1977). For example, students that have higher perceptions of social presence in an online course, due to feeling more comfortable and connected to their peers, might feel that way because prior experiences are reinforcing this perception. It is possible that students were verbally persuaded (social presence) to post more in the course or praised for having a good idea about the course materials in a discussion thread. This social presence-self-efficacy loop is continual in a class, and positive experiences can lead the students to engage more in the course.

Moreover, some researchers argue that the influence of social presence on learning effectiveness (cognitive presence) is so important, that the CoI framework should be adjusted to place higher emphasis on this construct (Armellini & Stephani, 2016). This research found that cognitive presence indicators often displayed social elements that did not fit the current CoI framework and that were difficult to isolate as social presence indicators (Armellini & Stephani, 2016). This could play a role in the relationships between cognitive presence and self-efficacy and social presence and self-efficacy.

Engagement In Learning

While the community of inquiry addresses how the students perceive various factors related to their learning, and self-efficacy focuses on students' confidence as it relates to the successful completion of a future task, engagement (cognitive and behavioral) is a direct outcome of students' experiences during a course. One critique of studying engagement is the lack of conceptual focus (Steele and Fullagar, 2009). In fact, this is a common concern; many constructs in educational research are often overlapping with small variation in definition and measurement (Astin, 1999). It is the obligation of the researcher to synthesize multiple definitions and perspectives in order to focus the proposed study.

Ben-Eliyahu et al., describe engagement as “the intensity of productive involvement with an activity” (2018, p. 7). This includes how a student is involved, focused, participates, and has persistence with a particular activity (Ben-Eliyahu et al., 2018). Other researchers define engagement as “the time and energy students devote to educationally sound activities inside and outside the classroom, and the policies and practices that institutions use to induce students to take part in these activities” (Kuh, 2003, p. 25 as cited in Burch et al., 2015).This definition originates from research in Student Involvement Theory (Astin, 1999) which focuses on the “physical and psychological energy that the student devotes to the academic experience” (p. 518). As one might notice, these definitions all focus on the energy a student devotes to the learning activities in a course and overlap between descriptions of constructs in the Community of Inquiry and self-efficacy.

Primarily, researchers see engagement as the representation of the outcome of motivation and the quality of the action (see Corno & Mandinach, 1983; Greene et al., 2004; and Winne & Hadwin, 1998). As represented by the model, this study frames student engagement as the outcome as well as the motivation aspect represented by self-efficacy and the design, interaction, and facilitation pieces represented through the Community of Inquiry. While engagement can manifest in multiple forms, for the purposes of this study cognitive and behavioral engagement are discussed.

Cognitive Engagement. There are a number of variations throughout the literature defining cognitive engagement and the various related constructs in an academic setting (see Greene et al., 2004). As mentioned previously, engagement refers to the quality of action, in this case the quality of academic action that a student demonstrates in the course, as well as the amount or time involved students put into cognitive activities in a meaningful way (Ravindran,

Greene, & DeBacker, 2005). Cognitive engagement has become an important focus of educational research as higher levels of cognitive engagement predict higher achievement (Greene et al., 2004). Specifically, cognitive engagement literature focuses on the motivational and self-regulation (Richardson, 2006) versus the design strategies and direct experiences of students as exemplified by cognitive presence.

Cognitive Presence and Cognitive Engagement (Path G). Prior research suggests there is a positive relationship between cognitive presence and cognitive engagement (Shea & Bidjerano, 2009a; Shea & Bidjerano, 2009b; West et al., 2018; Greene et al., 2004). However, remember that the foundations of cognitive presence are focused in critical thinking and reflection (Garrison et al., 1999; Garrison, 1991; Anderson & Garrison, 1995). While a student might perceive cognitive presence design elements in a course, reflect, and inquire, this construct does not measure the quality, effort, or time that a student would put into reflection and inquiry.

While previous studies in cognitive engagement have indicated the school environment plays a factor in student's levels of engagement (see Lee, 2008), an instructor that cultivates student experiences through design strategies to support cognitive presence would shape and therefore influence how students are engaging in the course in an online environment as well. Furthermore, while prior research has well supported the link between cognitive engagement and academic performance (Greene et al., 2004), little work has been done to show the relationship between specific design strategies and this desired outcome. This study aims to examine this relationship to find factors that influence positive cognitive engagement and therefore positive academic performance.

Cognitive presence items (measurement discussed more in Chapter Three) focus on the activities and design aspects of the student's experience in the course. For example, "Course

activities piqued my curiosity" and "Learning activities helped me construct explanations/solutions" both focus on the design elements of the course while items in the cognitive engagement measure focus on attention and concentration aspects such as "When I am reading or studying material for this class/course, I devote a lot of attention to class discussion and activities". In the engagement measure, the focus is on the action that the student is taking when it comes to learning activities, not their perceptions of the learning activities. As students indicate cognitive presence within the course through discussion and reflection, students could also indicate that they are more cognitively engaged in the course through their self-reports of working through course activities. Other prominent online researchers have also suggested and explored cognitive engagement and suggest stakeholders take note of how cognitive engagement plays a role in the online learning experience (Richardson, 2008; Oh & Kim, 2016).

Cognitive Engagement and Self-efficacy (Path J). It is hypothesized that students with higher reports of self-efficacy are likely to be more engaged in a course cognitively. Research also suggests that multiple factors outside of self-regulation indicate cognitive engagement in learning activities. Cognitive presence through the four phases of practical inquiry (triggering event, exploration, integration, and resolution) may provide the relationship that research has eluded to (see Fredericks et al., 2004; Fredericks, 2011). Greene et al. (2004) studied a similar model that examined students' perceptions of the classroom and cognitive engagement with self-efficacy as a mediating variable.

Behavioral Engagement. While some studies have found a correlation between GPA and grades (Macfadyen & Dawson, 2010; Davies & Graff, 2005), behavioral engagement does not necessarily co-vary with higher order thinking (Ben-Eliyahu et al., 2018). As an example in

online learning, many students may meet or exceed the required number of discussion posts, but they do not necessarily demonstrate deep engagement with the materials in the course.

Teaching Presence and Behavioral Engagement (Path H). Literature also suggests that there will be a relationship between teaching presence and behavioral engagement (Goggins & Xing, 2016; Ma, Friel, & Xing, 2014; Vonderwell & Zachariah, 2005). Prior research suggests factors such as instructional tasks and teaching materials influence student participation (Ma, Friel, & Xing, 2014). If students have previously had bad experiences with online teachers, then they may perceive feedback or other teaching presence factors (including things like language in the syllabus) and will choose to not ask questions or seek help from the instructor (behavioral engagement). Teaching presence, either through the instructor interaction in the course or through intentional course design, can serve as a catalyst to encourage behavioral engagement throughout the course (Zhao & Sullivan, 2017; Bliss & Lawrence, 2009).

Social Presence and Behavioral Engagement (Path I). Social presence factors within online discussion posts has been shown to reduce the time spent between posts (possibly indicating higher levels of engagement) and increased time spent reading posts (Goggins & Xing, 2016). If students are more comfortable interacting in the course, then they will be more motivated to engage in the course (Dunlap & Lowenthal, 2009).

In this model, it is not hypothesized that there will be higher levels of cognitive engagement in direct relation to teaching presence. While the student might feel confident in the course and engage in the course materials as well as with other students (Richardson & Swan, 2003), the student may not feel cognitively engaged for a variety of reasons such as not feeling challenged by the course material (Zhao & Sullivan, 2017).

Chapter 3: Methodology

The purpose of this chapter is to discuss the methodology of the study in order to better understand student's perceptions of learning effectiveness and engagement. It will discuss the participants, the sampling procedures in this study, and the measures that were used.

This study was approved by the University of Oklahoma's Institutional Review Board on February 3, 2020. Data collection began February 5, 2020 and continued through March 2020. On March 11, 2020, the World Health Organization characterized the COVID-19 virus as a pandemic. Universities in the United States moved face-to-face instruction to purely online offerings in an abundance of precaution for the safety of their students (Houlden & Veletsianos, 2020; IHE Staff, 2020) in addition to meeting new public health guidelines which included limiting public gatherings to ten people (Miller, 2020). At this time, an additional item was added to the survey to ask students if their course was online originally, or if it was placed online in response to COVID-19 (See Student Demographics Appendix E). For the duration of the analysis in this document, these responses are referred to as the Pre-COVID-19 group, indicating responses collected prior to the addition of this item in the survey, and the Post-COVID-19 group, indicating responses collected after the addition of this item in the survey.

During this time, both as the United States began to undergo "Safer at Home", "Shelter in Place", and other variations of lockdowns and quarantines (Lee, 2020), the data collection for this study began to slow going from 6 to 7 responses submitted per week to 1 to 2 responses per week (Starting March 12, 2020). Meanwhile, most universities, including those that the samples came from went to remote teaching. Remote teaching, while using online tactics, is not planned to think about course design, facilitation tools, or online learner readiness in the same way as a course that is initially designed to be online. Participants, while they may be enrolled in courses

designed to be online, were likely to also now be taking remote courses that were not originally intended to be facilitated online. Overall, there was a concern that this experience will impact participant responses as they reflect on their collective experiences rather than specific experiences in courses designed to be entirely online.

On March 29, 2020, approximately 140 completed responses were collected for this study, leaving approximately 50 short of the needed 200 total participants for the path analysis. Many at this time were warning that data (aside from COVID-19 specific research) would be skewed due to the unusual circumstances and financial/mental health students would find themselves in (Tobin, 2020). The researcher reached out to faculty a last time to recruit the remaining participants for the study. The resulting participants (an additional 69 in addition to the 140) were compared to examine the differences between the pre-shelter in place era and the post-shelter in place era, later referred to in this study as the Pre-COVID and post-COVID groups.

Participants

Demographic information was collected from students (See Appendix E). The participant group consisted of undergraduate students currently enrolled in a college credit, online, undergraduate class. Out of the 209 responses, the majority were white (71.8%), female (70.3%), between the ages of 18 and 24 (51.2%), were enrolled full time (79.9%) and were fairly experienced in taking online courses (77.5% responded that they have taken more than 3 courses). When asked about first generation student status, the majority (56%) reported that they were not first generation students. Degree programs reported were focused in business in addition to social and behavioral sciences with programs in humanities as well as science, technology, engineering or math making up the majority of the remaining responses (See

Appendix I). The sample demographics here are similar to those found in other national studies with the majority being white, female, enrolled full time, and primarily studying business (Allen, Seaman, Poulin, & Straut, 2016; Clinefelter & Aslanian, 2017).

Procedures

Criteria sampling (Fraenkel & Wallen, 2009) was used as participants had to be undergraduate students in an online course (prior to all courses going online due to the COVID-19 pandemic). First, faculty teaching undergraduate general education courses were contacted to aid in the study. Those contacted ranged from program coordinators and chairs who shared the study information with their faculty, to faculty recruited via social media who were given survey information via email after the initial contact had been made. Once faculty were recruited, they were instructed via the recruitment documents (See Appendix B, C, and D) to share the student survey via email or on their learning management system. Participants were incentivized to complete the surveys with $50 gift cards; participants were entered into a spreadsheet and selected using a random number generator. One gift card was awarded for every 50 participants; four gift cards were awarded in total. Faculty who recruited ten or more students were incentivized with a $25 gift card, and seven gift cards were awarded to faculty in total.

In order to maintain confidentiality the survey contained a link to a second survey asking them for a name and email address to be entered into a drawing for a prize for participation. The recruitment and data collection period lasted approximately 11 weeks in which some faculty taught eight week courses thus sharing the survey information with both groups of students.

Measures

In addition to demographic information, student data was collected using three instruments, the Revised Community of Inquiry survey (Arbaugh et al., 2008; Kozan & Richardson, 2014; see Appendix F), the Student Self-Efficacy Scale (Rowbotham & Schmitz, 2013; see Appendix G), and the Burch Engagement Survey for Students (Burch et al., 2015; see Appendix H).

Community of Inquiry

The core constructs of the Revised Community of Inquiry instrument match the framework: cognitive, social, and teaching presence. All items are interval variables using a 5-point Likert scale using a range (1) strongly agree to (5) strongly disagree. Each construct in the instrument contains items that represent the indicators developed from the original framework (e.g. social presence includes items that represent the affective response indicator). There are a total of 34 items in the measure.

The CoI survey was originally created by a collection of researchers involved in the development of the framework and seminal studies (Arbaugh et al., 2008). It was created using the original framework of cognitive, social, and teaching presence with items corresponding to each presence's subconstructs. After an initial validation study, the authors noted concern regarding a need to refine items in the survey to better measure teaching presence (Arbaugh et al., 2008; Boston et al., 2009; Shea et al., 2010). Therefore, a modified version of the CoI survey is used in this research design. The revised survey (Kozan & Richardson, 2014) was validated by

surveying two groups of graduate students with different analysis (EFA and CFA n=219, CFA only n=178). Results of this study indicated construct validity. The subscales were found to be reliable with cognitive presence (CP) α=.938, teaching presence (TP) α=.963, and social presence (SP) α=.911. Several studies have validated the reliability of the instrument using the same analysis methods with Cronbach's alpha ranging from .91 to .96 (Arbaugh et al, 2008; Shea & Bidjerano, 2009b; Bangert, 2009; Arbaugh, Bangert, & Cleveland-Innes, 2010).

Student Self-Efficacy Scale

The Student Self-Efficacy Scale (SSE), created by Rowbotham and Schmitz (2013) addresses four areas of efficacy: academic performance, skill and knowledge development, social interaction with faculty, and coping with academic stress (Rowbotham & Schmitz, 2013). Each item on the scale uses a 4-point Likert format with a range of (1) not at all true to (4) exactly true. A student completing the scale would result in a score range of 10 to 40 where higher scores represent a higher sense of self-efficacy. The scale was examined by expert educators to determine face and content validity to ensure the items represented the role of the student as it relates to the four areas mentioned above (Rowbotham & Schmitz, 2013). Validity was tested by examining correlations between items on the scale with items on the General Self-Efficacy Scale (GSE). The seminal study tested a group of 65 undergraduate students. Researchers found an internal consistency of α= 0.84 and strong correlations between the GSE items and the SSE.

Burch Engagement Survey for Students

The Burch Engagement Survey for Students (BESS) was developed by Burch et al. (2015) to measure four areas of engagement: emotional engagement, physical engagement,

cognitive engagement: in class, and cognitive engagement: out of class. For the purposes of this study, the in class engagement items were removed. This study focuses on courses entirely online; therefore, the items for cognitive engagement: Out of Class were used. These items, such as “When I am reading or studying material related to this class/course, I pay a lot of attention to class discussion and activities”, can easily apply to a student taking an online course as much as a face-to-face course. The instrument contains six items to measure emotional engagement, six items to measure physical or behavioral engagement, and six items to measure cognitive engagement (out of class). The original validation for the instrument was divided into two studies (Burch et al., 2015). The first study used an exploratory factor analysis with varimax rotation, the factor loadings resulted in four distinct components: emotional engagement, physical engagement, cognitive engagement: in class, cognitive engagement: out of class. Study one was conducted with 214 undergraduate students in the last two weeks of the semester. The second study involved 354 undergraduate students and used confirmatory factor analysis with the four factor model being the best fit for the data (CFI =.99, IFI = .99, RMSEA = .07, $\chi^{2/df}$=2.6). Data were collected from February 2020 through April 2020, the following chapter will discuss the results of the data collected.

Chapter 4: Results

Once data collection was finished, the data were downloaded into an Excel file from the survey facilitation system (Qualtrics). There were a total of 237 responses collected. Prior to analysis the data were screened for accuracies and missing data. A total of 28 responses were removed due to missing scale responses per advised research practices for data analysis (Tabachnick & Fidell, 2013). Proofreading was accomplished by a visual review as well as an examination of the descriptive statistics (Tabachnick & Fidell, 2013). According to Tabachnick and Fidell, missing data should first be handled by identifying if the missing data follows a pattern to see if there are any significant reasons or assumptions that can be made based off of the missing items (2013). There were no patterns to the missing data in the 28 removed responses.

In total, 209 responses were analyzed to address the research questions proposed in Chapter Three. The items were transformed into means for each of the three instruments and subscales. This was done by taking the item means from each subconstruct (COI cognitive presence, COI social presence, COI teaching presence, self-efficacy, cognitive engagement, emotional engagement, behavioral engagement) and creating a new variable for each case. Descriptive statistics and correlations of the three instruments (Community of Inquiry, Student Self-Efficacy Scale, and Burch Engagement Survey for Students) were analyzed as well as the model fit, parameters, and indirect effects of the variables. Since data collection was interrupted by the COVID 19 shutdown, some responses were collected before this occurred and some after. Therefore, an independent t-test was performed to analyze the differences between the pre-COVID responses collected and the post-COVID responses collected.

Analysis of the Impacts of COVID-19

The two groups, those collected before and after COVID-19 shutdown, were compared using a t-test with the independent variable being the Pre- or Post-COVID-19 responses (as indicated by the question added, described above) and the dependent variables being the Community of Inquiry, Student Self-Efficacy Scale, and Burch Engagement Survey for students measures.

A stratified random sample was used to create groups that were more equal than sample size. As t-tests are particularly susceptible to groups that do no share other characteristics, a stratified sample was used to get the two groups as equal as possible. First, descriptive statistics were analyzed for the post-COVID-19 group. The researcher used gender and race to obtain a stratified sample of the pre-COVID-19 group. The stratified sampling attempts to select a sample that reflects the population characteristics. The post COVID-19 group contained 20 males, 47 females, 1 participant elected to respond with “Prefer Not to Say”, and 1 participant did not select a gender. The pre-COVID group was selected by gender and race to represent similar characteristics as the post-COVID-19 group, including one participant that also selected “Prefer Not to Say” for gender in the pre-COVID-19 group (see Appendix L Figure L1, Figure L2, Figure L3 and Figure L4).

Table 4.18

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Teaching Presence	Equal variances assumed	0.022	0.882	0.131	136	0.896	0.01226	0.09347	-0.17259	0.19711
Social Presence	Equal variances assumed	0.045	0.833	0.262	136	0.794	0.03382	0.12929	-0.22186	0.28949
Cognitive Presence	Equal variances assumed	0.038	0.846	0.789	136	0.432	0.07246	0.09187	-0.10922	0.25415
Student Self-Efficacy Scale	Equal variances assumed	0.039	0.843	1.357	136	0.177	0.1	0.07369	-0.04573	0.24573
Emotional Engagement	Equal variances assumed	0.712	0.400	0.689	136	0.492	0.08937	0.12972	-0.16715	0.3459
Behavioral Engagement	Equal variances assumed	0.572	0.451	0.475	136	0.636	0.07246	0.15263	-0.22937	0.3743
Cognitive Engagement	Equal variances assumed	0.23	0.632	0.871	136	0.385	0.13768	0.15805	-0.17488	0.45024

The results of Levene's test for equality of variances indicates that the null hypothesis should be accepted, all p-values are greater than 0.05 (see table 4.18). Moreover, the t-test 2-tailed significance is all greater than .05, which would indicate that there is no difference between the two groups. Therefore, the full complete sample of responses (N=209) were used in the analysis for the proposed research questions.

Descriptive Statistics

Descriptive statistics were analyzed for each of the subconstruct means and the self-efficacy measure. Each of the scales were analyzed for univariate normality and reliability using Cronbach's alpha (see table 4.1). Skew and kurtosis values were analyzed for values greater than two in absolute value for univariate normality. Values greater than the absolute value of two are considered substantial and would indicate non-normality (Lomax & Hahs-Vaughn, 2012; Pituch & Stevens, 2016). Teaching presence was the only variable greater than two with a kurtosis value of 3.921. Structural equation modeling assumes multivariate normality, if this assumption is violated then errors can be made in the interpretation of the model fit and the model parameters (Byrne, 2010). I examined Mardia's kurtosis for multivariate normality, which indicated there was a violation of the assumption of multivariate normality [Mardia's kurtosis = 20.935, c.r. =15.445, $p < .001$]. An additional test was used, the Bollen-Stine bootstrap procedure, which indicated the model was not a good fit for the data, more on model fit in the path analysis section. The scales were also analyzed for internal validity using Cronbach's alpha ranging from .865 (social presence) to .944 (cognitive engagement) (see table 4.1).

Table 4.1

Descriptive Statistics for Scales

Descriptive Statistics for Scales

Scale	M	SD	Skew	Kurtosis	Cronbach's α
Teaching Presence	4.4788	0.62974	-1.848	3.921	0.934
Social Presence	4.0569	0.74536	-1.144	1.365	0.865
Cognitive Presence	4.3194	0.57831	-1.001	0.729	0.890
Self-Efficacy	3.4914	0.44713	-0.862	0.145	0.882
Behavioral Engagement	4.071	0.84646	-0.955	0.520	0.927
Cognitive Engagement	3.7879	0.88294	-0.570	-0.237	0.944

Measure Correlations

All scales, or measures, positively correlated significantly with one another, meaning that the scales operate interdependently (see table 4.2). Correlation coefficients equal to or less than .10 equal small effect, .30 equal moderate effect, and .50 equal large effect (Cohen, 1988). Behavioral engagement was moderately positively correlated with teaching presence, social presence, cognitive presence, and self-efficacy. Social presence and teaching presence were moderately positively correlated. Cognitive engagement was moderately positively correlated with teaching presence and self-efficacy. Self-efficacy was also moderately positively correlated with social presence. Large positive correlations occurred between cognitive presence and all other measures. Cognitive and behavioral engagement were also positively correlated with a large effect.

Table 4.2

Pearson Correlations for Scale

Pearson Correlations for Scales

	Teaching Presence	Social Presence	Cognitive Presence	Self-Efficacy	Behavioral Engagement	Cognitive Engagement
Teaching Presence	-					
Social Presence	.474**	-				
Cognitive Presence	.665**	.731**	-			
Self-Efficacy	.461**	.475**	.592**	-		
Behavioral Engagement	.336**	.320**	.438**	.394**	-	
Cognitive Engagement	.445**	.568**	.602**	.423**	.609**	-

**Correlation is significant at the 0.01 level (2-tailed).

Path Analysis

Path Analysis was used to address the research questions in this study to evaluate the direct, indirect, and total effects in the model. Paths A, B, C, G, H, and I all represent direct effects in the proposed model. The model was first analyzed to see if it was a good fit for the data. Next, parameter estimates were generated including standardized regression weights, covariances, squared multiple correlations, direct, indirect, and total effects.

Analysis of Global Fit for Hypothesized Model

The model was analyzed if the model was a good fit for the data set. First, the chi-square goodness of fit test was used, this test acts as “badness of fit” and examines how poorly the model fits the data. A significant chi-square test indicates that the model was a poor fit for the data. This test was impacted by sample size, so it’s best to use multiple indicators of fit. The

results of the chi-square test were significant at $\chi^2(5) = 87.843$ indicating that the model was a poor fit for the data set. Next, the GFI, or Goodness of Fit Index was at a .907, GFI levels range from 0 to 1 with values closer to one indicating good fit. A value of .907 indicates acceptable fit; however, we can also look at the AGFI, which is parsimony adjusted, this number is at .608 which indicates a poor fit.

Table 4.3

Chi-Square Goodness of Fit Test

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	16	87.843	5	0	17.569
Saturated model	21	0	0		
Independence model	6	590.925	15	0	39.395

Table 4.4

Goodness of Fit Indice

Model	RMR	GFI	AGFI	PGFI
Default model	0.073	0.907	0.608	0.216
Saturated model	0	1		
Independence model	0.211	0.429	0.201	0.307

Baseline comparisons evaluate the model against a null hypothesis assuming no relationships exist between the variables. Like the GFI, a range of 0 to 1 was used for the Comparative Fit Index (CFI) with values closer to 1 indicating an ideal fit and the Tucker-Lewis

Index adjusting for model complexity, similar to the AGFI. In this model, CFI was a .856 indicating less than optimal fit, but the TLI (adjusted for complexity) was a .568 indicating poor fit (for thresholds see Kline, 2016 and Schumacker and Lomax, 2016).

Table 4.5

Baseline Comparisons

	NFI	RFI	IFI	TLI	
Model	Delta1	rho1	Delta2	rho2	CFI
Default model	0.851	0.554	0.859	0.568	0.856
Saturated model	1		1		1
Independence model	0	0	0	0	0

Another indicator for fit is the RMSEA or Root Mean Square Error of Approximation, which again examines model complexity as well as sample size. Here, a range of 0 to .05 indicate good fit and values above .10 are poor indicators of fit (Schumacker & Lomax, 2016; Whittaker, 2016). In this model, the RMSEA value was .282 indicating a poor fit for the data with a PCLOSE value (indicating significance) of .000.

Table 4.6

Root Mean Square Error of Approximation

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.282	0.232	0.335	0
Independence model	0.43	0.4	0.46	0

Analysis of Parameters for Hypothesized Model

Each relationship in the model was analyzed to understand how well the model represented the relationships among the variables. All of the paths in the model had a positive relationship; however, only four are statistically significant at a conventional p-value of < .05. Cognitive presence was a positive predictor of self-efficacy and cognitive engagement; and teacher presence and social presence were positive predictors of behavioral engagement.

Table 4.7

Summary of Path Coefficients and Tests

Paths	Unstandardized path coefficients	s.e.	p-value	Standardized path coefficients
Self-Efficacy < Cognitive Presence	.342	0.074	<.001	.442
Self-Efficacy < Teaching Presence	.087	0.053	.097	.123
Self-Efficacy < Social Presence	.056	0.049	.247	.094
Cognitive Engagement < Self-Efficacy	.203	0.098	.132	.103
Cognitive Engagement < Cognitive Presence	.826	0.083	<.001	.541
Behavioral Engagement < Social Presence	.236	0.104	.004	.208
Behavioral Engagement < Teaching Presence	.320	0.135	.001	.238

As predicted by the literature, the Community of Inquiry subconstructs significantly, positively covaried.Based on Cohen's (1988) conventions, the relationship between cognitive presence and teaching presence had a large correlation (r=.665), teaching presence and social presence had a fairly large correlation (r=.474), and the relationship between cognitive presence and social presence had a large correlation (r=.731).

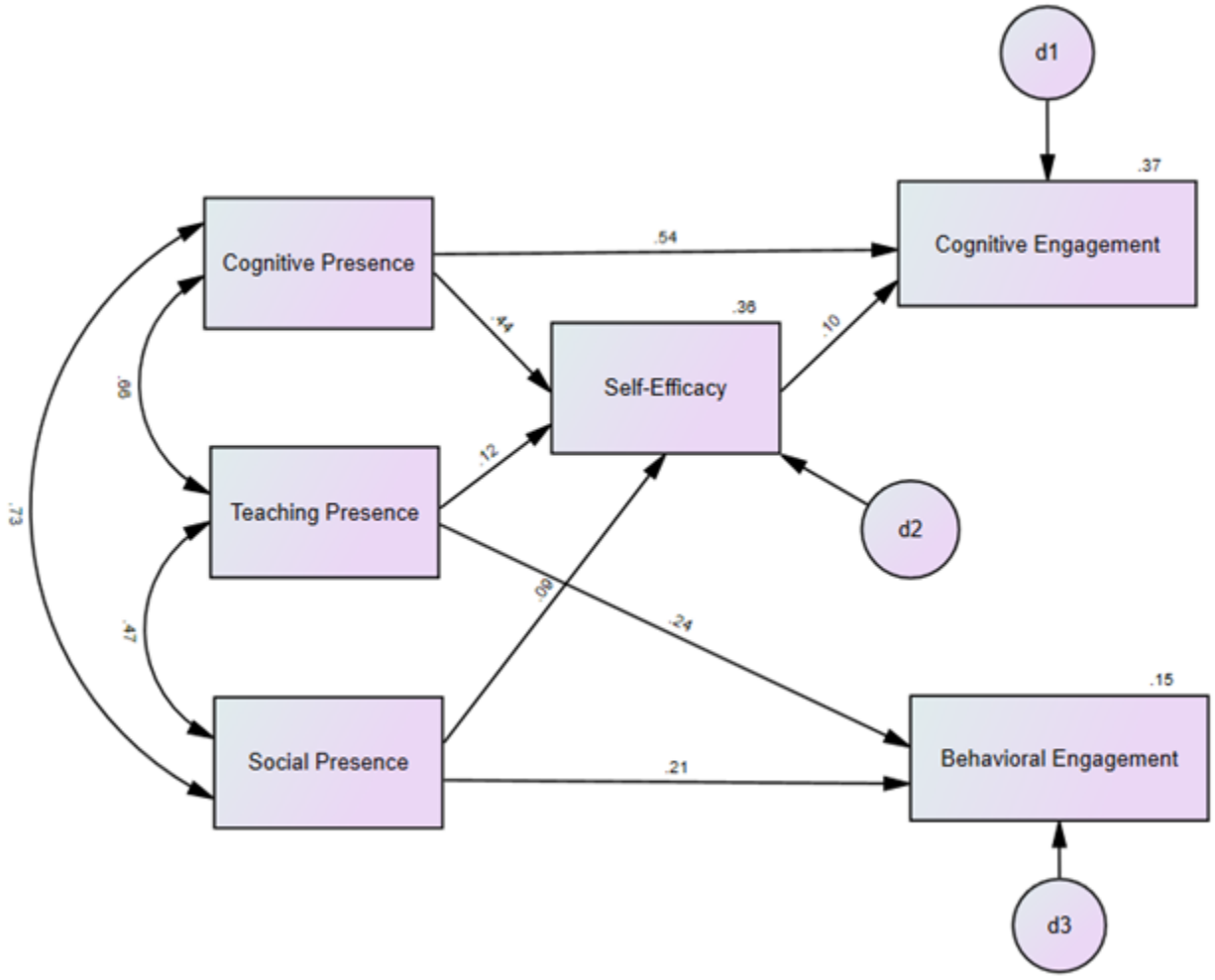

Figure 4.1 Standardized Estimates of Model 1. The double-headed arrows represent covariances between the community of inquiry subconstructs.

The squared multiple correlations output are data that show the percentage of variation shown in the model of the endogenous variables. In this model, self-efficacy, behavioral engagement, and cognitive engagement are the endogenous variables. The predictor variables accounted for 36.3% of the variation for self-efficacy, 14.6% for behavioral engagement, and 36.9% for cognitive engagement.

Indirect and Total Effects

The hypothesized model contains predictor variables (cognitive, social, and teaching presence) and a mediating variable (self-efficacy). The indirect effect of social presence, teaching presence, and cognitive presence on cognitive engagement is .011, .018, .069 with a 95% confidence interval of [-.004, .059], [-.001, .061] and [-.008, .162] respectively. The null hypothesis would equal zero and because all confidence intervals for the indirect effects contain zero, this would indicate accepting the null hypothesis that there is no indirect effect of social, teaching, nor cognitive presence on cognitive engagement.

In the case of total effects, we can examine the total effects on cognitive engagement through cognitive presence directly and as the effects of cognitive presence, teaching presence, and social presence indirectly (Paths G, J, E, D, and F - see figure 4.2).

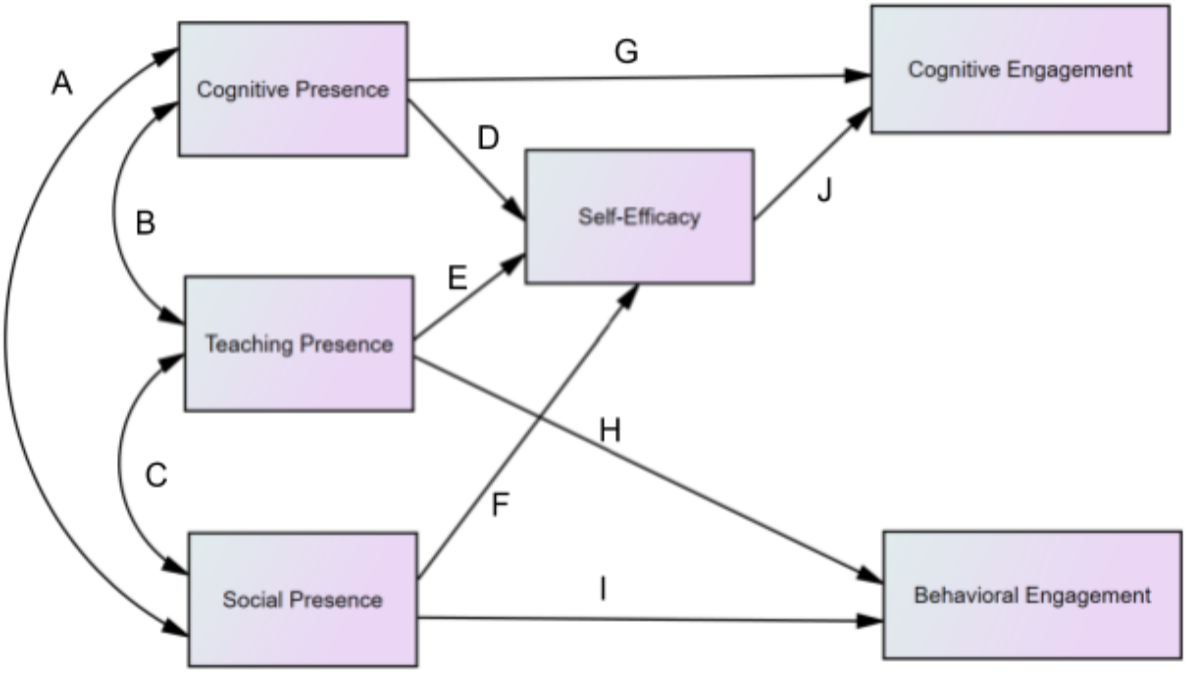

Figure 4.2 Path Diagram of Hypothesized Model

The total effects of cognitive presence on cognitive engagement was .895 and statistically significant 95%CI = [.74, 1.048]. The total effects of teaching presence on cognitive engagement was .018 and not significant 95%CI =[-.001, .061], the total effects of social presence on cognitive engagement was .011 and not significant 95%CI =[-.004,.059]. Overall, the data suggests self-efficacy does not act as a mediator between these particular variables.

Chapter 5: Discussion

Overall, when considering research and design in online education, researchers, designers, and educators need to focus on the learning effectiveness of online education and the unique attributes of online courses as perceived by the students they serve. Moreover, they should also be considering the learner population and how design considerations change depending on the experience and sophistication of the learner.

Online education is a learning environment that is gaining in popularity as a learning preference for many undergraduate students (Clinefelter & Aslanian, 2017). Researchers, designers, and educators, among other stakeholders, need to understand the unique challenges undergraduate students may face. Administrators, instructional designers, and other stakeholders will need to understand this in order to make effective decisions to empower faculty for online teaching. Unfortunately, at the time of this writing, we only need to look at the global pandemic of COVID-19 in order to understand the significance of these decisions on the learning experiences of students.

COVID-19 has shown us two things, (1) intentionally designing for an online learning environment is vital and (2) in a well-designed environment even students that don't prefer online learning can flourish (Clinefelter & Aslanian, 2017). Remember, online learning has four unique attributes that must be considered in design. Those attributes are asynchronous communication, higher levels of written communication, teacher immediacy, and a need for higher levels of self-directed learning (Kim, Olfman, Ryan, & Eryilmaz, 2014). When courses are planned for face-to-face instruction, educators might not be thinking of these factors because they either don't exist or they play a smaller role. However, when educators are suddenly forced to put their courses online, they likely aren't able to take the time to consider the differences

between the two environments other than the challenges they present (logistics, access etc.). This is why it was important to use a framework like the Community of Inquiry to specifically consider those attributes throughout the design and implementation process and assess the learning effectiveness of the environment.

As the world moves into a new era of online education, educators and other stakeholders aren't just considering the how of "How do I move my course online?". They are now considering the how of "How do I facilitate higher-order thinking skills in my online course?" Beyond basic strategies and tools of online teaching and learning, stakeholders are needing to understand the learning effectiveness as a component of online course design.

As mentioned previously, a number of studies (Arbaugh et al., 2008; Swan et al., 2008; Garrison, Cleveland-Innes & Fung, 2010), including this one, show that the Community of Inquiry factors covary and serve as a balanced system in supporting cognitive presence. In fact, some argue that the cognitive presence construct is the more dominant and significant construct amongst the three (Kozan & Richardson, 2014). Therefore, when considering designing for an online course, it is important to look at how design factors for cognitive, social, and teaching presence can ultimately support cognitive and behavioral engagement. When discussing each of the results related to the research questions, I will offer specific examples of relevant design features.

The majority of online learning students are undergraduate students (Allen et al., 2016) and thus the focus of this study. Stakeholders in online education need to consider the effects learning design and student perceptions might have on their cognitive engagement in the class. Graduate students might be more sophisticated learners, with higher levels of intrinsic and extrinsic motivation, such as job promotions or setting a personal goal of being the first in the

family with a graduate degree. However, undergraduate students do not share the same level of motivation as graduate students (Rovai, Ponton, Wighting, & Baker, 2007). Therefore, it is important to consider designing online offerings with self-efficacy in mind to improve persistence and retention (Rovai, Ponton, Wighting, & Baker, 2007; Reed, 2016; Sawtelle et al., 2012).

Research Questions

The purpose of this study was to understand the following research questions:

1. To what extent do undergraduate students' perception of the factors of Community of Inquiry predict cognitive and behavioral engagement?
2. To what extent do undergraduate students' self-efficacy act as a mediator between student perceptions of cognitive presence, teaching presence, social presence, and cognitive engagement?
3. What factor of Community of Inquiry predicts cognitive engagement the most?
4. What factor of Community of Inquiry predicts behavioral engagement the most?

Let's discuss the results based on each research question. Questions one and three have been combined as they yield results best understood together.

To What Extent Do Undergraduate Students' Perception Of The Factors Of Community Of Inquiry Predict Cognitive And Behavioral Engagement?

Cognitive engagement was shown to have 36.9% of the variation accounted for by the direct effects of cognitive presence and indirect effects of self-efficacy, which means that 63.1% of the variation is unaccounted for in this model. The path for self-efficacy and cognitive

engagement were not significant, clearly more research is needed to understand the relationship between teaching presence, social presence, self-efficacy and cognitive engagement. In this model, direct effects of teaching presence and social presence contributed to 14.6% of the variation in behavioral engagement, which means that an additional 85.4% of variation is unaccounted for in this model. Moreover, the regression weights for these paths were significant and moderate (Cohen, 1988) with the standard path coefficients at .208 and .238 for social presence and teaching presence respectively. These findings would suggest that stakeholders focusing on the teaching and social presence elements could expect a moderate impact on behavioral engagement with a population like those in this sample. The following sections will review factors related to predicting cognitive engagement and offer specific examples of design strategies that can be used.

Predicting Cognitive Engagement. The constructs of Community of Inquiry aren't simply about identifying what is currently happening in an online course or what did happen. The Community of Inquiry can also be used as a framework to implement and evaluate design elements in a course. Should CoI predict cognitive engagement, stakeholders in online education could use CoI as a design tool to design for these factors. For example, Darabi, Arrastia, Nelson, Cornille, and Liang (2011) wanted to explore different ways of facilitating cognitive presence through four different online discussion strategies. The researchers argued that simply asking probing questions in an online discussion does not promote cognitive presence nor facilitate higher order thinking skills. Each of the student groups was assigned one of the four online discussion strategies identified by the researchers (structured, scaffolded, forced debate, and role play). Researchers found that the role play discussion group (who had to step into the shoes of a

professional in their field and proceed with the discussion from that perspective) scored well in all phases of cognitive presence, with particularly high scores in integration.

While self-efficacy as a mediator variable was not significant, the direct effects of cognitive presence on cognitive engagement had a medium positive relationship of .541, which was significant. This would suggest that stakeholders looking to implement design elements to improve cognitive engagement would focus on cognitive presence design elements such as scaffolding learning activities and feedback to move students through the different phases of the practical inquiry model. Logically, the higher a student's perceptions of valuable learning activities (for example this item from the CoI measure "Learning activities helped me construct explanations/solutions.") would naturally lend the situation to higher levels of perceived cognitive engagement in which the student would work harder in the course (Greene et al., 2004). In fact, students have reported in CoI studies perceptions of more social connections and critical thinking in online courses versus blended courses (Arbaugh, Bangert, & Cleveland-Innes, 2010). Garrison (2003) argues that several constructs of metacognition overlap with reflective inquiry and self-directed learning. These constructs mostly tie back to two groups: awareness and control. When we evaluate our cognition and ultimately test and implement strategies to solve problems or reflect on a concept, we are practicing both awareness and control. This awareness and control may be seen through the measurement of engagement. It is argued that online learning environments require greater levels of metacognition strategies as students are inherently required to be more active and take more ownership in their learning (Akyol & Garrison, 2011; Topcu & Ubuz, 2008; Garrison & Akyol, 2015). Moreover, to integrate metacognition into inquiry, it is argued that metacognition must be self-corrective in one's thinking (Akyol & Garrison, 2011; Martinez, 2006).

Predicting Behavioral Engagement. While cognitive presence had a positive predictive relationship on cognitive engagement, social and teaching presence had a positive predictive relationship with behavioral engagement. Specific design factors for social and teaching presence can support behavioral engagement. Moreover, due to the covariances between the three constructs of CoI (found in this study and prior research, see Arbaugh et al., 2008; Swan et al., 2008; Garrison, Cleveland-Innes & Fung, 2010), it is important to remember that social presence and teaching presence are the support pillars of cognitive presence. While the central construct of the community of inquiry is cognitive presence, it is nearly impossible to observe this construct in a vacuum. Design factors emphasizing cognitive presence should take the other presences into account as supported by prior research (Armellini & Stephani, 2016). The online educator will need to make intentional decisions in the content selection and the overall structure of the course to facilitate cognitive presence. Garrison et al. (2000) suggest focusing on depth rather than breadth, selecting materials that cover the scope of the content and focusing on the big picture ideas. In this way, the material can be reflected upon iteratively throughout the course, rather than covered quickly and shallowly.

As students engage in the practical inquiry cycle (i.e. cognitive presence), they will find themselves both asking questions based on their own reflections and the reflections posted of others (Yang, 2016). This requires a good deal of design and facilitation to help students understand that it is okay for them to take on an instructional role and critically examine the discussions of others to ask these questions (Yang, 2016). Moreover, it is important to recognize that an instructor needs to take an active role in the discussion process in order to better facilitate and address the needs of students in an asynchronous environment to facilitate the social presence in a course (Cho & Tobias, 2016; Yang 2016). This does not mean that they have to

increase the amount that they are participating, only that their participation should be quality focused as well as how they design and structure the course discussions from the beginning so students are able to interact and provide feedback effectively (Yang 2016; Cho & Tobias, 2016).

As previously mentioned, the course needs to be designed with the intention of fostering cognitive and social presence. Structuring an online course requires more forethought and planning than the on-the-fly teaching opportunities in traditional formats (Anderson et al., 2001). Moreover, the lack of traditional classroom expectation and routines require the educator to be more explicit and detailed in their planning. Researchers developed five indicators of instructional design teaching presence in online education: “setting the curriculum," “designing methods," “establishing time parameters," “utilizing the medium effectively," and “establishing netiquette” (Anderson et al., 2001, p. 6).

Second, the online educator will need to facilitate social presence by structuring the discourse and modeling social and cognitive presence behavior (Yang, 2016). For example, educators can create prompts that scaffold students through the different stages of practical inquiry and establish rules and protocols for students as they engage through written communication to increase social presence (Stein, et al., 2007; Rourke et al., 1999; Cho & Tobias, 2016; Garrison et al., 2000). Educators can give students an opportunity to introduce themselves (self-disclosure), make humorous connections to the content of the course (use humor), ask about one another’s day or talk about sports (phatics), encourage them to use emoticons, gifs, or memes to express emotion, etc. (Anderson et al., 2001). The educator can establish explicit guidelines to encourage social presence in addition to modeling the behavior (e.g., asking them to reference other's posts or refer to each other by name, etc.). Students are more likely to engage in online communication when the educators are more engaged (Tagg &

Dickenson, 1995; Yang, 2016). Educators should model behavior by posting feedback throughout the discussion such as recognizing a student's inputs to the discussion. They should also use probing questions and critical evaluation to move the discussion forward, thus increasing the likelihood that students will engage critically with the discussion (Fabro & Garrison, 1998; Yang, 2016). Researchers established six indicators of this category of teaching presence: “identifying areas of agreement/disagreement”, “seeking to reach consensus/understanding”, “encouraging, acknowledging, or reinforcing student contributions”, “setting climate for learning”, “drawing in participants, prompting discussion”, and “assessing the efficacy of the process” (Anderson et al., 2001, p. 8).

Lastly in the context of CoI, direct instruction is not the crock-pot “set it and forget it” approach to designing a course then allowing the students to independently move through the content 100% self-directed without instructor intervention (Anderson et al., 2001). Student-centered in this approach does not mean student only. The instructor is obligated to provide instructional support using both domain and pedagogical expertise. To properly establish cognitive presence, the instructor needs to explicitly model the actions of an expert scholar (Anderson et al., 2001). Appropriate teaching presence requires a significant level of subject expertise that is shared through cognitive apprenticeship (Anderson et al., 2001). Indicators of direct instruction are: “present content/questions”, “focus the discussion on specific issues”, “summarize the discussion”, “confirm understanding through assessment and explanatory feedback”, “diagnose misconceptions”, “inject knowledge from diverse sources”, and “respond to technical concerns” (Anderson et al., 2001, p. 10).

To What Extent Do Undergraduate Students' Self-efficacy Act as a Mediator Between Student Perceptions Of Cognitive Presence, Teaching Presence, Social Presence, And Cognitive Engagement?

Online student self-efficacy presents an extra layer in understanding learning effectiveness online. A faculty member or instructional designer can add all kinds of activities and supports, but if the student doesn't believe they will succeed, then that design may be wasted effort to engage the student. While a student might feel efficacious when it comes to the materials, the same student might not feel as confident with their ability to succeed in an online course. In this model, it was hypothesized that self-efficacy was the mediating variable between CoI and cognitive engagement. This means that the student's perceptions of self-efficacy were first filtered through the lens of cognitive, social, and teaching presence before establishing the relationship between CoI and cognitive engagement. Therefore, according to this model, a student's self-efficacy is going to play a role in how the student engages in the course.

According to the results of the data, the three subconstructs of the Community of Inquiry accounted for 36.3% of the variation in the students' self-efficacy; however, the path between self-efficacy and cognitive engagement was not significant at $p < .05$. The results of this study suggest that self-efficacy does not play a role in mediating the community of inquiry constructs as they relate to cognitive engagement.

A number of factors could contribute to this outcome. First, the framing of the survey items for cognitive engagement uses the words "attention, focus, concentrate, and absorb". A student may perceive these items to mean length of time and attention, rather than quality of time spent on course materials. Therefore, while a student's self-efficacy and cognitive presence

might be high, the way they perceive their abilities in learning online and their ability to focus on course material simply differ. Moreover, the relationships between social presence and self-efficacy were low and non-significant; this could affect the relationship between self-efficacy and cognitive engagement. An improved model might omit these two factors. Remember, this particular self-efficacy scale (Rowbotham & Schmitz, 2013) addresses four areas of efficacy: academic performance, skill and knowledge development, social interaction with faculty, and coping with academic stress. An improved model may look at the emotional engagement factors as they relate to coping with academic stress.

Interestingly, there was a medium (.442) significant positive relationship between cognitive presence and self-efficacy. Prior research supports this finding, as cognitive presence is about a student's motivation to explore the content, the strategies a student uses to solve problems in the course, engaging in discussions in the course, and active integration of new knowledge with prior knowledge (Garrison et al., 2000; Garrison, 2003). A student's perception of these concepts would logically covary with higher levels of self-efficacy in the course which also determine the strategies students will use and level of motivation (Zimmerman, 2000). As previously mentioned, some researchers identified a fourth subconstruct in the CoI model: learning presence. Researchers argue that this construct attempts to bring together remaining constructs in deeper learning: self-regulation and self-efficacy (Shea & Bidjerano, 2010). However, advocates of the original model argue that these constructs are addressed within cognitive presence, specifically the discussions and dimensions of metacognition (Garrison & Akyol, 2009). One can draw a parallel between descriptions of self-regulation and the dimensions of metacognition as defined by Garrison and Akyol (2009) as regulation of

knowledge. Moreover, the descriptions of self-efficacy can be compared to the discussions of knowledge of cognition (Garrison & Akyol, 2009).

More research is needed to delineate between whether self-efficacy exists as a separate construct or if learning presence captures this latent variable. Remember, previous literature in self-efficacy suggests that a student's self-efficacy will determine strategies and efforts in the course (Zimmerman, 2000). As identified in the previous research questions, stakeholders in online education may benefit from focusing on design factors that increase students' cognitive presence as this may have an effect on a students' feelings of self-efficacy in an online course. Moreover, additional research is needed to understand if self-efficacy is a mediating variable in future models.

What Factor Of Community Of Inquiry Predicts Cognitive Engagement The Most?

The standardized path coefficient of cognitive presence on cognitive engagement indicated a significant positive predictor, with a medium effect of .541. Moreover, when examining the indirect and total effects of the community of inquiry subconstructs, indirect effects indicate that there are no indirect effects of the community of inquiry on cognitive engagement. However, total effects of cognitive presence on cognitive engagement were positive and significant at a moderate effect of .586. Therefore, the subconstruct that has the most effect and most significant effect on cognitive engagement is cognitive presence.

Remember, cognitive engagement focuses on how a student is involved, participates, and persists in a particular activity (Ben-Eliyahu et al., 2018). It stands to reason when a student is cognitively present they are cognitively engaged as well. Furthermore, cognitive presence includes understanding a student's self-regulation in the course, through their research, Ben-

Eliyahu et al. argue, “Motivation as a pre-existing learner characteristic that produces engagement and self-regulated learning as the type of engagement process” (2018, p. 8). This conclusion is theoretically supported by prior research (see Shea & Bidjerano, 2009a; Shea & Bidjerano, 2009b; West et al., 2018; Greene et al., 2004); as students become more cognitively interested in course materials (represented by cognitive presence) they are also going to demonstrate this interest through cognitive engagement.

What Factor Of Community Of Inquiry Predicts Behavioral Engagement The Most?

In this model, teaching presence and social presence were hypothesized to have direct effects on behavioral engagement. The results of the analysis indicated a significant medium positive predictive relationship between behavioral engagement, teaching presence, and social presence at .24 and .21 respectively. Moreover, they accounted for 14.6% of the variance of behavioral engagement. The results of this study would suggest that design factors for social and teaching presence may have an effect on behavioral engagement, although there are other unknown factors to consider as well.

A number of studies have sought to understand the perceptions of the student experience as related to teaching presence. Students have indicated that course design in general and clear learning objectives create a successful online learning experience (Song, Singleton, Hill & Koh, 2004: Harris et al., 2008; Cavus, Uzunboylu, & Ibrahim, 2007). Moreover, students that reported higher levels of teaching presence also reported higher levels of learning and community (Shea, Li, & Pickett, 2006). Teaching presence has also been shown to predict higher levels of student’s sense of support and educational objectives (Shea, Li, & Pickett, 2006). Other studies have reported a positive relationship between student performance and higher levels of student

perceptions of teaching presence (Nagel & Kotzé, 2010; Swan et al., 2008; Kupczynski, Ice, Wiesenmayer, & McCluskey, 2010).

Teaching presence is a multi-faceted approach that requires the online educator to be heavily involved in the design and implementation of the online course (Garrison et al., 2000; Anderson et al., 2001; Yang, 2016). Overall, the purpose of the teaching presence approach is to be intentional about supporting cognitive and social presence in the online course (Anderson et al., 2001; Yang, 2016). Logically and theoretically, the findings of this study are supported, when a teacher intentionally facilitates the course to support community and interaction, you will see students engaging in the courses (Dunlap & Lowenthal, 2009; Goggins & Xing, 2016).

Limitations

The limitations in this study are two-fold: one considers the factors that contributed to the poor model fit to the data and the second considers general limitations of the research. As mentioned in Chapter Four, the model was a poor fit to the data and a number of factors could contribute to these results. The study was limited in the focus and framing of the research questions. While the model encompassed multiple opportunities for research questions regarding the relationships between the constructs, the primary focus and framing was on the extent of the relationships primarily surrounding cognitive engagement. Additionally, engagement research typically includes emotional engagement as a factor in addition to cognitive and behavioral engagement; understanding how emotional engagement plays a role in this particular framework may need to be considered. It is also possible that models should be explored in understanding direct effects of social and teaching presence on cognitive engagement and cognitive presence on behavioral engagement. Third, self-efficacy is typically shown in literature as a construct that comes prior to a task (Bandura, 1977; Zimmerman 2000) . It is possible that rather than acting as

a mediator, self-efficacy is mediated through the community of inquiry. More research is needed to understand the relationship here. Fourth, there is a need for understanding the greater context of different subject areas and individual classrooms as they related to this framework. Additional research that includes multi-level modeling to understand how nested groups differ from one another should be considered. Lastly, we have to consider that the data collected through the COVID-19 pandemic might change how students overall perceive online education, even if they've taken online courses in the past. The two models (Pre-COVID-19 and Post-COVID-19) were likely not different because the Pre-COVID-19 group made up 67% of the full data set.

There are also additional general limitations with this study, more research is needed that considers a more diverse learner group. The demographics of the current study are fairly representative of other studies in online education (see Allen, Seaman, Poulin, & Straut, 2016; Clinefelter & Aslanian, 2017). However, the lack of diversity in age, race, ethnicity, gender, and domains is concerning both this and other studies. It is important to consider two overarching factors when interpreting and discussing the results of the study. First, the constructs and subsequent instruments only measure student's perceptions of the concepts; therefore, discussion can only center around how students perceive these concepts at play in their learning, not definitively how the constructs are happening cognitively. Second, it can only be assumed that any conclusions drawn at the end of the analysis can only be applied to this particular data set. The sample was largely skewed towards white females between 18 - 24, we shouldn't make assumptions about the needs of other learners without first examining a more diverse learner population that includes race, gender identity, age, socioeconomic status, first generation status, and students who have taken less than three courses, among other factors. Moreover, missing

cases were removed from the data set in order to run tests unique to a complete data set, such as bootstrapping; it is possible these missing cases would improve the model fit.

Recommendations for Future Research

The research questions and accompanying model, as well as the results lend themselves to a myriad of future research studies. In particular, as a result of COVID-19 research aims have changed dramatically and will continue to do so as primary, secondary, and higher education institutions seek ways to create dynamic and successful offerings for their students. It is likely higher education, as a result of COVID-19, will continue to use online learning and retain course offerings originally developed in response to COVID-19 (Brownlee, 2020). As with any study, this one needs replicating, and should be replicated considering different populations to examine how the relationships might change when considering different demographic factors.

Moreover, future research should consider using the model and focusing specifically on different subject areas in education. This study generalized results from a variety of domains; however, it is very possible that different relationships will appear due to the different expectations and contextual differences that are both explicit and implicit in different subject areas. Another area of research that should be expanded in looking at online course design is how teacher self-efficacy of online teaching impacts student's perceptions of CoI and could predict levels of engagement.

Future research should also consider the results of this study in making both theoretical and empirical modifications of the model. Empirically, we can use modification indices of this data set which suggest a respecification of the model to include a direct path from social presence to cognitive engagement and self-efficacy to behavioral engagement. The relationship between social presence and cognitive engagement can be theoretically supported, referring back

to Stein et al.'s (2007) research in which they examined discussion posts and coded them with teaching presence, social presence, and cognitive presence; we can see social presence acting as a catalyst for cognitive activity (refer back to Chapter Two, figure 2.4 and 2.5). The relationship between self-efficacy and behavioral engagement can also be theoretically supported; if a student feels confident in a class he/she is likely to engage more frequently in the course and spend more time on course materials (Goggins & Xing, 2016; Dunlap & Lowenthal, 2009; Richardson & Swan, 2003).

Moreover, indices suggest a covariance between cognitive engagement and behavioral engagement, in addition to indicating a covariance between their respective disturbance terms. Inherently if one puts a lot of time and energy into thinking about the course (cognitive engagement) it is likely that one is behaviorally engaging the course materials (logging in more often, clicking through more pages, responding to many discussion posts, etc.). Some studies (see Ben-Eliyahu et al., 2018) may disagree with this assumption; however, the change in context (face-to-face to online) may influence how these constructs are measured and perceived by online students versus face-to-face.

Other model respecificiations can be logically based, for example, social and teaching presences were not shown to be significantly related to self-efficacy. A logical change might be to run the model with self-efficacy mediating cognitive presence and cognitive engagement alone. Moreover, as mentioned in the limitations, another model change related to this one may be to run self-efficacy as the predictor variable of CoI; considering students' confidences might predict their perceptions of learning design. Another modification to the model mentioned in the limitations that may need to be considered is the addition of emotional engagement. Elements of social presence lead to developing emotional engagement in the course, such as using emoticons

to represent inflection and tone and create non-verbal communication that has a warmness and prevents miscommunications (Garrison et al., 2000; Rourke et al., 1999).

Conclusion

While the COVID-19 global pandemic will not continue forever, the changes that it has brought to many industries will likely continue. This includes the effects of COVID-19 on education and the role that online learning is playing in meeting the needs of students. While previously research has focused on comparing online and face-to-face offerings; hopefully stakeholders in education can now understand the value of using evidence-based practices to intentionally design online courses for cognitive, teaching, social presence to improve student experiences.

The results from this study suggest that design factors tied to cognitive presence could play a role in a student's self-efficacy and cognitive engagement in a course. Moreover, results also suggest design factors tied to social and teaching presence contribute to a student's behavioral engagement in a course. Understanding how design factors affect self-efficacy and cognitive engagement is important as we consider the gaps in learning strategies between undergraduate students (Cao, 2012) and graduate students—where most online education research has been focused. Educators should consider looking into design factors for cognitive presence such as integrating case-study based discussion prompts (Richardson & Ice, 2010), creating group exercises and projects centered around strong learning outcomes (Szeto, 2015), and learning how to facilitate discussions and activities that move students through the four phases of developing cognitive presence (Lambert & Fisher, 2013). Additionally, stakeholders should also consider supporting social presence through well structured asynchronous communication in the course that include community building elements such as sharing personal

interests and calling each other by name. Teaching presence factors that focus specifically on developing learning activities to fit the strengths of the online medium and are responsive to students are other areas to consider. Other stakeholders should look into professional development opportunities that teach these skills in higher education faculty training. Moreover, it may be beneficial for stakeholders to place an emphasis on understanding a student's self-efficacy in online learning and looking at strategies to support and improve student efficacy in online courses.

As we have seen with COVID-19, for many, online education isn't just an option for students that prefer an online environment. Sometimes online education is the only option. Therefore, it is imperative that researchers, educators, designers, and other stakeholders put efforts into understanding how to create dynamic and robust offerings that encourage and foster an effective learning environment for deep, meaningful thinking and experiences.

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Appendices

Appendix A

Recruitment for Program Coordinators/Chairs

Hello! Thank you for taking the time to read this request. I am Cat Jackson a doctoral student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my research for my dissertation. I believe your participation will help my efforts in understanding teaching and learning in an online environment. Your participation could help us improve student experiences in online education.

My project seeks to better understand how a student's confidence is related to a student's perceptions of learning and engagement in an online course. I hope that what I learn can be used to help improve student experiences in online courses in the future. Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate. Student surveys take about 20 minutes to complete.

I am asking faculty to do three things to help me with my research:

1. Distribute a survey to students. I have created a post for faculty to share the research invitation and survey information so that it should be relatively easy for faculty to share.
2. Send a reminder email to students approximately one week after initial survey distribution.
3. Consider awarding students that complete their survey's with extra credit in the class.

In exchange for your help, any faculty member that gets at least 20 student responses (to protect student confidentiality) will receive a report that summarizes the results from their class. This information can be used to better understand student perceptions of course activities and how they respond to them. This information could be useful to you as design courses and to improve course delivery. And of course, you will also have my appreciation and gratitude for assisting me in finishing my dissertation.

Thank you for your time and consideration. If you are interested in helping me, please contact me at catjackson@ou.edu and I will follow-up with emails for you to forward to faculty and students! I appreciate how important your time is and I will make sure to use it wisely. Thank you again for considering my request.

Appendix B

Faculty Recruitment Letter

Hello! Thank you for taking the time to read this request. I am Cat Jackson a doctoral student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my research for my dissertation. I believe your participation will help my efforts in understanding teaching and learning in an online environment. Your participation could help us improve student experiences in online education. As compensation for your time, any faculty that can recruit 10 students to participate in my research will receive a gift card for $25 to Amazon.

My project seeks to better understand how a student's confidence is related to a student's perceptions of learning and engagement in an online course. I hope that what I learn can be used to help improve student experiences in online courses in the future. Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate. Student surveys take about 20 minutes to complete.

This research is being conducted at The University of Oklahoma. I'm asking for your help because you are teaching an online undergraduate course in higher education in the United States.

If you are willing to help, I am asking you to do three things:

1. Distribute a survey to students. I have created a post for faculty to share the research invitation and survey information so that it should be relatively easy to share.
2. Send a reminder email to students approximately one week after initial survey distribution.
3. Consider awarding students that complete their survey's with extra credit in the class. If you are willing to give students extra credit for completing the survey, I will provide you with a special survey link for this purpose.

In exchange for your help, any faculty member that gets at least 20 student responses (to protect student confidentiality) will receive a report that summarizes the results from their class. This information can be used to better understand student perceptions of course activities and how they respond to them. This information could be useful to you as design courses and to improve course delivery. And of course, you will also have my appreciation and gratitude for assisting me in finishing my dissertation.

Thank you! I really appreciate your time and willingness to help me with my research! If you are giving students extra credit, I can provide a list of those who completed as long as I have at least 20 per your request at the end of the semester. I appreciate how important your time is and I will make sure to use it wisely. Thank you again for considering my request. Please see the information you can post for your students below. If you choose to offer extra credit to your students, please delete the SECOND link in the email below. If you do not want to offer extra credit to your students, please delete the FIRST link in the email below. Thank you again!!

Thank you so much for taking the time to read this! I am Cat Jackson, a Doctoral Student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my research that will help me finish my dissertation and GRADUATE! I've asked your instructor to help me with my research and pass this information along to you. Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate!

My project seeks to better understand how a student's confidence is related to a student's perceptions of learning. I hope that what I learn can be used to help improve student experiences in online courses in the future. Thank you for being willing to help finish my project.

This research is being conducted at The University of Oklahoma. You were selected as a possible participant because you are a student in an online undergraduate course in higher education in the United States. You must be at least 18 years of age to participate in this study. Thank you again for your willingness to participate. The survey will take approximately 30 minutes to complete (although many finish in about 10 minutes!).

Please follow this survey link to participate:

Student Survey (Extra Credit Option)
https://ousurvey.qualtrics.com/jfe/form/SV_9NoOUdz93PMmQwB

Student Survey (Drawing Only Option)
https://ousurvey.qualtrics.com/jfe/form/SV_3QVh0F50vu5LV0F

Thank you!

Reminder Email for Faculty to Send to Students

Hi FACULTY NAME!
I just wanted to reach out to say thanks again for participating in my study and check in to see if you needed anything else from me for passing the survey information along to your students. Thank you for helping me to complete my dissertation by sharing my survey with your class!

As of right now, any student participating in the survey has very good odds of winning the $50 gift cards from Amazon. I have ___ responses from your class so far. I have included the email/post below just in case you need to share again or if the link was lost. Thank you so much again for your help with my research!

Also, I've added an extra incentive to this request! **As compensation for your time, any faculty that can recruit 10 students to participate in my research will receive a gift card for $25 to Amazon!**

For your convenience, here is a reminder post for your students:

If you haven't already, this is a reminder that you have been invited to participate in research that will be used to help improve student experiences in online courses in the future. Thank you for being willing to help finish my project! Remember, students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate! The survey will take approximately 30 minutes to complete (although many finish in about 10 minutes!).

Please follow this survey link to participate:

Student Survey (Extra Credit Option)
https://ousurvey.qualtrics.com/jfe/form/SV_9NoOUdz93PMmQwB

Student Survey (Drawing Only Option)
https://ousurvey.qualtrics.com/jfe/form/SV_3QVh0F50vu5LV0F

Thank you!

Appendix C

Email/Course Post for Students

Thank you so much for taking the time to read this! I am Cat Jackson, a Doctoral Student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my research that will help me finish my dissertation and GRADUATE! I've asked your instructor to help me with my research and pass this information along to you. Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate!

My project seeks to better understand how a student's confidence is related to a student's perceptions of learning. I hope that what I learn can be used to help improve student experiences in online courses in the future. Thank you for being willing to help finish my project.

This research is being conducted at The University of Oklahoma. You were selected as a possible participant because you are a student in an online undergraduate course in higher education in the United States. You must be at least 18 years of age to participate in this study. Thank you again for your willingness to participate. The survey will take approximately 30 minutes to complete (although many finish in about 10 minutes!).

Please follow this survey link to participate:

Student Survey (Extra Credit Option)
https://ousurvey.qualtrics.com/jfe/form/SV_9NoOUdz93PMmQwB

Student Survey (Drawing Only Option)
https://ousurvey.qualtrics.com/jfe/form/SV_3QVh0F50vu5LV0F

Thank you!

Appendix D

Faculty - Web Post/Flyer Information And Post COVID Follow-up email

Hi all! I'm a doctoral student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my dissertation research so I can GRADUATE! I am looking for college faculty that are teaching online undergraduate courses.

Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate! My project seeks to better understand how a student's confidence is related to a student's perceptions of learning and engagement.

As compensation for your time, any faculty that can recruit 10 students to participate in my research will receive a gift card for $25 to Amazon!

I hope that what I learn can be used to help improve student experiences in online courses in the future. If you are interested in helping me, please contact me at catjackson@ou.edu and I will send you more information. Thank you!!

Dear Professor ___,

I hope this email finds you well in these unusual times. I know everyone has been impacted by the COVID-19 pandemic in different ways, from health care workers on the frontlines to the growing number of unemployed due to nonessential businesses shut down. In addition to my personal and professional life being affected by this pandemic, my academic career has also taken a turn. My goal was to collect data for my dissertation through the end of March so that I could graduate in May. As universities shifted to exclusively online learning and the United States became more impacted by COVID my data collection slowed to a trickle of responses to eventually nothing. Please don't misunderstand, relative to what is going on this is but a small inconvenience in the grand scheme of things.

I'm writing this email in hopes that you can reach out to your students one last time or if you are teaching a second eight weeks class you would be willing to share this with them. I am 40 students shy of hitting my needed number of participants (and yes I am considering the impacts of COVID on this data set). I am looking for undergraduate students that are taking an online course - courses that were originally designed to be online pre-COVID outbreak. Currently, ____ of your students have participated in my survey.

As a reminder, faculty that can recruit a minimum of 10 students for me will receive a gift card for $25 at Amazon. My project seeks to better understand how a student's confidence is related

to a student's perceptions of learning and engagement in an online course. I hope that what I learn can be used to help improve student experiences in online courses in the future - especially given the current situation! Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate. Student surveys take about 20 minutes to complete.

Moreover, in exchange for your help, any faculty member that gets at least 20 student responses (to protect student confidentiality) will receive a report that summarizes the results from their class. This information can be used to better understand student perceptions of course activities and how they respond to them. This information could be useful to you as design courses and to improve course delivery. And of course, you will also have my appreciation and gratitude for assisting me in finishing my dissertation.

Here is the information to share with your students:

Thank you so much for taking the time to read this! I am Cat Jackson, a Doctoral Student from the Educational Psychology Department, and I am hoping you would be interested in helping me with my research that will help me finish my dissertation and graduate! My research has recently been impacted due to the COVID-19 pandemic, your participation would be incredibly helpful in bettering student experiences in online courses in the future and will help me finish my degree in all of the chaos that is the world right now.

I've asked your instructor to help me with my research and pass this information along to you. Students that participate in my survey will be entered into a drawing for $50 Amazon gift card as compensation for their time, there will be one gift card awarded for every 50 students that participate!

This research is being conducted at The University of Oklahoma. You were selected as a possible participant because you are a student in an online undergraduate course in higher education in the United States. You must be at least 18 years of age to participate in this study. Thank you again for your willingness to participate. The survey will take approximately 30 minutes to complete (although many finish in about 10 minutes!).

Please follow this survey link to participate:

Student Survey (Extra Credit Option)
https://ousurvey.qualtrics.com/jfe/form/SV_9NoOUdz93PMmQwB

Student Survey (Drawing Only Option)
https://ousurvey.qualtrics.com/jfe/form/SV_3QVh0F50vu5LV0F

Thank you!

Appendix E

Student Demographic Questions

1. Are you taking an online class in higher education that is offered for university credit in the United States?

   Yes

   No

   Skip To: End of Survey If Are you taking an online class in higher education that is offered for university credit in the United States? = No

2. This study attempts to understand courses that were originally intended to be online. Is your online course currently online as a result of the COVID-19 outbreak? Was your course previously face-to-face or met periodically face-to-face and has recently been moved to an online format to prevent the spread of COVID-19?

   Yes

   No

   Skip To: End of Survey If = Yes

3. What is the name of your course?
4. What is the name of your instructor?
5. What is the course number for your course?
6. What is the section number for your course?

_____

7. Gender

   Male

   Female

   Non-binary or Non-gender conforming

   Prefer not to say

8. Age

_____

9. Are you an Undergraduate (working on an Associates or Bachelors degree) or a Graduate (working on a Masters or Doctorate degree) student?

   Undergraduate

   Graduate

Skip To: End of Survey If Are you an Undergraduate (working on an Associates or Bachelors degree) or a Graduate (working on a Masters or Doctorate degree) student? = Graduate

10. Are you a first generation student?(A first generation student is a student whose parents do not have a college degree)

    Yes

    No

11. What is your race/ethnicity?

    Hispanic

    Black or African American

    American Indian or Alaska Native

    Asian

    White

    Native Hawaiian or Pacific Islander

    Biracial

    Other

12. Are you a full time student?

    Yes

    No

13. What best describes your degree program?

    Humanities

    Arts and Music

    Science, Technology, Engineering or Math

    Social and Behavioral Sciences

    Business

    Education

    Health Professions

    Aviation

14. What is your experience with online courses? (including this course)

    This is my first online course

    I've taken 2 - 3 online courses

I've taken more than 3 online courses

15. In this online course, what activities have you participated in or used (select all that apply):

    Discussion Board

    Written Assignments

    Individual Projects

    Collaborative Projects

    Lecture Videos/Notes/PowerPoint/Reading Assignments

    Quizzes and Exams

16. Why did you sign up to take this class? (choose the one that best fits your situation)

    I prefer to take online courses

    It worked best with my schedule

    It is required and only offered online

    It is required and the online course was the only one that had available spots

    It is required and I prefer to take it online

    It is required and an online course worked best with my schedule

Appendix F

Community of Inquiry Survey

This is a draft organized by subconstruct and indicators. The actual survey in the design was created in Qualtrics with each item randomized for each data point.

Teaching Presence

Design & Organization
1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction
11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses.
13. The instructor provided feedback in a timely fashion.

Social Presence

Affective expression
14. Getting to know other course participants gave me a sense of belonging in the course.
15. I was able to form distinct impressions of some course participants.
16. Online or web-based communication is an excellent medium for social interaction.

Open communication
17. I felt comfortable conversing through the online medium.
18. I felt comfortable participating in the course discussions.
19. I felt comfortable interacting with other course participants.

Group cohesion

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
21. I felt that my point of view was acknowledged by other course participants.
22. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

Triggering event
23. Problems posed increased my interest in course issues.
24. Course activities piqued my curiosity.
25. I felt motivated to explore content related questions.

Exploration
26. I utilized a variety of information sources to explore problems posed in this course.
27. Brainstorming and finding relevant information helped me resolve content related questions.
28. Discussing course content with my classmates was valuable in helping me appreciate different perspectives.

Integration
29. Combining new information helped me answer questions raised in course activities.
30. Learning activities helped me construct explanations/solutions.
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

Resolution
32. I can describe ways to test and apply the knowledge created in this course.
33. I have developed solutions to course problems that can be applied in practice.
34. I can apply the knowledge created in this course to my work or other non-class related activities.

<u>5 point Likert-type scale</u>
1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree

Appendix G

Student Self-Efficacy Scale

Please indicate how each statement represents your feelings as a student in this class using the following indicators: (1) not at all true, (2) hardly true, (3) moderately true, (4) exactly true.

1. I am convinced that I am able to successfully learn all relevant subject content even if it is difficult.
2. I know that I can maintain a positive attitude toward this course even when tensions arise.
3. When I try really hard, I am able to learn even the most difficult content.
4. I am convinced that, as time goes by, I will continue to become more and more capable of learning the content of this course.
5. Even if I get distracted in class, I am confident that I can continue to learn well.
6. I am confident in my ability to learn, even if I am having a bad day.
7. If I try hard enough, I can obtain the academic goals I desire.
8. I am convinced that I can develop creative ways to cope with the stress that may occur while taking this course.
9. I know that I can stay motivated to participate in the course.
10. I know that I can finish the assigned projects and earn the grade I want, even when others think I can't.

Appendix H

Burch Engagement Survey for Students (BESS)

Please indicate how each statement represents your feelings as a student in this class using the following indicators: (1) strongly disagree, (2) somewhat disagree, (3) neither disagree nor agree, (4) somewhat agree, (5) strongly agree.

Emotional Engagement

1. I am enthusiastic about this class/course.
2. I feel energetic when I am in this class/course.
3. I am interested in material I learn in this class/course.
4. I am proud of assignments I complete in this class/course.
5. I feel positive about the assignment I complete in this class/course.
6. I am excited about coming to this class/course.

Physical (Behavioral) Engagement

7. I work with intensity on assignments for this class/course.
8. I exert my full efforts toward this class/course.
9. I devote a lot of energy toward this class/course.
10. I try my hardest to perform well for this class/course.
11. I strive my hardest to perform well for this class/course.
12. I exert a lot of energy for this class/course.

Cognitive Engagement

13. When I am reading or studying material for this class/course, my mind is focused on class discussion and activities.
14. When I am reading or studying material for this class/course, I pay a lot of attention to class discussion and activities.
15. When I am reading or studying material for this class/course, I focus a great deal of attention on class discussion and activities.
16. When I am reading or studying material for this class/course, I am absorbed by class discussion and activities.
17. When I am reading or studying material for this class/course, I concentrate on class discussion and activities.
18. When I am reading or studying material for this class/course, I devote a lot of attention to class discussion and activities.

Appendix I

Table I1

Demographic Statistics

Demographics	Frequency	Percentage
Gender		
Male	58	27.8%
Female	147	70.3%
Non-Binary/Non-Gender Conforming	1	.5%
Prefer Not to Say	2	1%
Missing	1	.5%
Age Groups		
18 - 24	107	51.2%
25 - 30	22	10.5%
31 - 40	40	19.1%
41 - 50	27	12.9%
51 - 60	7	3.3%
61 - 65	2	1.0%
Missing	4	1.9%
Race/Ethnicity		
Hispanic	16	7.7%
Black or African American	14	6.7%
American Indian or Alaska Native	9	4.3%
Asian	7	3.3%

White	150	71.8%
Native Hawaiian or Pacific Islander	0	0%
Biracial	10	4.8%
Other	3	1.4%
First Generation Student Status		
First Generation Student	92	44%
Not a First Generation Student	117	56%
Full Time Student Status		
Full Time	167	79.9%
Not Full Time	42	20.1%
Degree Program		
Humanities	26	12.4%
Arts and Music	9	4.3%
Science, Technology, Engineering or Math	28	13.4%
Social and Behavioral Sciences	52	24.9%
Business	58	27.8%
Education	20	9.6%
Health Professions	12	5.7%
Aviation	3	1.4%
Missing	1	.5%
Online Course Experience		
First Online Course	15	7.2%

Taken 2 - 3 Online Courses	32	15.3%
Taken More than 3 Online Courses	162	77.5%

Appendix J

Independent T-Test 3

Figure L1

Male Group - Post COVID-19 Sample

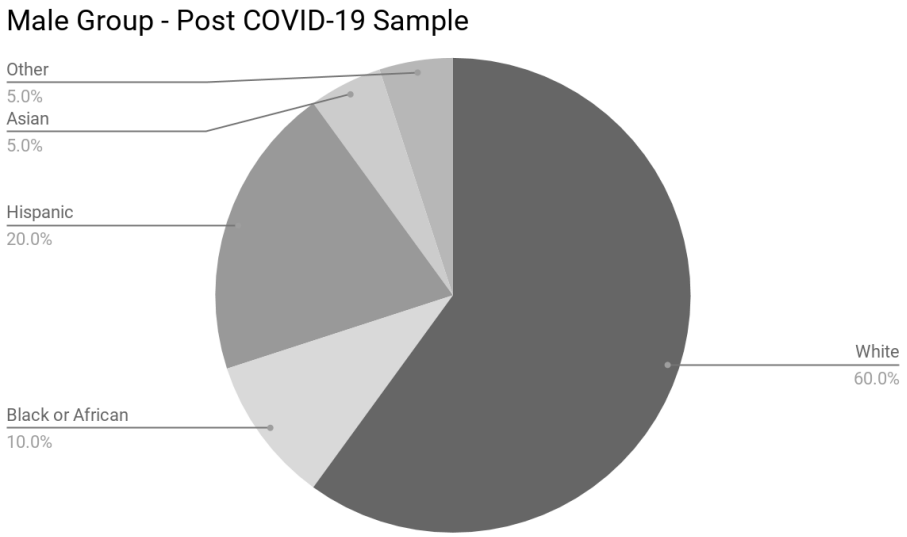

Figure L2

Pre COVID-19 Stratified Sample - Male Race Demographics

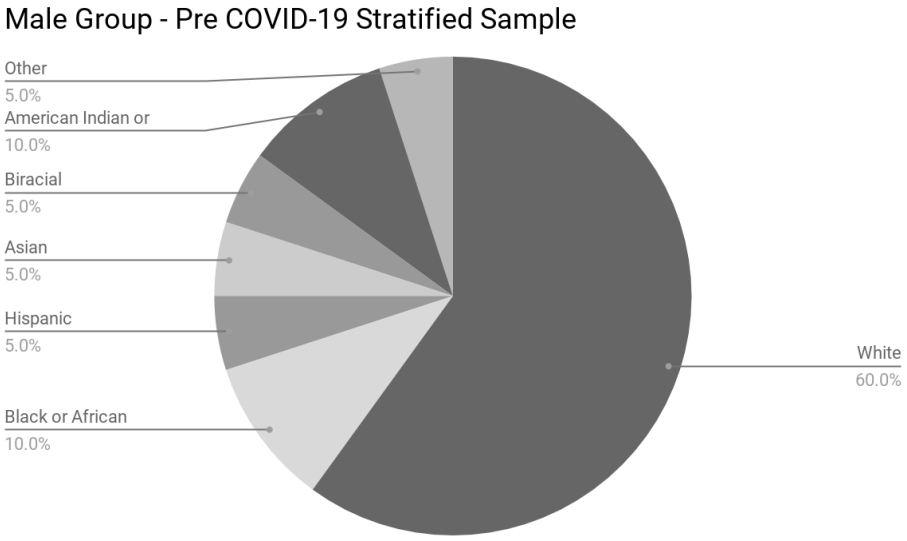

Figure L3

Post COVID-19 Sample - Female Race Demographics

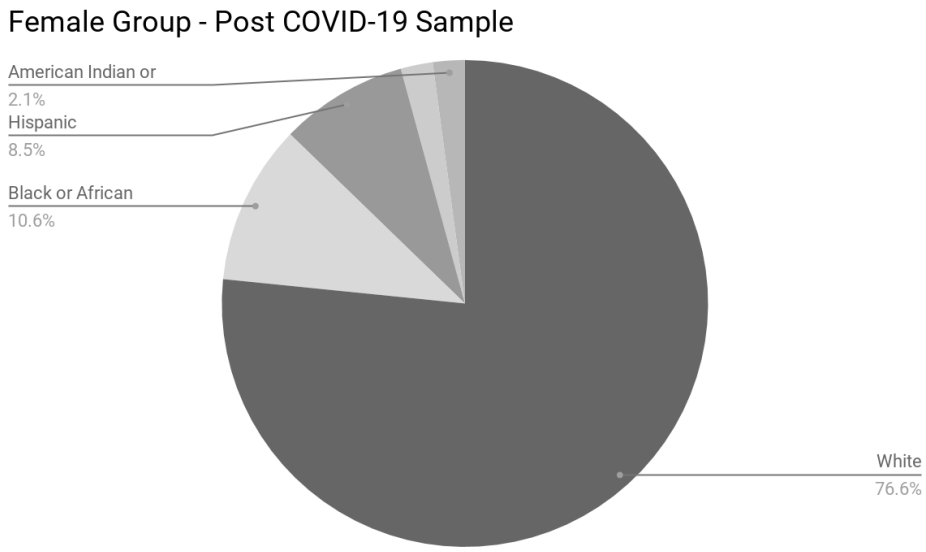

Figure L4

Pre COVID-19 Stratified Sample - Female Race Demographics

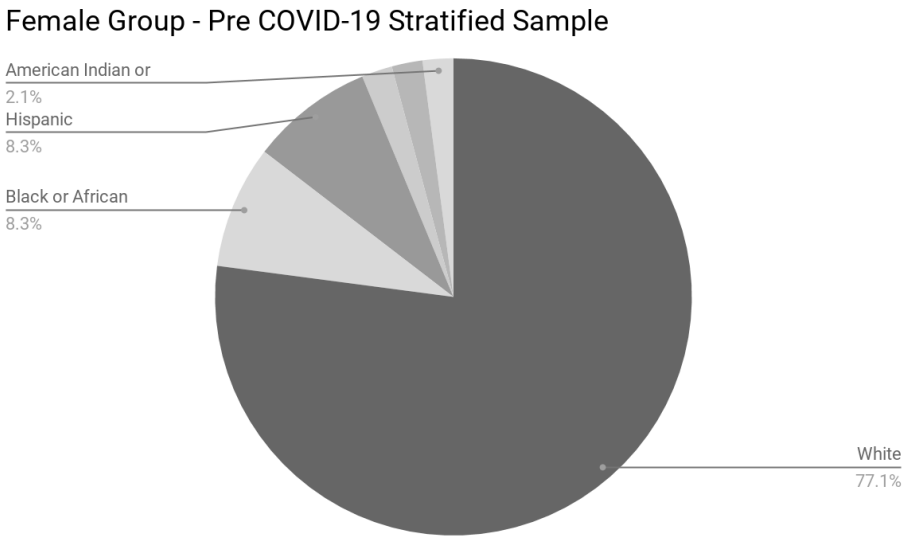

Table L1

Group Statistics for Stratified Data Set Comparison

	Collected Post-COVID-19?	N	Mean	SD	Std. Error Mean
COI Teaching Presence	YES	69	4.5452	0.56059	0.06749
	NO	69	4.5329	0.53722	0.06467
COI Social Presence	YES	69	4.0274	0.76966	0.09266
	NO	69	3.9936	0.74897	0.09017
COI Cognitive Presence	YES	69	4.3575	0.52083	0.0627
	NO	69	4.285	0.55781	0.06715
Student Self-Efficacy	YES	69	3.5638	0.41691	0.05019
	NO	69	3.4638	0.44819	0.05396
Emotional Engagement	YES	69	4.1691	0.76935	0.09262
	NO	69	4.0797	0.7544	0.09082
Behavioral Engagement	YES	69	4.0821	0.95513	0.11498
	NO	69	4.0097	0.83377	0.10037
Cognitive Engagement	YES	69	3.8357	0.90995	0.10955
	NO	69	3.6981	0.94639	0.11393

Appendix K

Model Tests

Table M1

Hypothesized Model Regression Weights

Regression Weights

			Estimate	S.E.	C.R.	P
Self-Efficacy	<---	Cognitive Presence	0.342	0.074	4.623	<.001
Self-Efficacy	<---	Social Presence	0.056	0.049	1.157	0.247
Self-Efficacy	<---	Teaching Presence	0.087	0.053	1.659	0.097
Cognitive Engagement	<---	Cognitive Presence	0.826	0.104	7.911	<.001
Behavioral Engagement	<---	Social Presence	0.236	0.083	2.853	0.004
Cognitive Engagement	<---	Self-Efficacy	0.203	0.135	1.505	0.132
Behavioral Engagement	<---	Teaching Presence	0.32	0.098	3.268	0.001

Table M2

Hypothesized Model Standardized Regression Weights

Standardized Regression Weights

			Estimate
Self-Efficacy	<---	Cognitive Presence	0.442
Self-Efficacy	<---	Social Presence	0.094
Self-Efficacy	<---	Teaching Presence	0.123
Cognitive Engagement	<---	Cognitive Presence	0.541
Behavioral Engagement	<---	Social Presence	0.208
Cognitive Engagement	<---	Self-Efficacy	0.103
Behavioral Engagement	<---	Teaching Presence	0.238

Table M3

Hypothesized Model Covariances

Covariances

			Estimate	S.E.	C.R.	P
Cognitive Presence	<-->	Teaching Presence	0.241	0.03	7.982	***
Teaching Presence	<-->	Social Presence	0.222	0.036	6.18	***
Cognitive Presence	<-->	Social Presence	0.314	0.037	8.514	***

Table M4

Hypothesized Model Correlations

Correlations

			Estimate
Cognitive Presence	<-->	Teaching Presence	0.665
Teaching Presence	<-->	Social Presence	0.474
Cognitive Presence	<-->	Social Presence	0.731

Table M5

Hypothesized Model Variances

Variances

	Estimate	S.E.	C.R.	P
Cognitive Presence	0.333	0.033	10.198	***
Teaching Presence	0.395	0.039	10.198	***
Social Presence	0.553	0.054	10.198	***
d2	0.127	0.012	10.198	***
d1	0.49	0.048	10.198	***
d3	0.609	0.06	10.198	***

Table M6

Hypothesized Model Squared Multiple Correlations

Squared Multiple Correlations

	Estimate
Self-Efficacy	0.363
Behavioral Engagement	0.146
Cognitive Engagement	0.369