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EXAMINING THE IMPACTS OF CONSTRUCTIVE CONTROVERSY ON A COMMUNITY
OF INQUIRY AND OPEN-MINDEDNESS IN AN ASYNCHRONOUS ONLINE
DISCUSSION FORMAT

by

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Abstract

The community of inquiry (COI) framework is a theoretical and practical model for creating deep, meaningful online learning experiences through three essential and interconnected elements: teaching presence, social presence, and cognitive presence. Asynchronous online discussions (AODs) are the typical communication medium in a COI; therein, a sense of community (i.e., social presence) is designed and facilitated (i.e., teaching presence) to develop and foster critical inquiry (i.e., cognitive presence). The construct of cognitive presence is based on the practical inquiry model, which includes four phases—a triggering event, exploration, integration, and resolution—to foster critical thinking skills through knowledge generation and confirmation. However, a persistent finding in COI research is that learners experience difficulty in moving beyond the exploration phase. Across a variety of AOD types, learners demonstrate low engagement levels in integration and little or no resolution, which are the phases associated with higher-order critical thinking processes and skills. This problem of practice may be symptomatic of the focus of the COI framework on developing learners' critical thinking skills and the inattention to critical thinking dispositions, such as open-mindedness and truth seeking. Thus, this quantitative, experimental posttest-only control group study investigates the impact of the constructive controversy (CC)-AOD learning strategy on learners' perceptions of the COI, their actively open-minded thinking about evidence (AOT-E), and AOD rubric scores. Those in the treatment group participated in the CC-AOD learning strategy, a collaborative argumentation process in which learners worked in pairs and utilized perspective-switching to reach a consensus position on a controversial issue; learners in the control group worked independently. The treatment group had higher mean scores in every self-reported dependent variable, but the between-groups differences were nonsignificant. Learners in the treatment group, furthermore,

exhibited significantly higher cognitive presence and social presence rubric scores in weekly AODs during the intervention period compared to the control group. Practical and theoretical implications are discussed, with a focus on the unique cultural context of the study and the potential conceptual mismatch between the COI and AOT-E.

Keywords: community of inquiry, teaching presence, social presence, cognitive presence, critical thinking, actively open-minded thinking, online learning, asynchronous online discussion, myside bias

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List of Abbreviations

Actively Open-minded Thinking (AOT)

Actively Open-minded Thinking about Evidence (AOT-E)

Asynchronous Online Discussion (AOD)

Cognitive Presence (CP)

Communication and Etiquette (C&E)

Community of Inquiry (COI)

Constructive Controversy (CC) Learning Strategy

Institutional Review Board (IRB)

Practical Inquiry Model (PI model)

Social Presence (SP)

Statistical Package for Social Sciences (SPSS)

Teaching Presence (TP)

United Nations Convention on the Rights of Persons with Disabilities (UN CRPD)

CHAPTER ONE: INTRODUCTION

Introduction

Learners are expected to be critical thinkers, both in skill and disposition, to face complex and controversial problems in the real world. These skills include cognitive capabilities, such as problem-solving and inquiry, while the willingness to think critically involves dispositions such as open-mindedness, empathy, and curiosity (Iordanou et al., 2020). Therefore, critical thinking skills alone are insufficient, as people must have the internal motivation to employ their critical thinking skills (Facione, 2000; Nieto & Saiz, 2011). Ideally, learners would be motivated by positive epistemic ends, such as truth seeking. Instead, learners are often susceptible and even motivated to preserve their existing beliefs (Southworth, 2021). Employing personal beliefs as the criteria for judging evidence leads to myside bias, in which people think *with* their beliefs instead of *about* their beliefs (Iordanou et al., 2020, p. 320). Learners are susceptible to myside bias when arguing the points of an issue, especially when they are tasked with persuading others (Knobloch-Westerwick et al., 2015; Nussbaum & Kardash, 2005; Wolfe & Britt, 2008); examples of this bias include selectively exposing oneself to belief-consistent information (Hart et al., 2009), attaching higher importance to prior beliefs, and spending more time on attitude-consistent content (Knobloch-Westerwick et al., 2015). Each of these manifestations of myside bias misalign with the tenets of critical thinking.

The community of inquiry (COI) framework is a theoretical model for creating deep, meaningful online learning experiences through three essential and interconnected elements: teaching presence, social presence, and cognitive presence (Garrison et al., 2000). Asynchronous online discussions (AODs) are the typical communication medium in a COI; therein, a sense of community (i.e., social presence) is designed and facilitated (i.e., teaching presence) to develop

and foster critical inquiry (i.e., cognitive presence). Critical thinking is a social endeavor that requires facilitation, but cognitive presence encourages critical thinking skills by generating and confirming knowledge (Garrison, 2017; Kaczkó & Ostendorf, 2023).

Cognitive presence is operationalized by the four stages of the practical inquiry (PI) model: a triggering event, exploration, integration, and resolution (Garrison et al., 2001). Garrison (2016) contends that collaborative inquiry enables learners to “break out of cognitive straightjacket[s] and to consider new ideas; to overcome the human bias to confirm and not question currently held perspectives and ideas” (p. 2). However, this idealized outcome may not be realized in practice. Notably, across a variety of AOD formats and types, learners demonstrate low engagement levels in integration and little or no resolution (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). These final two phases are essential in higher-order critical thinking processes and skills. In the integration phase, learners combine and connect ideas collaboratively to test and apply their solutions in the resolution phase (Garrison et al., 2001). The lack of attention to learners’ critical thinking dispositions, such as open-mindedness, in the COI framework may be responsible for the trend of learners not moving beyond the exploration phase. Therefore, this study investigates the impact of the constructive controversy (CC) learning strategy in an AOD format on online undergraduate learners’ perceptions of the COI, their critical thinking dispositions toward actively open-minded thinking about evidence (AOT-E), and AOD rubric scores.

Statement of the Problem

Encouraging learners to develop as critical thinkers has both primacy and permanence as an educational goal (Iordanou et al., 2020). While no singular definition of critical thinking exists, the literature has consistently described critical thinking as requiring both skills and

dispositions (Facione, 2011; Nieto & Saiz, 2011). Consequently, instruction and facilitation should focus on strengthening learners' cognitive skills and intellectual character (Facione, 2000). The context in which the most support may be needed in critical thinking is argumentation; herein, learners are expected to rationally resolve complex, sometimes controversial issues by weighing arguments and counterarguments (Jonassen & Kim, 2010). Instead of engaging in rational resolution, however, learners are prone to cognitive fallibilities (Lilienfeld et al., 2009). When tasked with arguing, learners tend to utilize myside bias, especially when the intent of the learning strategy is to persuade others (Knobloch-Westerwick et al., 2015; Nussbaum & Kardash, 2005; Wolfe & Britt, 2008). Myside bias is notably more likely when learners are faced with contradictory evidence regarding an issue that they revere or that is inherently controversial (Stanovich et al., 2013). This bias can distort objectivity and lead to affective polarization (Bowes et al., 2022) as well as faulty belief formation and truth identification (Peters, 2020). The repercussions of myside bias have implications beyond educational contexts in areas such as divisive politics and democratic discourse.

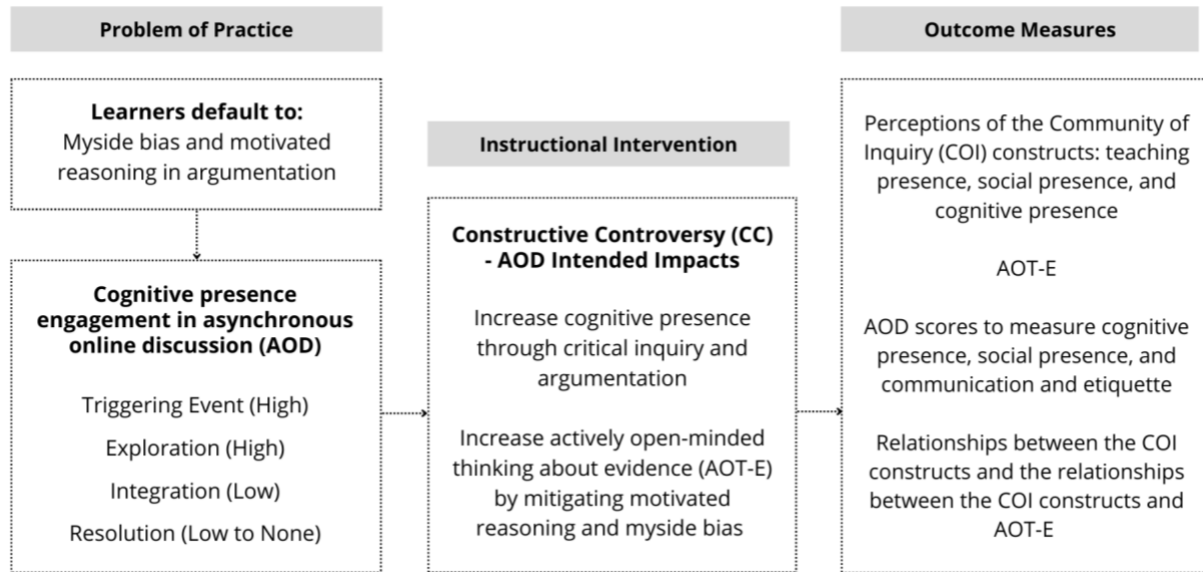
Whereas myside bias involves utilizing personal beliefs to judge evidence, critical thinking requires evaluations of evidence and decision-making through open-mindedness (Baron, 2019). Specifically, actively open-minded thinking (AOT) is a disposition in which alternative perspectives are considered and appreciated (Lilienfeld et al., 2009). To teach AOT is to support metacognitive strategies that make critical thinking more likely (Willingham, 2008). Learners, however, still need critical thinking skills. The COI framework is a theoretical and practical model for creating effective and meaningful online learning experiences through three essential and interdependent elements: teaching presence, social presence, and cognitive presence (Garrison et al., 2000).

Cognitive presence represents the development of critical thinking skills through a four-phase inquiry process: a triggering event, exploration, integration, and resolution (Garrison et al., 2001). The latter stages represent advanced forms of critical inquiry in which learners integrate cocreated ideas and solutions and then test as well as apply them. Across a variety of AOD formats and types, however, learners demonstrate low levels of integration and little or no engagement in resolution (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). This pattern is problematic, as the desired outcome of a COI is to elicit a high-level cognitive presence among online learners, and developing critical thinking is foundational to the model (Shea & Bidjerano, 2009). Thus, purposeful design and facilitation are required to support cognitive presence, as its later stages do not occur automatically (Sadaf & Olesova, 2017).

A promising learning strategy that may support learners' AOT and increase higher-level cognitive presence is the CC learning strategy, a structured, collaborative argumentation process in which learners are tasked with seeking a consensus position on a controversial issue with a partner or group (Johnson & Johnson, 1993). This approach has produced numerous positive results; of particular interest is the outcome of greater sophistication in thinking regarding an issue (e.g., learning oppositional perspectives), increasing perspective-taking skills, and enhancing attitudinal and positional changes (Bruen et al., 2016; Johnson et al., 2000). This study employs an online adaptation of the CC learning strategy in an AOD format to investigate whether the intervention developed improved critical thinking through engagement in inquiry processes and in learners' dispositions regarding AOT (see Figure 1).

Figure 1

Problem of Practice, Instructional Intervention, and Outcome Measures



Specifically, this study presents an examination of the impact of the CC-AOD learning strategy on learners’ perceptions of the COI as well as its accompanying elements. Learners’ critical thinking skills were measured by their cognitive presence (Garrison et al., 2001), and their critical thinking dispositions toward open-mindedness were measured by their AOT-E (Pennycook et al., 2020). The outcome measure of learners’ AOD rubric scores were analyzed according to an instructor-created rubric to determine their cognitive presence, social presence, and communication and etiquette across four weekly AODs during the intervention period. The relationships between the COI constructs, the COI overall, and the AOT-E were also investigated.

Research Purpose

The purpose of this experimental, posttest-only control group study is to determine the impact of the CC learning strategy in an AOD format on learners’ perceptions of the COI, learners’ AOT-E, and learners’ AOD rubric scores. Learners’ perceptions of the COI, including

teaching presence, social presence, and cognitive presence were measured by utilizing the COI survey (Arbaugh et al., 2008). Actual learners' outcomes, such as grades or other performance measures, are important, as are adult learners' perceptions of learning and critical thinking. Accordingly, Rovai and Barnum (2003) note that self-reports for adult learners are a valid measurement; for this demographic group, their decisions about learning are often perception-based (p. 61). Self-reports of learning are independent of course content, the instructor and the institution, the grade level, and other factors that may limit comparison (Rovai et al., 2009). Corrallo (1994) also declares that self-reports offer more accurate measurements of cognitive outcomes and change than other measures, such as grades.

The second aim of this study is to determine the impact of the CC-AOD learning strategy on learners' critical thinking dispositions regarding AOT. The AOT-E scale was employed to measure learners' openness toward changing their beliefs or opinions according to evidence (Pennycook et al., 2020). The actual learners' outcome of their AOD grades were also examined to differentiate between participation in the treatment and control groups and the impact on learners' cognitive presence, social presence, and their communication and etiquette. This study also seeks to confirm that a strong correlation exists among the constructs within the COI framework, which allows an examination of the association between the COI elements and AOT-E.

A nonprobability convenience sample was utilized; participants were enrolled in an undergraduate disability studies course at Ocean State University, a large, public university located in the Pacific United States. This online, asynchronous course offered an introduction to disability and diversity with a variety of controversial topics suitable for the CC-AOD learning strategy. The context for the study was appropriate because cognitive biases, such as myside

bias, and their repercussions can be especially damaging regarding social beliefs (Stammers, 2018). Thus, it is imperative to develop and test strategies that support learners to avoid harmful heuristics and biases, approach issues with open-mindedness, and establish the skills to be effective critical thinkers. By considering others' perspectives and life experiences, learners lay the groundwork for a more inclusive and diverse society for persons with disabilities and other groups. Additionally, the study context was appropriate because the CC learning strategy is commonly adopted to teach diversity and cultural competence skills, such as becoming self-aware and confronting one's assumptions and biases (Steiner et al., 2003). However, the CC learning strategy has not been previously examined in an AOD format within the COI research.

The independent variables for the study were participants in the CC-AOD learning strategy at the treatment and control group levels. At the beginning of the 16-week semester, learners were randomly assigned to two course sections, which became the treatment and control groups. The groups had identical course assignments in the first 11 weeks of the course, including structured AOD prompts with required responses and replies, an independently written essay, and three multiple-choice quizzes. The final 5 weeks of the semester comprised the intervention period. Participants in the treatment group were assigned to pairs and to one of the instructor-provided controversial debate topics in disability studies (see Appendix A).

Each pair in the treatment group participated in four CC-AODs, which culminated in a collaboratively written essay. The CC-AOD learning strategy steps included the following: (1) Research the issue independently to prepare the assigned position; (2) Generate at least three best case scenario arguments for the assigned position; (3) Reverse positions with the assigned partner; and (4) Synthesize the perspectives and evidence on both sides of the issue to develop a consensus position. The control group had the same list of controversial debate topics. In the

final 5 weeks of the semester, participants were instructed to begin work on their argumentation paper. The first two weekly AODs were area-of-interest prompts based on the article learners selected from an instructor-provided list of readings. In the final 3 weeks of the semester, the control group had two weekly AODs based on their controversial topic, followed by an independently written argumentation paper that was due in the final week of the semester. Utilizing independent work for the control group aligns with Johnson et al.'s (2000) comparison of the CC learning strategy, debate, concurrence-seeking argumentation, and individualistic learning. Likewise, Kuhn (2015) calls for additional studies to investigate the benefits of collaborative work with a comparison condition in which individuals work independently.

At the end of the semester, participants completed a posttest survey to measure the dependent variables of learners' perceptions of the COI; perceptions of teaching presence, social presence, and cognitive presence; and AOT-E. The 34-item COI survey by Arbaugh et al. (2008) was employed; its subscales include teaching presence (i.e., design and organization, facilitation, and direct instruction), social presence (i.e., affective expression, open communication, and group cohesion), and cognitive presence (i.e., triggering event, exploration, integration, and resolution; Garrison et al., 2001). The composite score of the COI survey measures the learners' perceptions of the COI, which is generally defined by deep, meaningful learning in a collaborative online learning environment (Arbaugh et al., 2008). The composite score from the 8-item AOT-E scale by Pennycook et al. (2020) was applied. AOT-E reflects people's openness to change their beliefs or opinions according to evidence. The learners' AOD rubric scores from an instructor-created rubric were also examined to compare differences in cognitive presence, social presence, and communication and etiquette across four weekly AODs that occurred during

the intervention period. The relationships between the COI constructs and the COI and AOT-E were also investigated.

Theoretical Framework

The COI framework was originally proposed by Garrison, Anderson, and Archer (2000) as a result of their research on computer-mediated communication; it represents a shift toward community building in online learning and away from individualistic, autonomous activities in distance education (Dempsey & Zhang, 2019). This conceptual model has since become the most widely adopted framework in online educational research (Valverde-Berrocoso et al., 2020) with the central focus of developing learners' critical thinking skills (Garrison et al., 2000). The COI framework utilizes Lipman's (1991) conceptualization of a COI and Dewey's (1933) model of reflective thought (Kaczkó & Ostendorf, 2023).

Establishing a COI requires teaching presence, social presence, and cognitive presence (Garrison et al., 2001). Teaching presence is the binding element and includes three elements: instructional design and organization, facilitation of discourse and understanding, and direct instruction (Garrison et al., 2000; Majeski et al., 2018). Social presence is based on learners' abilities to accurately present themselves online and identify with the community; its three foundational elements include affective or emotional expression, open communication, and group cohesion in a COI (Garrison et al., 2000). Cognitive presence is the extent to which learners co-construct meaning through reflection and discourse; this facet is operationalized by the PI model (Garrison et al., 2001).

The PI model represents the development of critical thinking skills through four phases of collaborative inquiry: a triggering event, exploration, integration, and resolution (Garrison et al., 2001). The process becomes more cognitively demanding when moving toward resolution, both

theoretically and practically (Garrison & Arbaugh, 2007). For example, in evaluations of AODs' effectiveness in higher education courses, a persistent finding is that learners have difficulty with higher-order thinking and in attaining the two highest phases of cognitive presence (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). This pattern may be a symptom of the COI framework's inattention to Lipman's ideals for a COI (Kaczkó & Ostendorf, 2023), in which learners not only engage in knowledge generation and confirmation (Garrison & Archer, 2000) but do so with *good judgment*, "the chief characteristic of critical thinking" (Lipman, 2003, p. 210). One of Lipman's desirable cognitive dispositions, in addition to the commitment to inquiry, is open-mindedness. The COI framework, however, does not sufficiently address learners' development of *good judgment*; consequently, this study presents an examination of both the critical thinking processes inherent in cognitive presence and the disposition of open-mindedness.

Specifically, the intent that underscores the study is to investigate whether an online, asynchronous adaptation of the CC learning strategy develops critical thinkers within a COI, as measured by cognitive presence and AOT-E. The impacts of the CC-AOD learning strategy on teaching presence and social presence were also explored since cognitive presence cannot be understood in isolation (Garrison, 2017). Teaching presence and social presence support collaborative inquiry processes and thus cognitive presence (Garrison et al., 2000). Learner AOD rubric scores were also analyzed as an objective measure to assess the learners' levels of cognitive presence, social presence, and communication etiquette in their weekly AOD posts and replies during the intervention period.

Research Questions

The research questions for this study are as follows:

Research Question 1. What differences, if any, exist in online learners' perceptions of the COI after they participate in a CC-AOD learning strategy compared to those in independent AODs?

Subquestion 1.1. What differences, if any, exist in the teaching presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?

Subquestion 1.2. What differences, if any, exist in the social presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?

Subquestion 1.3. What differences, if any, exist in the cognitive presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?

Research Question 2. What differences, if any, exist in online learners' dispositions of AOT-E after they participate in a CC-AOD learning strategy compared to those in independent AODs?

Research Question 3. What differences, if any, exist in the AOD rubric scores of participants in a CC-AOD learning strategy compared to those in independent AODs?

Null Hypotheses

The null hypotheses for this study are as follows:

Null Hypothesis 1. No difference exists in learners' perceptions of the COI based on participation in the AOD learning strategy.

Null Hypothesis 1.1. No difference exists in learners' teaching presence based on participation in the AOD learning strategy.

Null Hypothesis 1.2. No difference exists in learners' social presence based on participation in the AOD learning strategy.

Null Hypothesis 1.3. No difference exists in learners' cognitive presence based on participation in the AOD learning strategy.

Null Hypothesis 2. No difference exists in learners' AOT-E based on participation in the AOD learning strategy.

Null Hypothesis 3. No difference exists in learners' AOD rubric scores based on participation in the AOD learning strategy.

Definitions

Actively open-minded thinking (AOT). Developed as a principle of *good thinking* by Baron (1993), AOT is the critical thinking disposition necessary to evaluate evidence and arguments for an issue from various perspectives without myside bias (Mellers et al., 2015).

Actively open-minded thinking about evidence (AOT-E). AOT-E measures people's openness to change their beliefs or opinions according to evidence (Pennycook et al., 2020).

Argumentation. Argumentation is a dialectical social process in which participants weigh a variety of positions and arguments to determine a reasoned judgment for an issue (Battersby & Bailin, 2011).

Asynchronous online discussions (AODs). AODs are online, typically text-based platforms for learner discourse and community building that have no time or space constraints (Zhu et al., 2019).

Cognitive presence. Cognitive presence is the extent to which learners co-construct meaning through reflection and discourse; it is operationalized by the four stages of the PI model: triggering event, exploration, integration, and resolution (Garrison et al., 2001).

Community. A community offers feelings of belonging and trust and is bolstered by the members' commitment to be together (McMillan & Chavis, 1986).

Community of inquiry (COI) framework. The COI framework is a theoretical and practical model for creating effective and meaningful online learning environments through three essential and interdependent elements: teaching presence, social presence, and cognitive presence (Garrison et al., 2000).

Consensus goals. The instructional goal to achieve consensus occurs within collaborative argumentation in which learners are tasked with achieving an agreement or joint solution with a peer or group (Villarroel et al., 2016).

Constructive controversy (CC). CC is a collaborative argumentation learning strategy that scaffolds learners to attain a consensus position on an ill-structured, controversial issue (Johnson & Johnson, 1993; Steiner et al., 2003).

Critical thinking. No singular definition of critical thinking exists, but definitions consistently include both skills and dispositions (Facione, 2011; Nieto & Saiz, 2011). For example, Dwyer et al. (2017) define critical thinking as “a metacognitive process, consisting of a number of sub-skills and dispositions that...increases the chances of producing a logical conclusion to an argument or solution to a problem” (p. 48).

Critical thinking disposition. A critical thinking disposition is an attribute or habit of mind that impacts one's motivation to act or respond in potentially malleable ways when faced with problem-solving or decision-making (Facione, 2000).

Exploration phase. Exploration is the second phase of the PI model and a facet of cognitive presence in a COI (Garrison et al., 2001). In this phase, learners switch between personal reflection and social exploration of ideas to deconstruct problems.

Integration phase. Integration is the third phase of the PI model and a facet of cognitive presence in a COI (Garrison et al., 2001). In this phase, learners combine and connect ideas to create solutions collaboratively.

Metacognition. Metacognition is a construct defined by self-awareness and the management of one's own thoughts (Kuhn & Dean, 2004).

Myside bias. Myside bias is a cognitive state in which a person favors belief-consistent information, ignores counterevidence, and makes inferences based on one-sided thinking processes (Baron, 2006).

Practical inquiry (PI) model: The PI model is the operationalization of cognitive presence and a generalized critical thinking model (Garrison et al., 2000) that includes a triggering event, exploration, integration, and resolution.

Resolution phase. Resolution is the final stage of the PI model and a facet of cognitive presence in a COI (Garrison et al., 2000). Resolution involves applying new ideas as well as testing and defending solutions, often through social consensus building.

Social presence. Social presence is based on learners' abilities to accurately present themselves online and identify with a community; this presence in a COI includes three factors: affective or emotional expression, open communication, and group cohesion (Garrison et al., 2000).

Teaching presence. Teaching presence is the binding element in a COI; it has three aspects: instructional design and organization, facilitation of discourse and understanding, and direct instruction (Garrison et al., 2000; Majeski et al., 2018).

Triggering event. A triggering event is the first stage of the PI model and a facet of cognitive presence in a COI (Garrison et al., 2001). A triggering event is a problem, issue, or

topic presented by the instructor to create a source of cognitive dissonance and a sense of puzzlement.

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

Within the constructivist paradigm for learning, learners are expected to productively engage in argumentation with critical peers by assuming positions, negotiating meaning, and approaching issues from multiple perspectives (Noroozi et al., 2018). Effective argumentation requires not only the capacity but also the willingness to think critically when faced with controversial issues; the intent in the classroom is for learners to transfer these skills and dispositions to the real world (Brien et al., 2016). Specifically, critical thinking involves the skill of evaluating information and making decisions with the disposition of open-mindedness to avoid undue bias (Baron, 2019). Open-mindedness is the propensity to seek and consider alternative and opposing perspectives on an issue. However, learners—and humans in general—are susceptible to cognitive fallibility, leading to judgments and decisions that are clouded by biases and heuristics (Lilienfeld et al., 2009). Accordingly, myside bias includes favoring belief-consistent information, ignoring counterevidence, and making inferences based on one-sided thinking processes (Baron, 2006). This heuristic of engaging one's beliefs as the criteria for judging truth is especially likely when a person is faced with contradictory evidence on a revered or inherently controversial issue (Stanovich et al., 2013).

Within education, myside bias is common in argumentation, particularly when learners are tasked with persuading others (Knobloch-Westerwick et al., 2015; Nussbaum & Kardash, 2005; Wolfe & Britt, 2008). In addition to being a barrier to effective argumentation, myside bias, or learners' lack of open-mindedness, may also inhibit cognitive presence. Studies of AODs have consistently provided evidence of low integration and little or no resolution within the COI literature (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). To address this trend,

a promising approach is utilizing learning strategies that support the development of learners' critical thinking skills and dispositions. Therefore, this study presents an examination of an online adaptation of a CC learning strategy in an AOD format, the aim of which was to facilitate critical inquiry and an AOT disposition. In a CC learning strategy, learners are faced with a controversial issue that has no clear consensus or solution, as it has significant support and opposition on each side (Johnson & Johnson, 2007). The structured process of the CC learning strategy scaffolds collaborative peers to employ perspective-taking approaches, consider and integrate evidence from both sides, and generate a consensus position. This learning strategy has the potential to develop critical thinkers in a COI by encouraging engagement in the integration and resolution phases of cognitive presence while concurrently developing the critical thinking disposition of AOT by mitigating learners' myside bias.

This literature review begins with a discussion of the COI framework as the theoretical context for the study. The research included herein pertains to critical thinking, the ways in which critical thinking is foundational to the COI framework, and how critical thinking is situated within the problem of practice. A summary of the research on cognitive presence in AODs is presented to underscore the need for purposeful learning strategies that support increased engagement in the integration and resolution phases of the PI model's inquiry process. The causes of myside bias in argumentation are then discussed to ground the proposed learning strategy and its encouragement of cognitive presence and AOT. The literature review concludes with an overview of the CC learning strategy, which incorporates the theoretical foundations, the existing research outcomes, and the suitability of the learning strategy within a COI to support learners' AOT.

Theoretical Context

Community of Inquiry Framework

The COI framework is centered on three essential and interdependent elements through which a sense of community (i.e., social presence) is strategically designed and facilitated (i.e., teaching presence) to develop and foster learners' critical thinking (i.e., cognitive presence) around shared learning goals (Garrison et al., 2000). Dewey (1933) and Peirce (1955) developed the philosophical notions of a COI with the premise that knowledge is created in a social context to collaboratively generate ideas and solutions. The COI framework is therefore rooted in the constructivist learning theory by Piaget (1977) and Vygotsky (1978), which posits that knowledge is co-constructed. Constructivism emphasizes (a) learning processes over outcomes, (b) active co-construction of meaning and knowledge, (c) the teacher's role as a guide and facilitator rather than a direct instructor, (d) the importance of process and the inherent value of learning tasks, and (e) assessment and feedback as tools to discover and share understanding (Adams, 2006). Accordingly, the COI framework presents learner collaboration as the catalyst for meaningful critical thinking and knowledge creation (Garrison et al., 2010). In a COI, "members question one another, demand reasons for beliefs, and point to consequences of each other's ideas—thus creating a self-judging community when adequate levels of social, cognitive, and teach[ing] presence are evident" (Garrison et al., 2001, p. 12). This points to a COI's suitability for developing learners' critical thinking skills through argumentation processes; however, all three presences must be sufficiently high and effective.

The three presences fundamental to the COI framework overlap and reciprocally interact, as illustrated in Figure 2 (Junus et al., 2019; Majeski et al., 2018). The term *presence* signifies fidelity or the level of reality in the learning environment and experience (Hosler & Arend,

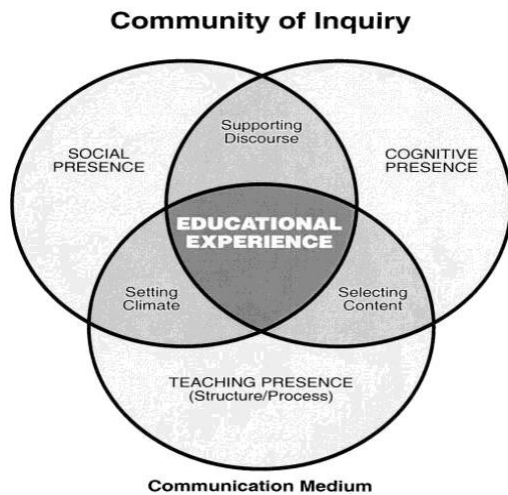
2012). The presences further reflect the shared distribution and responsibility between the learners, instructor(s), and course materials to shape the COI (Shea et al., 2022). To evaluate the three presences, two tools are the validated COI survey (Arbaugh et al., 2008) and content analysis of AOD transcripts in which a coding protocol is utilized (Garrison et al., 2001).

While the three presences are independent elements, they are conceptually and statistically interrelated (Archibald, 2013). Conceptually, cognitive presence is a purposeful collaborative inquiry process that cannot be understood in isolation from social presence or teaching presence (Garrison, 2017). Statistically, Kozan and Richardson (2014) report a three-factor solution for the COI survey in which the results of an exploratory factor analysis demonstrate correctly loaded items for each presence. The cognitive presence factor has large, positive correlations with both the teaching presence factor ($r = .694$) and the social presence factor ($r = .596$), and a positive, medium correlation ($r = .450$) exists between the teaching presence and social presence factors. Garrison et al. (2010) also confirm causal relationships among the presences in which teaching presence and social presence significantly influence cognitive presence and teaching presence influences social presence.

Rockinson-Szapkiw et al. (2015) deem the COI framework useful in evaluating and explaining effective online learning environments and suggest that the three presences predict learner outcomes. Arbaugh et al. (2008), Garrison and Arbaugh (2007), and Heilporn and Lakhali (2020) offer empirical support of the framework for its ability to understand and convey the critical components of an online learning community. Importantly, each presence is a contributing factor for learner outcomes, including course satisfaction, perceived learning, and actual learning outcomes (Richardson et al., 2017).

Figure 2

The Three Presences of the Community of Inquiry Framework



Note: Reprinted from “Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education,” by R. D. Garrison, T. Anderson, and W. Archer, 2000, *The Internet and Higher Education*, 2(2-3), p. 88. Reprinted with permission. See Appendix K.

Teaching Presence

Teaching presence includes instructional design and organization, discourse and comprehension facilitation, and direct instruction (Garrison et al., 2000; Majeski et al., 2018). Considered the binding element in a COI, teaching presence and its three facets support the other model presences, particularly the inquiry phases of cognitive presence (Shea et al., 2022). For instance, a strong teaching presence is needed to move learners to the resolution phase of the inquiry process (Garrison, 2007, p. 66).

Instructional design and organization include the planning and development of the course structure and materials (e.g., the syllabus and guidelines for the online community) to support collaborative communication and critical discourse (Anderson et al., 2001; Boston et al., 2019). Facilitating discourse and understanding involves establishing a community (i.e., social

presence) and inquiry (i.e., cognitive presence) by scaffolding learners' interactions and engagement with the instructional materials. For example, instructor facilitation may include offering feedback on discussion posts, asking probing questions, making observations, and moderating collaboration efforts. Direct instruction, the final facet of teaching presence, relies on the instructor's expertise to ensure not only accurate delivery but also learners' comprehension to support cognitive presence.

Notably, teaching presence is distinct from "teacher presence" (Dempsey & Zhang, 2019). All COI participants contribute to teaching presence: while the instructor assumes a leadership role in teaching presence through design and instruction, learners engage in teaching presence through, for example, their critical feedback to peers on discussion posts (Shea et al., 2022). Caskurlu et al.'s (2020) meta-analysis of 30 studies reports moderately strong positive correlations between teaching presence and satisfaction as well as between teaching presence and perceived learning. Thus, this presence in a COI is essential for engagement in the other presences as well as other vital outcome measures for learners.

Social Presence

The social presence construct is formed by affective or emotional expression, open communication, and group cohesion in a COI (Garrison et al., 2000). The original conceptualization by Short et al. (1976) defines social presence as the degree of salience or the level of authenticity and mental presence the other person has between two people utilizing a communication medium (Oh et al., 2018a). Intimacy and immediacy are the two core aspects of social presence, according to Short et al. (1976), in which the "quality of the medium itself" means that the communication medium and its affordances may impact, for example, the level of connectedness, resulting in a social presence that is technologically determined (p. 65). Social

presence, as conceptualized more recently in the COI framework, is based on learners' abilities to accurately present themselves online and identify with the community (Richardson et al., 2017). While community building offers feelings of belonging and trust (McMillan & Chavis, 1986), the role of social presence in a COI is to support critical inquiry toward the intended educational goals (Garrison & Akyol, 2013).

With affective or emotional expression—the first facet of social presence—learners feel comfortable sharing their personal values and offering self-disclosures with others (Garrison et al., 2000). Open communication, the next element, supports the process of critical discourse through meaningful collaboration within a trusting and safe learning environment. Finally, group cohesion reflects a group identity and a shared commitment to the learning goals (Boston et al., 2019; Garrison et al., 2000). Examples of group cohesion in an AOD include utilizing salutations, phatic expressions, and inclusive pronouns, such as *we*, *us*, and *our*, among learners (Rourke et al., 1999).

Social presence is a mediating variable between cognitive presence and teaching presence (Arbaugh et al., 2008; Garrison et al., 2010). For example, social presence alone may not ensure productive discourse, but developing critical discourse is difficult without social presence. Richardson et al. (2017) conducted a meta-analysis of 25 studies, examining the relationship between learner outcomes and social presence. They found a moderately large positive correlation between social presence and satisfaction ($r = 0.56$) and social presence and perceived learning ($r = 0.51$). Richardson et al. (2017) critique the concept of social presence due to the various ways the construct is conceptualized and measured across studies. For instance, social presence has been described as including immediacy, intimacy, copresence, mutual attention, a sense of community, influence, cohesiveness, and instructor friendliness.

Cognitive Presence

Cognitive presence is supported by the two other model elements to guarantee deep and meaningful understanding through critical discourse (Garrison et al., 2001). As displayed in Table 1, cognitive presence is defined and operationalized by the four phases of the PI model, which represents the idealized logical sequencing of critical thinking. Based on Dewey’s (1933) framework of reflective thought, the model includes a triggering event, exploration, integration, and resolution (Garrison et al., 2000). Progression through the four phases is iterative rather than linear, with integration and resolution representing more advanced cognitive processes (Garrison et al., 2001; Shea et al., 2022). Kaczkó and Ostendorf (2023, p. 3) argue that in Garrison’s conceptualization of a COI, the PI model operationalizes cognitive presence by connecting critical thinking with knowledge generation and confirmation (Garrison & Archer, 2000). This diverges from Lipman’s (2003) ideals of a COI, in which the argumentation process is based on seeking meaning and truth with the outcome of *good judgment*. Specifically, the PI model does not explicitly indicate whether learners employs *good judgment* (i.e., critical thinking dispositions, self-correction, etc.) in their engagement with the inquiry phases.

Table 1

The Practical Inquiry Model’s Alignment with the Three Presences

Phase and Indicators	Cognitive Presence	Social Presence	Teaching Presence
Triggering Event <i>Sense of puzzlement and recognition of the problem</i>	Source of cognitive dissonance is introduced	Problem identification and recognition through shared discourse	Problem is initiated, focused, and shaped by instructor
Exploration <i>Divergence, information exchange, brainstorming, and conclusions</i>	Perception or identification of the nature of the problem and exploration of relevant information	Personal reflection and social exploration processes	Technical support and provision of new knowledge and feedback

Table 1 (Continued)

Integration <i>Convergence, connecting ideas, and creating solutions</i>	Assessment of ideas through reflection and interaction to generate meaning	Personal reflection and social exploration processes	Promotion of idea synthesis with probing questions, guidance, diagnoses of misconceptions, and modeling
Resolution <i>Applying new ideas, testing solutions, and defending solutions</i>	Knowledge creation and experience gained for a new triggering event	Social consensus building	Connection to or introduction of new ideas or triggering events

The PI model involves the intersection of learners’ personal and shared contexts (Garrison et al., 2000); here, learners critically assess their ideas through personal reflection and shared critical discourse (Dempsey & Zhang, 2019). This critical thinking process highlights both problem-solving and the scientific method (Garrison, 2013) as well as collaborative discourse to resolve conflicts and achieve mutual agreement.

The triggering event is a source of cognitive dissonance that disrupts existing beliefs or attitudes to create a sense of puzzlement (Dempsey & Zhang, 2019). This event is a problem, issue, or topic that is initiated, focused, and shaped by the instructor (Garrison et al., 2001). In the exploration phase, learners switch between personal reflection and a social exploration of ideas to identify the nature of the problem. Information is exchanged, and a divergence of opinions may develop as learners brainstorm and generate conclusions. In the integration phase, learners assess, combine, and connect the ideas from the previous phase to cocreate solutions through critical reflection processes (Dempsey & Zhang, 2019). Teaching presence is essential at this stage since learners are typically more comfortable remaining in the exploration phase. Finally, resolution involves applying, testing, and defending the solutions generated in the integration phase to resolve the original triggering event.

Garrison and Arbaugh (2007) note that inquiry becomes increasingly more demanding for learners as they move toward resolution. However, learners must engage in these latter stages of cognitive presence because they are vital for effective collaborative inquiry as well as actual academic performance and perceived learning (Galikyan & Admiraal, 2019; Olesova et al., 2016). The most researched topic among cognitive presence studies, according to Sadaf et al. (2021), is instructional strategies. Learners portray better performance outcomes when online instructional activities are strategically designed to promote progression through the PI model (Darabi et al., 2011). For example, questions asked at the integration and resolution phases result in higher levels of cognitive presence (Olesova et al., 2016). Similarly, tasks designed to achieve resolution produce more engagement at the integration and resolution phases (Richardson & Ice, 2010).

Review of the Literature

Critical Thinking

Developing learners' critical thinking skills is foundational to the COI framework and to higher education overall (Shea & Bidjerano, 2009). While there is no singular definition of critical thinking, the definitions consistently include both skills and dispositions (Facione, 2011; Kuhn, 2019; Nieto & Saiz, 2011). For example, McPeck (1981) describes critical thinking as "the skill and propensity to engage in an activity with reflective skepticism" (p. 7). Thus, critical thinking includes not only skill and ability, such as problem-solving and inquiry but also the disposition to execute the task (Kuhn, 2019). Critical thinking further requires effort, intentionality, and motivation (Weinstock et al., 2017).

Facione (2000) define dispositions as "a person's consistent internal motivation to act toward, or respond to, persons, events, or circumstances in habitual, and yet potentially

malleable, ways” (p. 64). Researchers have focused on critical thinking skills as opposed to dispositions (Janse van Rensburg & Rauscher, 2021); however, Facione (2000) suggest that effective teaching must include strategies that cannot exclusively focus on strengthening cognitive skills. Instead, learning strategies must also build learners’ intellectual character. One such critical thinking disposition is AOT, or the propensity to actively seek, engage with, and appropriately weigh evidence while avoiding myside bias (Baron, 2019). Thus, critical thinkers are those who examine their beliefs about a topic instead of utilizing those beliefs as a filter to interpret information (Iordanou et al., 2020). The latter instance is called *myside bias*, which occurs when people think *with* their beliefs instead of *about* their beliefs (Iordanou et al., 2020, p. 320). Myside bias and its repercussions are common in argumentation, which is notable, as some authors view critical thinking as comprising only inquiry and argumentation (e.g., Battersby & Bailin, 2011; Kuhn, 2019).

Critical Thinking and Cognitive Presence

The cognitive presence construct is critiqued for not being directly related to critical thinking (Shea et al., 2022, p. 151). According to Garrison et al.’s (2000) seminal paper, cognitive presence is ideally understood as part of critical thinking since the PI model is a variation of Garrison’s (1991) five-phase critical thinking model (problem identification, problem definition, exploration, applicability, and integration). Some researchers have since utilized cognitive presence and critical thinking as associated constructs, while others have conflated the two (Breivik, 2016). For example, Garrison et al. (2001) employ the PI model to operationalize learners’ critical thinking in online discussions (Shea et al., 2022), and more recent studies follow suit, utilizing evidence of cognitive presence as a measure of critical thinking in content analyses of discussion posts (e.g., Oh et al., 2018b; Richardson & Ice, 2010).

Other researchers view critical thinking as separate from cognitive presence. For example, Yang and Mohd (2020) employ the COI survey to measure perceptions of the three presences and the motivated strategies for learning questionnaire to measure critical thinking, concluding that critical thinking is a mechanism in the COI framework.

Lipman's (2003) notion of a COI is based on a learning community in which members search for shared *good judgment*, which is "the chief characteristic of critical thinking" (p. 210). *Good judgment* relies on criteria to establish an argument's trustworthiness and legitimacy while applying self-correction to identify and rectify faults in thinking while remaining sensitive to context (Lipman, 2003). In their analysis of cognitive presence coding schemes, Kaczkó and Ostendorf (2023) demonstrate that when cognitive presence is operationalized by the PI model, its purpose is knowledge construction and confirmation. This contrasts with Lipman's definition of critical thinking and thus with cognitive presence, which is criteria-driven, self-correcting, and context-specific (Kaczkó & Ostendorf, 2023). Therefore, with the PI model, learners may achieve considerable levels of cognitive presence as they engage in integration and resolution but may not do so according to Lipman's standards of *good judgment* (2003).

Cognitive Presence and Asynchronous Online Discussions

AODs are integral in a COI since collaborative discourse occurs in an authentic context without time and space constraints (Zhu et al., 2019). Shea et al. (2022) call AODs a "collaborative constructivist medium" in which a transcript of discourse is captured that offers evidence of knowledge co-construction via learners' writing based on their individual reflection (p. 150). Examples of the types of AODs include problem-based, project-based, and debate. Typically, instructors design and facilitate AODs, tasking learners with posting an initial response to a prompt and continuing the conversation throughout the week by replying to their

peers' posts. Findings generated from research regarding COI frameworks consistently indicate that AOD prompts must be purposefully designed to optimize learning, although there are mixed results on the levels of engagement in the three presences across various AOD types (deNoyelles et al., 2014).

Recent findings—that learners have difficulty moving beyond the triggering event and exploration phase of the PI model in AODs—are consistent with early COI research (e.g., Garrison et al., 2001; Shea et al., 2010). For example, in a study of 43 undergraduates who participated in 12 weeks of AODs, 60% of posts were coded as the exploration phase and no posts reached the resolution phase (Jo et al., 2017). Likewise, the AOD posts from 91 learners who were pursuing an online associate's degree were coded according to a cognitive presence phase by utilizing transcript analysis (Kilis & Yildirim, 2019). Participants completed six AODs over a 12-week period, and one or more phases could be present simultaneously (e.g., both triggering event and exploration) per post. After averaging the percentage of posts for each cognitive presence phase, most posts were at the triggering event (55%) and exploration phases (72%), although notably, there were relatively high levels of integration (35%) and resolution (49%). Despite these resolution levels found by Kilis and Yildirim (2019), scholars have generally revealed low to moderate integration and little or no resolution. For example, a study with two groups of preservice teachers featured 41% and 45% of posts at the integration phase over a 15-week period, whereas posts in the resolution phase were minimal at 4% and 6% (Galikyan & Admiraal, 2019). Overall, across a variety of AOD types, learners tend to exhibit little or no engagement in integration and resolution.

Debate-type AODs are frequently utilized to support cognitive presence in a COI; learners are prompted to support or oppose an issue and justify their arguments or reasons.

Although debate-type AODs are complementary to progression through the PI model, study findings have consistently presented a lack of engagement in the resolution phase (Darabi et al., 2011). For example, Richardson and Ice (2010) compare the impact of case-based, debate, and open-ended AODs on cognitive presence across 16 sections of an undergraduate class. The case-based AODs had the highest instances of resolution at 3%, and both the debate and open-ended types featured less than 1% of resolution posts. Similar results are found by Liu and Yang (2014) in their comparison of four AOD types (theory exploration, life experience, case-based, and debate). Participants comprised 36 seniors attending an 18-week online information ethics course. The debate AOD featured significant levels of social presence, but “the discussion content tended to loosen and fail to converge, which limited high-level knowledge construction” (p. 349). Thus, no resolution was present in this debate-type AOD. Darabi et al. (2011) indicate that learners rarely demonstrated cognitive presence levels beyond exploration in their comparison of four scenario-based AOD strategies (structured, scaffolded, debate, and role play AODs). The participants comprised 73 junior and senior undergraduates enrolled in a 15-week online course on stress and resilience in families and children. The debate AOD exhibited considerable levels of exploration and integration but minimal engagement in the triggering event and resolution phases.

Collectively, these findings, especially regarding the debate-type prompts, convey the need for an AOD learning strategy that offers the potential to heighten cognitive presence engagement in a COI by targeting both critical thinking skills (i.e., cognitive presence) and the disposition to apply those skills (i.e., AOT to mitigate myside bias). Garrison (2016) proffers the potential of collaborative inquiry to “break out of cognitive straightjacket[s] and to consider new ideas; to overcome the human bias to confirm and not question currently held perspectives and

ideas” (p. 2). However, this intention falls short if the instructional design within a COI does not encourage Lipman’s (2003) *good judgment*, which includes the critical thinking disposition of open-mindedness to promote critical inquiry and mitigate myside bias.

Myside Bias

According to the heuristics and biases perspective, cognitive biases are attributed to limitations in available information and in human processing capacities (Kahneman & Klein, 2009; Korteling et al., 2018). Relatedly, Kahneman (2011) posits a dual system of thought, simply referred to as System 1 and System 2. Humans tend to rely on System 1, which is characterized as fast, automatic, emotional, experiential, heuristic, stereotypical, error prone, and unconscious, whereas System 2 is slow, effortful, logical, rational, deliberate, calculating, and conscious. Thus, reliance on System 1 means defaulting to cognitive shortcuts in lieu of rationality, deliberate processing, and decision-making (Korteling et al., 2018). Cognitive shortcuts such as myside bias can drive choices and decision-making. Axiomatically, an awareness or scaffolding is needed to encourage learners to pause and engage in more purposeful System 2 thinking.

Myside bias involves favoring belief-consistent information, ignoring counterevidence, and making inferences based on one-sided thinking processes (Baron, 2006). With myside bias, people engage their existing beliefs as a filter to interpret information; this egocentric approach diminishes the possibility of belief change since individuals think *with* their beliefs rather than critically examining their existing beliefs (Jordanou et al., 2020, p. 320). Evidence of myside bias includes selective exposure to belief-consistent information (Hart et al., 2009), affective polarization (Bowes et al., 2022), and attaching higher importance and spending more time on attitude-consistent content (Knobloch-Westerwick et al., 2015). This bias is further exacerbated

by echo chambers (i.e., only choosing information from like-minded sources) and filter bubbles, in which exposure to content is determined by algorithms that are based on past online behavior, which is currently synonymous with behaviors as a result of social media usage (Bakshy et al., 2015). People are biased in their perceptions of myside bias. For example, individuals tend to think others, not themselves, are influenced by their preexisting beliefs (Wang & Jeon, 2020). Myside bias is also independent of cognitive ability, education level, and age (Stanovich & Stanovich, 2010; Stanovich & West, 2007). Therefore, regardless of cognitive ability, all learners need training to avoid myside bias. Leaving myside bias to persist without diagnosis or mitigation can diminish critical thinking processes and result in faulty belief formation and truth identification (Peters, 2020).

Argumentation and Myside Bias

Argumentation is an instructional strategy employed to foster critical thinking skills and rational decision-making in which learners are tasked with justifying and explaining their beliefs and opinions with evidence (Noroozi et al., 2012). In argumentation, learners share opinions, question assumptions, and reconsider beliefs through critical discussions (Jonassen & Kim, 2010). Argumentation typically involves seeking truth and persuading others; seeking truth has considerable epistemic motivation that includes a diligent, open-minded, and responsible search for the optimal course of action or solution to a problem in which one considers all the available information and alternative perspectives (Ramage et al., 2006, p. 391). Ideally, learners are exposed to an opposing, critical person who disrupts myside bias by thoroughly investigating evidence and reflecting on conclusions to promote two-sided reasoning (Asterhan & Schwarz, 2009; Felton & Kuhn, 2001; Kuhn et al., 1997; Rips et al., 1999).

Argumentation can be persuasive in nature, such as when the objective is to argue to defend a conclusion, or argumentation can be deliberative, such as when the objective is to argue and attain a conclusion (Walton, 1989). In deliberative argumentation, a goal for learners may be to achieve a consensus position. Myside bias is a persistent barrier to effective argumentation, especially when learners are tasked with arguing to persuade others; myside bias “leads individuals to neglect or suppress opposing side claims and evidence when presenting arguments to others...and concerns how we use arguments and evidence to present our beliefs to others” (Felton et al., 2015, p. 318). Two causes of myside bias in argumentation are a suboptimal schema of effective argumentation and motivated reasoning (Taber & Lodge, 2006; Wolfe & Britt, 2008).

A suboptimal mental model, or schema, of effective argumentation means that learners have a faulty understanding of how to generate effective arguments (Wolfe & Britt, 2008). For instance, when faced with the controversial topic of abortion, undergraduates evaluated arguments as better when the argument was one-sided rather than two-sided, even when the learner disagreed with the position (Baron, 1995). Learners who favored one-sided arguments tended to make one-sided arguments as well. In Wolfe and Britt’s (2008) study, undergraduate learners were assigned to argue for or against a topic. Participants who conceptualized argumentation as a display of facts (i.e., fact-based argumentation) revealed more myside bias by excluding other-side information in their essays; they applied myside bias because they believed it was argumentatively advantageous to do so. Similarly, Wolfe et al. (2009) find that learners believed that addressing arguments for the other side of a debate topic was a weakness. These findings reinforce Baron’s (1995) claim that myside bias is due to one’s beliefs about thinking.

For example, if people believe that including evidence that favors the opposing side weakens their argument, then they will exclude counterevidence.

Another contributor to myside bias in argumentation is defensiveness or motivation from one's reasoning. Although learners should, according to critical thinking and rationality guidelines, be motivated by accuracy in their claims, people adopt motivated reasoning to support their own beliefs, insulate themselves from opposition, and strengthen their existing beliefs (Kunda & Appelbaum, 1990). For example, in Taber and Lodge's (2006) study with political science undergraduates, participants were provided information for or against either affirmative action or gun control. Although participants were instructed to view the evidence impartially, they demonstrated not only a prior belief effect by seeking arguments that aligned with their initial beliefs but also a stronger resulting outcome among the participants who had stronger initial beliefs. Furthermore, motivated reasoning is activated when learners are prompted to persuade others. For example, persuasion goals resulted in learners misinterpreting information to bolster their arguments (Hart et al., 2009; Villarroel et al., 2016). Moreover, with persuasive and defensive goals, learners featured decreased skepticism toward disconfirming evidence and decreased impartiality, which enabled them to default to closed-mindedness. Consensus goals in argumentation, however, may rectify the two causes of myside bias in argumentation by encouraging learners' AOT and cognitive presence.

Consensus Goals in Argumentation to Mitigate Myside Bias

Goal instructions are the explicit intentions of an assignment or task (Nussbaum & Kardash, 2005). Instructing learners to attain a consensus position with a partner is effective in supporting optimal argument schema and thus mitigating myside bias (Christensen-Branum et al., 2019). In a study among college freshmen, participants were assigned to two discourse

conditions: arguing to persuade or arguing to achieve consensus (Felton et al., 2015). Learners engaged in an online dialogue with a peer who personally disagreed with them regarding capital punishment and then independently wrote an essay. Participants in the consensus group were more likely to cite, integrate, and synthesize opposing-side arguments than those in the persuasion group. The authors claim that myside bias was mitigated since learners demonstrated an openness to acknowledge the validity of their partner's claims and addressed opposing arguments. Those in the persuasion group were more likely to suppress opposing arguments. These findings align with those from Wolfe and Britt (2008): participants in their study's persuasion group were more likely to misinterpret and neglect evidence from the other side than those in the consensus group condition.

Similar findings appear in Villarroel et al.'s (2016) study on the impact of argumentative discourse goals among 40 preservice teachers. Participants were presented with evidence that supported, challenged, or offered ambiguity toward their stated initial view on an issue. They were assigned to a partner who held an opposing view and were tasked with persuading or attaining consensus within their dyad. Participants engaged in a chat-based dialogue with their partner and then wrote an independent essay. Those in the persuasion condition were more likely to misinterpret evidence and less likely to reference the dialogue from their dyad than those in the consensus group.

In the studies discussed above (e.g., Felton et al., 2015; Villarroel et al., 2016), participants who were tasked with persuasion featured a higher likelihood of misinterpreting and neglecting evidence that opposed their beliefs, whereas those in the consensus condition demonstrated a diminishment of myside bias. Villarroel et al. (2016) indicate that "persuasion goals seem to trigger a defense motivation that is antithetical to the task of evaluating data with

care and impartiality” (p. 172). Southworth (2021) agrees that consensus-seeking argumentation is effective in mitigating myside bias, although he claims that the participants in the consensus group continued to engage motivated reasoning to maintain their initial beliefs. For example, Villarroel et al. (2016) find no belief change among consensus group participants with few between-groups differences in polarization. While most participants across both groups expressed no opinion change, the consensus-seeking participants exhibited more polarizing beliefs. As such, although participants consciously mitigated myside bias by considering other-side arguments, they employed motivated reasoning to persist in their initial beliefs (Southworth, 2021, p. 221). To advance the research on consensus-seeking argumentation and myside bias, this study examines the impact on AOT-E, the critical thinking disposition that rejects motivated reasoning within a COI (Pennycook et al., 2020). Considered an antidote to motivated reasoning, AOT is a bias toward belief revision, whereas motivated reasoning is biased toward confirming one’s beliefs (Stenhouse et al., 2018, p. 18).

Actively Open-Minded Thinking

In an examination of principles of *good thinking* in decision-making, Baron (1993) developed a reasoning style called *AOT*. AOT is a critical thinking disposition in which users evaluate evidence and arguments for an issue from various perspectives without undue bias from their prior beliefs (i.e., myside bias; Mellers et al., 2015). AOT, as a decision style and approach to decision-making, is distinctive from measures of cognitive style, such as the rational-experiential inventory by Epstein et al. (1996), and epistemic motivation, which includes the need for cognition by Cacioppo and Petty (1982). Conceptually, AOT “encompass[es] the cultivation of reflectiveness rather than impulsivity; the desire to act for good reasons; tolerance for ambiguity combined with a willingness to postpone closure; and seek[s] the processing of

information that disconfirms one's beliefs" (Stanovich & Toplak, 2019, p. 156). Baron (2006, p. 191-192) distinguishes principles of *good thinking* from *poor thinking*, which involves insufficient searching, an overconfidence in initial opinions, and myside bias. Thus, AOT is a suggested antidote to motivated reasoning (Stenhouse et al., 2018). Myside bias is directionally predisposed to confirm personal beliefs due to motivated reasoning (Kunda & Appelbaum, 1990), whereas AOT moves in the opposite direction as a safeguard against motivated reasoning (Stenhouse et al., 2018).

The AOT scale (Stanovich & West, 1997, 2007) operationalizes Baron's concept of AOT. The most widely employed instrument (Stanovich & West, 2007) has six subscales: (a) flexible thinking (also referred to as AOT), (b) openness, (c) dogmatism, (d) categorical thinking, (e) belief identification, and (f) counterfactual thinking. The AOT scale measures the tendency to engage System 2 processing while minimizing and overriding incorrect, intuitive System 1 responses, such as myside bias (Newton et al., 2022, p. 12). Scholars have confirmed that AOT measures the absence of myside bias (Svedholm-Häkkinen & Lindeman, 2018). For example, undergraduate participants were presented with 23 propositions that featured arguments of varying quality; participants who possessed considerable AOT skills were less influenced by their prior beliefs on the topic (Stanovich & West, 1997). Those with significant AOT skills were also more likely to rate the weak arguments as weak. Stanovich and West (1998) find that high AOT is negatively associated with rating belief-consistent arguments as stronger than the counterarguments. This is significant because AOT may be the ideal thinking disposition to encourage learners to engage in integration and resolution in a COI.

AOT is positively correlated with reflective thinking (Toplak et al., 2011), crystallized intelligence and syllogistic reasoning (Toplak et al., 2014), and rational thinking (Svedholm-

Häkkinen & Lindeman, 2018). Those who have practiced AOT tend to provide more evidence for their views (Sá et al., 2005) and engage in more extensive information seeking (Haran et al., 2013). Moreover, measures of AOT demonstrate an openness to evidence in both belief formation and revision (Pennycook et al., 2020). For example, AOT correlates negatively with beliefs in conspiracy theories (Swami et al., 2014), superstitious thinking (Toplak et al., 2014), and paranormal beliefs (Svedholm-Häkkinen & Lindeman, 2018).

The AOT scale is intended to measure rational thinking as a single psychological trait (Janssen et al., 2020). An unsurprising critique, however, is that rational thinking is not a unidimensional phenomenon (Svedholm-Häkkinen & Lindeman, 2018). Consequently, the AOT scale (Stanovich & West, 2007) includes pooled items from various sources, such as the constructive thinking inventory (Epstein & Meier, 1989) and the belief identification scale (Sá et al., 1999). Baron (2019) clarifies that AOT is a multidimensional concept with three interdependent functions: (a) a norm to evaluate thinking; (b) a social norm to compare one's views to the perspectives of others; and (c) a standard to evaluate the trustworthiness of others' thinking or claims. Thus, Baron's (2019) conceptualization and operationalization of AOT—a principle of *good thinking*—is similar to Lipman's (2003) COI and its requirement of *good judgment*, which evaluates and establishes the trustworthiness and legitimacy of arguments while self-correcting to identify and repair faults in one's thinking.

The AOT-E scale was developed and validated by Pennycook et al. (2020) and measures one's openness to change one's beliefs or opinions according to evidence. The AOT-E scale maps onto Baron's third function of AOT, which pertains to evaluating the trustworthiness of the source of evidence (2019). AOT-E is a strong predictor of many beliefs, values, and opinions. For example, those with considerable AOT-E skills are less likely to be religious, less likely to

hold conspiratorial and paranormal beliefs, more likely to believe in a variety of scientific claims, and more politically liberal (e.g., overall ideology, political affiliation, moral values, and a variety of specific political opinions) with high effect sizes for these correlations (Pennycook et al., 2020, p. 495). AOT-E is also positively correlated with truth discernment: participants with higher AOT-E traits identified false information related to the COVID-19 pandemic more accurately than those who had lower scores on the AOT-E scale (Bonafé-Pontes et al., 2021). Edgcumbe (2022) posits that gender is not a predictor of AOT-E, but notes that scores decreased as age increased, suggesting a reluctance to change values and ideas that are well-established.

Believing one's beliefs should change according to evidence requires one to reject motivated reasoning (Pennycook et al., 2020, p. 493). While all reasoning is motivated (Taber & Lodge, 2006), reasoning can be truth-oriented with beneficial epistemic ends, or reasoning can be motivated in a way that supports one's prior beliefs (Southworth, 2021). Combating motivated reasoning requires the development of learners' open-mindedness and should be an urgent focus in education (Southworth, 2021). The strategy of interest for this study is an online adaptation of the CC learning strategy that enables an examination of the COI and AOT-E's impacts on perceptions.

Constructive Controversy Learning Strategy

The concept of academic controversy was established by Johnson and Johnson (1993). The learning strategy is referred to in the literature by many names, such as *structured academic controversy* (Bruen et al., 2016), *structured controversy* (Steiner et al., 2003), *structured academic controversy model* (Estes & Mintz, 2016), *cooperative controversy* (D'Eon & Proctor, 2001), *constructive controversy* (Ou et al., 2018), and other variations. In this literature review

and study, *CC* is applied to reinforce the practical and theoretical nature of the instructional strategy as a social-constructivist process.

CC is designed to create intellectual conflict to direct learners toward uncertainty and epistemic curiosity while refining conclusions (Johnson & Johnson, 2011). Issues are considered to be controversial in this learning strategy when there is no clear consensus and each side has both significant support and opposition (Johnson & Johnson, 2007). Thus, with the *CC* learning strategy, learners face ideas, conclusions, and opinions that are at odds, and the goal is to achieve an agreement or resolution based on a variety of perspectives (Johnson & Johnson, 2007). Similar to the instructional goal of reaching consensus, learners who employ a *CC* learning strategy face conceptual conflict from proponents of opposing views to create doubt toward their initial opinions (Johnson et al., 2006).

The Process and Theory of Constructive Controversy

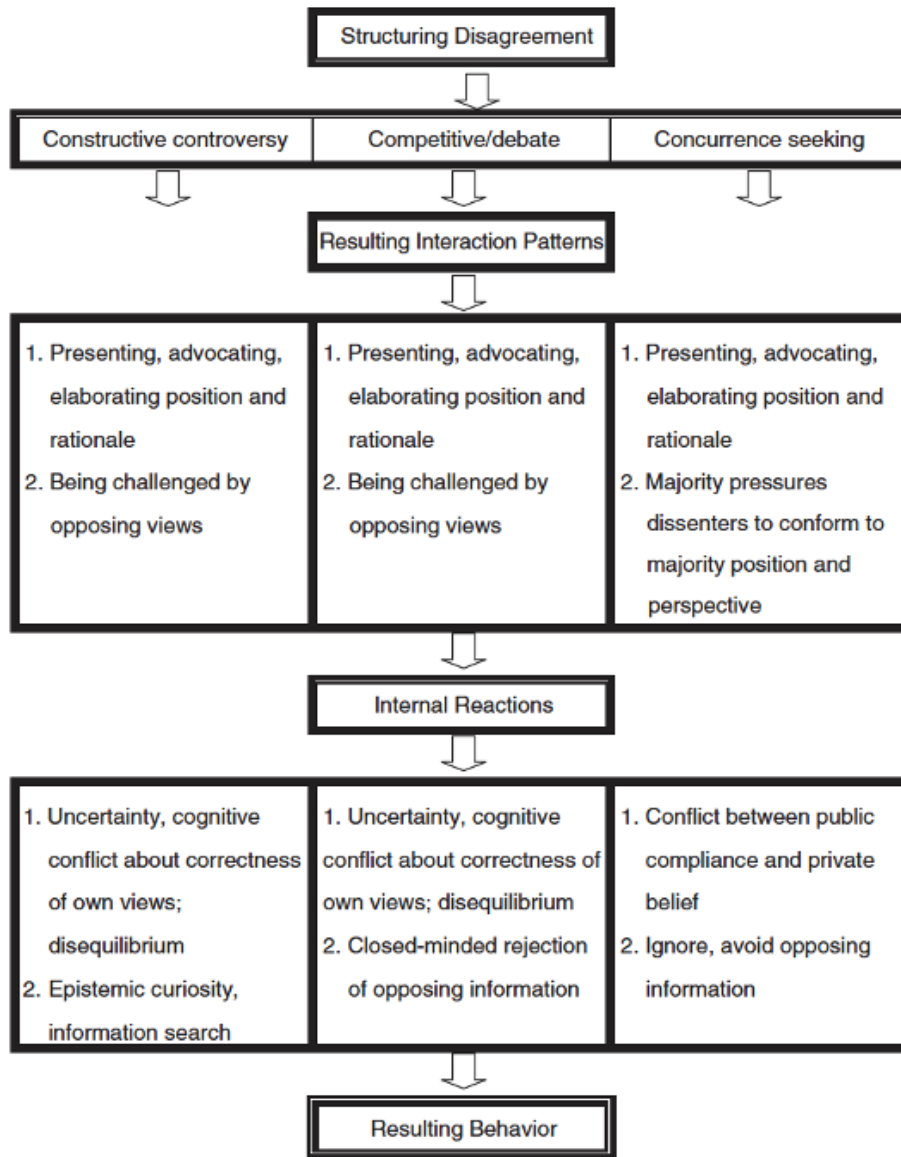
The *CC* learning strategy process begins with the introduction of a problem. At this stage, individuals possess considerable confidence in their initial conclusions (i.e., *myside bias*), and epistemic processes are frozen due to the lack of friction (Johnson & Johnson, 2011, 2014). Next, individuals share their conclusions and justifications with others. This process deepens learners' understanding of their personal ideas and reasoning strategies. Learners are confronted with contrasting information and perspectives as others share their ideas; this leads to a state of conceptual conflict and epistemic curiosity. With the thawing of epistemic processes, individuals become motivated to actively search for more information from different perspectives to increase the validity of their claims (i.e., *AOT*). Finally, new solutions and decisions are generated as alternative perspectives and reasoning are synthesized to produce new conclusions. The process is complementary to the *PI* model and is the basis for cognitive presence (Garrison et al., 2001);

however, perspective-taking and -switching are at the heart of CC, which supports both critical thinking skills and AOT.

CC theory is based on the relationship between conflict, cooperation, and the ways in which conflict processes lead to positive outcomes (Johnson & Johnson, 2011). Learners are responsive to the structure of conflict, and the outcomes of structured conflict are determined by learner interactions (Johnson & Johnson, 2014). Conflict can be structured with the CC learning strategy on one end of the spectrum and concurrence seeking at the other end. Competitive forms of argumentation, such as debate, fall between CC and concurrence seeking on the continuum (see Figure 3). Whereas CC promotes effective argumentation, concurrence seeking may lead learners to suppress opinions and beliefs in an effort to conform or concur. These two conflict structures therefore lead to different outcomes. When seeking concurrence, the dominant initial position is accepted, which leads to a convergence of ideas and a false consensus. This characterization of concurrence seeking in conflict aligns with the findings from Felton et al. (2015) and Villarroel et al. (2016) in which myside bias is mitigated but evidence of motivated reasoning remains. In CC, however, the resulting behaviors include the integration of perspectives to generate consensus that reflects good judgment from all points of view (Johnson & Johnson, 2015).

Figure 3

Theory of Controversy



Note: Reprinted from *Constructive Controversy: Theory, Research, Practice* by D. W. Johnson, Cambridge University Press, 2015, p. 33. Reprinted with permission from the licensor through PLSclear. See Appendix L.

The strategy that underscores consensus goals in argumentation maps onto concurrence seeking, while persuasive argumentation maps onto competition or debate. The closed-minded

rejection of opposing information that leads to myside bias in debate and the enduring motivated reasoning of learners when engaging in consensus goals were the impetus for this study. The CC learning strategy may be effective in supporting learners through high-level collaborative inquiry processes (i.e., cognitive presence) while concurrently mitigating motivated reasoning by heightening AOT. The CC learning strategy, among other benefits, such as the adaptation of diverse perspectives (Johnson & Johnson, 2015), supports significant epistemic curiosity, which leads learners to actively seek and evaluate new information and perspectives as they attempt to integrate evidentiary differences (Tjosvold, 2014).

Outcomes of Constructive Controversy

Johnson et al. (2000) conducted a meta-analysis that compares the CC learning strategy to debate, concurrence seeking, and individualistic learning (i.e., learners complete self-paced independent work); the CC learning strategy exhibits (a) more improvement in learners' reasoning; (b) increased quality, quantity, and range of ideas; (c) greater social support among learners; (d) higher self-esteem among learners; and (e) overall positive attitudes toward the class (Johnson et al., 2000). Of particular interest is the outcome of greater sophistication in learners' thinking about an issue after participating in the CC learning strategy; participants learned oppositional perspectives more accurately and completely, increased their perspective-taking skills, and expressed greater attitudinal and positional changes. These findings are notable since an exchange of evidence increases the likelihood that differences of opinion will decrease (Norman, 2016).

A qualitative study among university lecturers who participated in an in-person CC implementation featured one group of four and one group of two. Participants indicated that adequate preparation and time to learn about the issue was needed. One participant noted the

potential danger of learners “falling back on simplistic stereotypes when required to switch sides in an argument” (Bruen et al., 2016, p. 23); thus, strong foundational knowledge is a requisite for effective engagement in the CC process. Importantly, the CC process in this study supported self-awareness of potential myside bias, as participants noted that a benefit of this approach was that they were challenged to disagree with their preconceived opinions on the matter (Bruen et al., 2016, p. 23). For example, one participant stated, “It has certainly made me question the positions that I (un)consciously take and that I need to be more balanced in the approach I take” (p. 23). Thus, these findings demonstrate the appropriateness of the CC-AOD to positively impact cognitive presence in COIs and AOT.

Adaptation of Constructive Controversy for Online Implementation

To manage conflict constructively, Johnson and Johnson (2011) indicate that a procedure is needed to engage learners in productive social and cognitive skills and dispositions. The specific structure of the CC learning strategy includes the following steps: (a) research and preparation for the issue, (b) development and advocacy for the initial position, (c) reversal of the perspective and position, and (d) synthesis and integration of the optimal evidence into a joint solution (Johnson & Johnson, 1993, p. 41). The CC learning strategy is typically implemented in an in-person classroom or as part of workplace training in teams of four or two.

An AOD version of the CC learning strategy aligns with Andriessen and Schwarz’s (2009) requirements for productive argumentation, since online discourse can exponentially increase the number of interactions, ideas, feedback, and critiques. To qualify as productive argumentation, at least two of the following criteria must be met: (a) Several arguments must be raised or challenged; (b) Learners must capitalize on arguments in subsequent activities; (c) Learners must refer constructively to others; and (d) All learners must actively participate in the

discussion (p. 145–146). Electronic discourse, as described by Kuhn (2018), supports these criteria, as learners have more time to reflect on their ideas and arguments compared to face-to-face dialogues. Moreover, these “written artifacts” regarding AODs reinforce to learners that they are responsible for what they think, share, and argue (Kuhn, 2018, p. 124). Researchers have indicated that cognitive presence does not develop automatically (Sadaf & Olesova, 2017) and that the later stages of cognitive presence are more demanding (Garrison & Arbaugh, 2007). Consequently, AODs must be purposefully designed to develop and sustain an effective COI that includes cognitive presence as well as its integration and resolution phases. An adaptation of the CC learning strategy (Johnson & Johnson, 1993) in an AOD format is untested and has the potential to support both cognitive presence and learners’ AOT-E. The specific CC-AOD learning strategy process employed for this study is detailed in Chapter 3.

Conclusion

A research dearth exists regarding critical thinking dispositions compared to critical thinking skills (Janse van Rensburg & Rauscher, 2021); similarly, the research on debiasing strategies is minimal in comparison to the significant amount of research on the impacts of biases and heuristics (Lilienfeld et al., 2009). Debiasing strategies seek to eliminate or reduce the intensity or frequency of biases. For myside bias, the goal of a debiasing strategy is not to lead learners to believe that all perspectives are of equal value and validity (e.g., naïve cultural and moral relativism; Lilienfeld et al., 2009, p. 393); instead, the goal is to support AOT, whereby alternative perspectives are considered and appreciated. Supporting AOT involves teaching metacognitive strategies that make critical thinking more likely (Willingham, 2008). Encouraging learners to think about how they are thinking with AOT aligns with findings from other researchers seeking to do the same (e.g., Harrington, 2020). Therefore, this study adopted

an approach grounded in meliorism, which acknowledges that human thinking departs from rationality but improvements can be made through interventions (Stanovich, 1999). The basis for instructional interventions that seek to change thinking dispositions is the assumption that AOT increases a person's rationality (Stanovich, 2001, p. 30). The outcome measures of interest for the study are learners' perceptions of the COI, their AOD rubric scores, and their critical thinking disposition of AOT after participating in the CC-AOD learning strategy, which is intended to support argumentative inquiry and open-mindedness.

CHAPTER THREE: METHODOLOGY

Introduction

The purpose of this study is to determine whether the CC-AOD learning strategy impacts learners' critical thinking within a COI. Learners' perceptions of teaching presence, social presence, and cognitive presence were examined by utilizing the COI survey (Arbaugh et al., 2008). The construct of cognitive presence measures learners' critical thinking skills (Garrison et al., 2001), and their critical thinking disposition of open-mindedness was measured by the AOT-E scale (Pennycook et al., 2020). Learners' AOD rubric scores from four weekly AODs during the intervention period were analyzed according to an instructor-created guide to examine cognitive presence, social presence, and communication and etiquette. Finally, the relationships between the COI constructs, the COI overall, and AOT-E were investigated. The research questions and corresponding hypotheses, as outlined in Chapter 1, were investigated through quantitative methods. This chapter includes details about the method and design, the study participants, and the setting in which the study was conducted. Additionally, this chapter presents the instruments as well as the data procedures, collection, and analyses.

Method and Design

An experimental, posttest-only control group design was applied to examine the effectiveness of instructional intervention on a number of variables (Gall et al., 2005). This quantitative research design involved two groups in which one received the treatment (i.e., instructional intervention) and one did not; data were collected on outcome measures at the conclusion of the intervention (Morgan & Renbarger, 2018). The independent variables were the two groups of participants in the CC-AOD learning strategy: the treatment group and the control group. The dependent variables were the outcome measures, which included learners'

perceptions of the COI (teaching presence, social presence, and cognitive presence) and the AOT-E as well as their AOD rubric scores. The posttest survey had three sections: the 34-item COI survey, the 8-item AOT-E scale, and six items regarding participant demographics (see Appendices D–F, respectively). Learners’ AOD rubric scores from the intervention period, which were based on the instructor’s framework, measured cognitive presence, social presence, and communication and etiquette. Two raters and interrater reliability procedures were employed to ensure consistency in score evaluations.

An experimental design was chosen, as it is among the most rigorous for research that involves a treatment group (Gall et al., 2007). Compared to other quantitative research methods, experimental designs are more powerful than descriptive, correlational, or causal-comparative designs in demonstrating cause-and-effect relationships among variables (Gall et al., 2005, p. 249). Moreover, a posttest-only design was employed, as it controls for the possibility that a pretest could impact the study results. A pretest could threaten internal validity if the participants were sensitized or responsive to the purpose of the study (Gall et al., 2007). Additionally, administering the AOT-E scale as a pretest could have led to inflated scores on both the pretest and posttest due to the potential of social desirability bias, in which respondents present themselves in a way that they believe is most desirable rather than reflecting their true beliefs (Krumpal, 2013).

The treatment group participated in the CC-AOD learning strategy in pairs, whereas the control group participants worked independently. This design reflected Kuhn’s (2015) work, which proposes additional studies to contrast collaborative group work with a comparison condition in which individuals work independently. In collaborative work, group performance may result from the efficiency and productivity of a division of labor, or the most competent

group member may ensure that the group meets the instructional goal. In the latter, any group with a member who has above-average competence has the potential to heighten group performance compared to individuals working alone. This study specifically examines the effectiveness of the CC-AOD learning strategy on learners' perceptions of the COI, learners' critical thinking dispositional gains specific to AOT-E, and learners' AOD rubric scores.

Participant and Learners' Characteristics

A nonprobability convenience sample was utilized, as the participants were convenient and available (Creswell & Guetterman, 2019). Per research conventions, a minimum sample of 15 participants per group was obtained (Gall et al., 1996). The sample population from which participants volunteered was an asynchronous, online disability studies undergraduate course. After learners enrolled in the course, they were randomly assigned to two sections and therefore had access to two course shells, materials, and syllabi. The two sections comprised the treatment and control groups. Random assignment allows for the assumption of group equivalence and improves internal validity to control for extraneous variables, such as inherent between-groups differences (Campbell & Stanley, 1963). Participation in the study was elicited upon completion of the course.

Demographic data were gathered to examine group homogeneity. Therefore, demographic variables were analyzed to determine whether statistical control was necessary. Chi-square tests were conducted to determine whether the proportion of learners in each demographic variable differed between groups. The demographic survey items included gender, age, ethnic background, year in college (e.g., freshman, sophomore, etc.), preference for course format (e.g., online asynchronous, online synchronous, hybrid, etc.), and the number of asynchronous online courses completed at the time of taking the survey (see Appendix F).

Registrants for the online course were typically traditional undergraduate learners pursuing a bachelor's degree. Traditional undergraduates are characterized as those 24 years of age or younger who are enrolled full time, employed 34 hours or less per week, and have no dependents, whereas nontraditional undergraduates meet at least one of the following criteria: 25 years of age or older, delayed college enrollment, enrolled part time, employed 35 or more hours per week, financially independent, married with or without dependents, or single with dependents (McFarland et al., 2017). Additionally, registrants often take the course as an elective among business or social work majors.

A nonprobability convenience sample of 43 participants was obtained, comprising learners who registered for and completed an online, undergraduate course on disability and diversity during the fall 2021 and spring 2022 semesters. Of the 21 learners in the fall 2021 treatment group and the 22 learners from spring 2022, 8 and 14 participated in the study, respectively, resulting in a participation rate of 51.16% for the treatment group. Of the 18 learners in the fall 2021 control group and the 20 learners from spring 2022, 10 and 11 participated in the study, respectively. The participation rate for the control group was 55.26%. The overall participation rate for the study was 53.09%.

A majority of the learners in the sample (76.74%) were between 18 and 24 years of age, and less than 6.98% were older than 35 (see Table 2), which is consistent with the age range for traditional undergraduate learners (McFarland et al., 2017). The vast majority (86.05%) identified as female ($n = 37$), whereas 13.95% ($n = 6$) identified as male, which aligns with the trend of women having higher enrollment than men in higher education overall and in online courses specifically (Hachey et al., 2022). A Fisher's exact test indicated that there was not a significant difference in gender proportions across groups ($p = .185$). Fisher's exact test was

employed instead of a Pearson's chi-square because six participants in the treatment group and one participant in the control group identified as male. Pearson's chi-square requires at least five in each category (Pallant, 2016).

Table 2

Frequencies and Percentages of Categorical Demographics

	Full Sample (<i>n</i> = 43)		Treatment (<i>n</i> = 22)		Control (<i>n</i> = 21)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	37	86.05	17	77.27	20	95.24
Male	6	13.95	5	22.73	1	4.76
Race						
White	16	37.21	9	40.91	7	33.33
Asian	26	60.47	12	54.55	14	66.67
Hispanic	5	11.63	2	9.09	3	14.29
African American	6	13.95	4	18.18	2	9.52
Native American	2	4.65	1	4.54	1	4.76
Native Hawaiian or Pacific Islander	8	18.60	6	27.27	2	9.52
More than one race	16	37.21	10	45.45	6	28.57
Age						
18–24	33	76.74	16	72.73	17	80.95
25–34	6	13.95	3	13.64	3	14.29
35–44	2	4.65	2	9.09	0	0.00
45+	1	2.33	0	0.00	1	4.76
Missing	1	2.33	1	4.54	0	0.00
Year						
Freshman	1	2.33	1	4.54	0	0.00
Sophomore	4	9.30	3	13.64	1	4.76
Junior	14	32.56	5	22.73	9	42.86
Senior	24	55.81	13	59.09	11	52.38
Asynchronous Classes Taken						
1–2	14	32.56	6	27.27	8	38.10
3–4	10	23.26	5	22.73	5	23.81
5–6	10	23.26	6	27.27	4	19.05
7+	9	20.93	5	22.73	4	19.05

A series of Mann-Whitney U analyses demonstrated that there was no difference in median scores for the COI elements and AOT-E between female and male learners. The analyses further revealed no significant difference based on gender for COI ($U = 128.00, z = .598, p = .572$), for teaching presence ($U = 120.50, z = .391, p = .745$), for social presence ($U = 136.00, z = .882, p = .400$), for cognitive presence ($U = 117.00, z = .213, p = .851$), or for AOT-E ($U = 69.50, z = -1.463, p = .149$). Therefore, gender was not added as a control variable in the final analysis.

The largest ethnic group among participants was Asian ($n = 26, 60.47\%$), which was followed by White ($n = 16, 37.21\%$) and Mixed Race ($n = 16, 37.21\%$); Mixed Race data reflect answers in which more than one race was selected. Pearson's chi-square and Fishers' exact test analyses indicated that there was not a significant difference in the proportions between any ethnic group across the treatment and control groups.

The majority of participants were seniors ($n = 24, 55.81\%$), and 14 participants (32.56%) were juniors. All participants had some experience in asynchronous online classes; however, 14 participants (32.56%) had taken only one or two asynchronous online classes. The remaining participants had previously taken three or four ($n = 10, 23.26\%$), five or six ($n = 10, 23.26\%$), or seven or more asynchronous online classes ($n = 9, 20.93\%$). Participants mostly preferred the asynchronous online format for classes ($n = 27, 62.79\%$), followed by a hybrid model of online and in-person offerings ($n = 8, 18.60\%$).

Setting

The setting was a large, higher education public institution in a medium-sized metropolitan area in the Pacific United States, which is hereinafter referred to as *Ocean State University*. Ocean State University is a public land-grant university with an R1 classification

(doctoral university with very high research activity) and is the flagship campus among a network of other universities and community colleges within the same system. With over 200 campus-based or online degree-issuing programs at the undergraduate, graduate, and doctorate levels, Ocean State University is ranked among the most diverse universities in the United States and is an Asian American and Native American Pacific Islander Serving Institution.

The online, undergraduate disability studies course for this research is offered by the College of Education and covers a foundation in disability and diversity studies. Enrollment for the course is typically 25–40 learners, and offerings are in the fall, spring, and summer. It is implemented in an online, asynchronous format. The course has the following foci: (a) disability as a type of diversity and identity compared to other types of diversity and identity, such as race, class, gender, sexuality, and other intersectionalities; and (b) diversity within disability, insofar as people with disabilities are diverse and different from one another. Those who complete the course are knowledgeable about various definitions and models of disability and disability identity as well as critiques of those definitions and models. The course also examines the character or nature of ableism as well as educational, employment, and health care access exclusions and disadvantages faced by individuals with disabilities. This course, as a context for the study, was suitable for the identified problem because cognitive biases and their repercussions can be especially damaging to social beliefs (Stammers, 2018). Moreover, topics in disability studies are often open-ended, allowing opinions to shift based on the social context, environment, and lens. Thus, controversial debate topics in disability studies are often ill-structured and suitable for this study's intervention.

I was both the instructor and the instructional designer for the course. This approach—utilizing one's course and identified problem of practice—is consistent with applied and action-

focused research. This approach also aligns with the expectations of a scholar-practitioner, which, as the name suggests, exists along the continuum between scholar and practitioner (Throne, 2020). Scholar-practitioners apply both practical and theoretical knowledge to address problems of practice within their context to improve instruction, learning environments, and systems (Arslan-Ari et al., 2018). Similarly, action research, or the systematic inquiry that involves planning, action, and reflection, was appropriate for this study and for an evolving scholar-practitioner (Mertler & Henriksen, 2018).

The semester duration was 16 weeks; assignments included 14 AODs, an essay on the United Nations' Convention on the Rights of Persons with Disabilities (UN CRPD), three multiple-choice quizzes, and a final argumentation paper. Structured AODs were assigned each week, except when the UN CRPD paper (Week 11) and the argumentation paper (Week 16) were due. The weekly topics for the first 11 weeks of the course included the following: (a) introductions, (b) defining disability, (c) cultural competence, (d) implicit bias and ableism, (e) education, (f) employment, (g) community living, (h) gender and sexuality, (i) race and indigeneity, (j) aging, and (k) UN CRPD. The final 5 weeks of the course were the instructional intervention period. The treatment group completed the steps in the CC-AOD learning strategy, which culminated in an argumentation that was collaboratively written with their assigned partner, while the control group completed their AODs and argumentation paper independently.

The treatment and control groups had access to two learning management system (LMS) course shells, syllabi, and AOD sections. The university-wide LMS was employed to house and organize the course materials, Articulate Rise, a course creation tool, was utilized for weekly module content, and Campuswire, a discussion platform, was engaged for weekly AODs. For each assigned AOD, a response post was due on Thursday, and replies to at least two peers on

different days were due by Sunday. The discussion prompts were structured based on the assigned readings and were intended to build a COI through discourse and reflection.

Research Intervention and Instructional Strategy

By Week 11, learners from both the treatment and control groups indicated via email their top two preferences for the controversial disability studies debate topic, and topics were assigned by the instructor for the argumentation essays. Whereas the treatment group was assigned a topic and partner, the control group participants were assigned a topic only. The topics were developed by the instructor based on the disability studies literature. Each debate topic qualified as controversial since each issue had no clear consensus or solution as well as significant support and opposition on each side of the debate (Johnson & Johnson, 2007). The list of controversial debate topics is available in Appendix A.

The final 5 weeks (Weeks 12–16) of the course comprised the intervention period. Learners in both the treatment and control groups worked on an argumentation paper that was due in the final week of the semester. Whereas the learners in the treatment group participated in the CC-AOD learning strategy, the control group participants completed their AOD posts and replies independently (see Appendix B). Learners in the treatment section were paired and assigned a controversial topic. The pairs decided who would be Partner A and Partner B. Partner A started with the for position, and Partner B began with the against position. The weekly AOD prompts corresponded with the first four steps of the CC protocol and ended with the submission of a collaborative argumentative essay. The treatment group also had access to a graphic organizer that is often utilized alongside the CC process to compile information and generate a final consensus position (see Appendix C). Use of the CC graphic organizer was not required nor tracked by the instructor.

The control group participants selected their position (i.e., for or against) when indicating their top two topic preferences. They were instructed to begin working on their argumentation paper after they received their assigned topic. However, their AOD requirements for Weeks 12 and 13 were area-of-interest prompts to support their continued exploration of disability studies. The AODs specific to their argumentation paper occurred in Weeks 14 and 15. In the final week of the course, the control group participants submitted their final argumentation paper. The suggested outline for the final paper for both the treatment and control groups included the following components: (a) introduction with background information and a thesis statement, (b) at least three arguments with supporting evidence, (c) at least three counterarguments with refutations, and (d) a conclusion. Consequently, both groups were scaffolded to adopt an effective argumentation schema that included and acknowledged both arguments and counterarguments.

Garrison's (2006) online collaboration design principles for a COI shaped the design, development, and implementation for both the treatment and control group sections of the course. Table 3 presents the principles pertinent to the three elements of teaching presence: instructional design and organization, facilitation of discourse and understanding, and direct instruction. For instructional design and organization, the two approaches specific to the treatment group included learners' assignments to small groups to support social presence and the usage of AODs throughout the semester to establish cognitive presence that would support collaborative work later in the semester. The skills as well as the expectations for communication and etiquette in the AOD were modeled throughout the semester to increase learners' critical reflection and discourse.

Table 3

Design Principles for Developing a Community of Inquiry Utilizing Instructional Design and Organization

Teaching Presence: Instructional Design and Organization

Social Presence Principle. Establish a climate that is conducive to creating a COI.

- Learners introduce themselves and are encouraged to share a profile picture.
- **Learners are assigned to small groups** (*treatment group only*).
- Learners interact formally and informally (e.g., texting).
- Instructor avoids being the center of the discussion.
- Instructor establishes office hours and is available for timely responses via email.
- AODs require deliberate and intentional communication.

Cognitive Presence Principle. Establish critical reflection and discourse that supports systematic inquiry.

- Learners have clear goals for the course overall and for specific assignments.
 - Instructor establishes a friendly, trusting online environment and reinforces expectations by modeling appropriate discourse.
 - Instructor provides clear goals, course topics, and instructions for effective and appropriate participation in academic tasks.
 - Instructor implements learning activities that align with the PI model, such as argumentation tasks.
 - **AODs early in the semester set the stage for collaborative projects** (*treatment group only*).
 - AODs afford time for reflection and increase learners' responsibility for work, as a transcript of posts and learning is generated and available.
-

Teaching Presence: Facilitation of Discourse and Understanding

Social Presence Principle. Sustain community through expressions of group cohesion.

- Learners engage and rely on one another to reach course and assignment goals.
 - Learners interact frequently to enhance personal identity and projection.
 - **Instructor designs collaborative group activities to maintain group cohesion** (*treatment group only*).
 - Instructor models facilitation skills to ensure effective and productive learner engagement.
 - AODs include opportunities for learners to be questioned and challenged while maintaining trust and safety, which are valuable to the learning community.
-

Table 3 (Continued)

Cognitive Presence Principle. Encourage and support the progression from inquiry to resolution.

- Learners build on one another's ideas with required replies that have structured prompts and expectations.
 - Instructor models the inquiry process.
 - Instructor facilitates discussions in a timely manner to maintain the focus of the discourse, to ask stimulating questions, and to resolve issues.
 - Instructor remains present in AODs but does not dominate.
-

Teaching Presence: Direct Instruction

Social Presence Principle. Evolve collaborative relationships in which learners are supported in assuming increasing responsibility for their learning.

- Learners self-regulate as the instructor assumes a supportive role.
- Learners respect one another and the instructor even when challenged.
- **Learners have opportunities for team activities** (*treatment group only*).
- Instructor directly addresses conflict situations as needed.

Cognitive Presence Principle. Ensure that there is resolution and metacognitive development.

- Learners contribute ideas and perspectives to constructively shape discourse.
 - Learners make connections, integrate ideas, summarize discussions, and progress toward resolution.
 - Learners discover how to learn through metacognitive awareness.
 - Learners and instructors diagnose misconceptions.
 - Instructor explicitly states course and assignment expectations and guidelines.
 - Instructor creates self-directed activities.
 - Instructor employs a question-based approach balanced with providing direction as a subject matter expert.
 - Instructor provides guidance to ensure that discourse evolves toward shared goals.
-

A design element to establish a climate suitable for a COI for both the treatment and control groups involved learners and the instructor introducing themselves in the first AOD. While not a requirement, learners were encouraged to share a picture of themselves on Campuswire. Learners interacted formally with the discussion prompts, and they could send

direct messages to one another and the instructor through Campuswire for more informal interactions. A design practice that established critical reflection and discourse included clear instructor-provided goals, course topics, and instructions on how to participate effectively and appropriately in academic tasks. These details were provided to learners in many ways, including the syllabus, the LMS, and weekly course announcements.

Table 3 also portrays the social presence and cognitive presence principles for the teaching presence facets of facilitating discourse and understanding as well as direct instruction. As part of facilitating discourse and understanding, the instructor required the treatment group to participate in a collaborative group activity to foster group cohesion. Their participation in the CC-AOD learning strategy involved a process designed by the instructor to maintain group cohesion. The instructor determined, as part of direct instruction that only treatment group participants would have opportunities for team activities to develop collaborative relationships and increase responsibility for their learning.

Instrumentation

The posttest survey included validated instruments and demographic questions. Learners' perceptions of the COI, the first dependent variable, were measured through the COI survey, including teaching presence, social presence, and cognitive presence (Arbaugh et al., 2008). Learners' AOT-E, or the openness to change opinions or beliefs according to evidence, was measured through the AOT-E scale (Pennycook et al., 2020). There were six demographic questions that gathered information on participants' gender, age, ethnic background, year in college, preference for course format, and the number of asynchronous online courses completed thus far (see Appendix F). The posttest was administered via Qualtrics, a survey management

program licensed through the University of Memphis, after learners opted to participate in the research study.

The COI survey by Arbaugh et al. (2008) was adopted to measure the dependent variables of learners' perceptions of the COI, including teaching presence, social presence, and cognitive presence. The COI survey is validated for three factors (teaching presence, social presence, and cognitive presence) that construct a COI (Arbaugh et al., 2008; Bangert, 2009; Díaz et al., 2010). The findings from a validation study on the COI survey reveal that the instrument is reliable, with Cronbach's alphas of .94 for teaching presence, .91 for social presence, and .95 for cognitive presence (Arbaugh et al., 2008). Cronbach's alpha was employed in this study to assess the reliability of this validated instrument with the study sample.

In the COI survey, Items 1–13 measure teaching presence, Items 14–22 measure social presence, and Items 23–34 measure cognitive presence (Arbaugh et al., 2008). The three subscales are separate variables. The survey's composite score measures the respondent's perception of the COI, which is generally defined as deep, meaningful learning in a collaborative online learning environment. Each item was scored on a 5-point Likert scale in which responses ranged from "strongly disagree" (1) to "strongly agree" (5). Possible minimum and maximum scores were 34 and 170, respectively; a low total score indicated that the COI inhibited collaboration and critical thinking, and a high total score indicated an environment that supported collaboration and critical thinking. The subscales were also examined. The minimum and maximum scores for each were 13 and 65, respectively, for teaching presence, 9 and 45, respectively, for social presence, and 12 and 60, respectively, for cognitive presence. This instrument was appropriate for the study, as the COI survey is frequently employed to evaluate

the effectiveness of AODs in online higher education courses (Stenbom, 2018). The COI survey is an open resource and is included in Appendix D.

The AOT-E scale was developed and validated by Pennycook et al. (2020) to measure openness to change one's beliefs or opinions according to evidence. The most widely utilized AOT scale, which was developed by Stanovich and West (2007), includes 41 items with six subscales. These subscales include a 10-item flexible thinking (also referred to as AOT) subscale, an 8-item openness values subscale, a 9-item dogmatism subscale, a 3-item categorical thinking subscale, a 9-item belief identification subscale, and a 2-item counterfactual thinking subscale. Since 2007, numerous AOT scale variations have been designed, ranging from 7 to 46 items and response formats of 4- to 7-point scales (Janssen et al., 2020). AOT-E is an 8-item Likert-type scale drawn from four of the six full AOT subscales including: AOT (2 items), belief identification (4 items), dogmatism (1 item), and openness value (1 item). The AOT-E scale was appropriate for the purposes of this study since the AOT-E is specific to thinking regarding evidence and mitigating the motivated reasoning that leads to myside bias (Pennycook et al., 2020).

Each item on the AOT-E scale was scored on a 5-point Likert scale in which responses ranged from "strongly disagree" (1) to "strongly agree" (5) to enable a neutral option (e.g., Bonafé-Pontes et al., 2021). Possible minimum and maximum scores for the instrument were 8 and 40, respectively; a low total score indicated closed-mindedness to changing beliefs or opinions, and a high total score indicated an openness to changing beliefs or opinions according to evidence. Pennycook et al. (2020) demonstrate satisfactory concurrent validity, proving that the AOT-E is correlated with the original AOT scale and has high reliability ($\alpha = 0.87$).

Cronbach's alpha was utilized to assess the reliability of this validated instrument with the study sample. The AOT-E scale is an open resource and is included in Appendix E.

Finally, learners' AOD submissions from the instructional intervention period were evaluated by applying an instructor-created rubric (Appendix G) that evaluated learners on three criteria by utilizing a Likert-type scale that included the following scores: "no submissions" (0), "unacceptable" (1), "acceptable" (2), "good" (3), and "excellent" (4). The ratings and criteria were based on a best practices AOD rubric that was originally developed by Dr. Lynn E. Nielsen from the University of Northern Iowa and later adapted by Joan Vanderveld of the University of Wisconsin-Stout (Wilke, 2012). The rubric has three components: (a) a critical analysis of the post (i.e., cognitive presence), (b) participation in the learning community with replies (social presence), and (c) communication and etiquette. The total rubric score was between 0–12 for learners' weekly AOD grades. For this study, the three criteria were examined separately to enable between-groups outcome measure comparisons.

Person-first language was a rubric requirement for this disability studies course as part of the communication and etiquette criteria, although such speech is not without controversy. Therefore, the issue was among the controversial debate topics for the course. The debate between utilizing person-first language (e.g., a person with a disability) and identity-first language (e.g., disabled person) persists; the former intends to convey respect for the individual (Best et al., 2022, p. 127). Critics state that person-first language reinforces a negative notion of disability, while identity-first language reclaims the historically pejorative word *disability*. The American Psychological Association (APA) style guide, which was the academic format employed for the course, subscribes to and recommends the exclusive usage of person-first language (Gernsbacher, 2017). For the purposes of learners' work and grading according to the

rubric, learners were not penalized for employing identity-first language if such speech was justified, purposeful, and respectful. However, they were encouraged to employ person-first language in the course, and this was part of the rubric.

Learners' AOD posts and replies from the intervention period were scored independently by two faculty evaluators. At the time of scoring, the raters had a combined 15 years of experience teaching in an online environment at the university level. Both raters have extensive publications in online education and the COI framework. Interrater reliability was calculated with the kappa statistic.

Procedures

Approval from the Institutional Review Board (IRB) was secured from both the University of Memphis and Ocean State University as an exempt study (see Appendix H). The request included data collection for two semesters from the disability studies undergraduate course to reach a minimum of 15 participants for the treatment and control groups (Gall et al., 1996). Per IRB requirements, the recruitment letter and consent form were not sent to the eligible participants until after their grades were finalized (see Appendices I and J, respectively). Prospective participants received study information and a consent form via email; the message requested their participation as well as inclusion of their survey data, AOD posts, and replies in the study. Those who agreed to participate returned the signed consent form via email or FileDrop. Participants were emailed the link to the posttest survey. At the end of the survey, participants could opt out of allowing their AOD submissions to be utilized as data for the study.

The course instructor and study researcher were the same person; consequently, this situation involved double agency or fulfilling two roles simultaneously (Ferguson et al., 2004). As a result of this dual role, learners may have perceived undue pressure to participate or persist

in the study. Learners may have assumed a conflict of interest; however, the data collection process occurred in a posttest-only design and thus diminished this risk. Learners were reassured that there were no penalties for nonparticipation and that their participation would occur at the conclusion of the semester after grades were finalized.

Data Analysis

The null hypothesis for the first research question was analyzed with a one-way between-groups multivariate analysis of variance (MANOVA) to examine two additional correlated dependent variables (Campbell & Stanley, 1963). This was appropriate since the three presences, as measured by the COI survey subscales, are correlated variables and comprise the COI construct (i.e., perceptions of the learning environment). A one-way between-groups ANOVA was also conducted to explore between-groups differences regarding perceptions of teaching presence, social presence, and cognitive presence.

To address the second null hypothesis, an independent samples *t*-test was performed to compare the group means for AOT-E to determine whether the differences between the treatment and control groups were statistically significant (Warner, 2013). A follow-up nonparametric analysis was conducted to verify the results. As noted previously, Cronbach's alpha was employed to establish reliability for each instrument.

To address the third null hypothesis, learners' AOD posts and replies were scored by two raters who utilized an instructor-created rubric, then Mann-Whitney *U* tests were performed to compare between-groups grades. Table 4 demonstrates the alignment for each research question, their corresponding data source, and the analyses planned and employed. Additional analyses included nonparametric tests and correlation analyses, as detailed in Chapter 4. All analyses for the study were completed by utilizing Statistical Package for Social Sciences (SPSS).

Table 4*Research Questions, Data Sources, and Analysis Alignment*

Research Question	Data Source	Data Analyses
RQ1: What differences, if any, exist in online learners' perceptions of the COI after they participate in a CC-AOD learning strategy compared to those in independent AODs?	Results from the COI survey	<ul style="list-style-type: none"> ● Mean ● Standard deviation ● Multivariate ANOVA ● Cronbach's alpha
RQ1.1: What differences, if any, exist in the teaching presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?	Results from the COI survey—teaching presence subscale	<ul style="list-style-type: none"> ● Mean ● Standard deviation ● Post hoc analyses (ANOVA)
RQ1.2: What differences, if any, exist in the social presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?	Results from the COI survey—social presence subscale	<ul style="list-style-type: none"> ● Mean ● Standard deviation ● Post hoc analyses (ANOVA)
RQ1.3: What differences, if any, exist in the cognitive presence of online learners who participated in a CC-AOD learning strategy compared to those in independent AODs?	Results from the COI survey—cognitive presence subscale	<ul style="list-style-type: none"> ● Mean ● Standard deviation ● Post hoc analyses (ANOVA)
RQ2: What differences, if any, exist in online learners' dispositions of AOT-E after they participate in a CC-AOD learning strategy compared to those in independent AODs?	Results from the AOT-E scale	<ul style="list-style-type: none"> ● Mean ● Standard deviation ● Independent samples <i>t</i>-test (a nonparametric Mann-Whitney <i>U</i> test) ● Cronbach's alpha
RQ3. What differences, if any, exist in the AOD rubric scores of participants in a CC-AOD learning strategy compared to those in independent AODs?	Scores from the four AODs during the intervention period on an instructor-created rubric	<ul style="list-style-type: none"> ● Interrater reliability ● Median ● Standard deviation ● Nonparametric Mann-Whitney <i>U</i> tests ● Interrater reliability

Community of Inquiry: Multivariate ANOVA and ANOVA

A MANOVA was performed to investigate differences between the treatment and control groups regarding their perceptions of the COI. The three dependent variables were teaching presence, social presence, and cognitive presence; the treatment and control groups were the independent variables. Preliminary assumption testing was conducted to check for normality, univariate and multivariate outliers, linearity, homogeneity of variance-covariance matrices, and multicollinearity.

The MANOVA is reasonably robust to modest violations of normality when the sample size contains at least 20 in each cell, unless there are extreme outliers (Tabachnick & Fidell, 2013). Normality, which was tested by creating histograms, is assumed when there is a symmetrical, bell-shaped curve for each dependent variable for each group. The Shapiro-Wilk test, appropriate for sample sizes of < 50 , was also performed to test for normality. Both univariate and multivariate normality and outliers were checked. Boxplots identified univariate outliers (i.e., any data point more than 1.5 box lengths from the box) and extreme outliers (i.e., any data point more than 3 box lengths from the box). Multivariate outliers (i.e., when participants have a strange combination of scores for the dependent variables) were examined by utilizing the Mahalanobis distance (Pallant, 2016, p. 292). Scatterplots were graphed to demonstrate the presence of a linear relationship between pairs of dependent variable scores in each group.

The assumption of the homogeneity of variance-covariances matrices was assessed by employing Box's test of equality of covariance matrices. Pearson's correlation coefficients were calculated; to examine the assumption of the absence of multicollinearity, no correlation

coefficients can exceed the critical value of .9 (Tabachnick & Fidell, 2013). To test whether the samples had equal variances, Levene's test of homogeneity of variance was performed.

To determine the level of significance for the MANOVA, the standard value of .05 was adopted. The Bonferroni adjusted alpha level of .017 (.05/3) was applied to determine whether the post hoc analysis reached statistical significance to avoid a Type II error due to intercorrelation among the dependent variables (Rovai et al., 2013; Tabachnick & Fidell, 2013). Rather than $p < .05$, the number of dependent variables (three) was employed to calculate the significance value. Finally, an effect size was calculated by utilizing partial eta-squared.

Post hoc one-way between-groups ANOVAs were conducted to explore between-groups differences on learners' perceptions regarding teaching presence, social presence, and cognitive presence as separate constructs. The Bonferroni adjusted alpha level of .017 (.05/3) was utilized to determine whether the post hoc analysis reached statistical significance to avoid a Type II error, as described previously. Partial eta-squared was applied to calculate the effect size.

Actively Open-Minded Thinking About Evidence: Independent Samples *t*-Test and Mann-Whitney *U* Test

Prior to conducting the independent samples *t*-test, assumption testing was performed. Boxplots were graphed to examine whether extreme outliers existed. Normality was tested with the Shapiro-Wilk test; nonsignificant results (a significance level $> .05$) indicate the tenability of the assumption. Levene's test for homogeneity of variances was performed to examine the assumption of equal variances in each group. A statistically significant mean difference between the groups was determined in which $p < .05$. Assumptions were violated, so in addition to the *t*-test, the nonparametric Mann-Whitney *U* test was also conducted. Instead of comparing the group means, the Mann-Whitney *U* test compares the medians, thus negating the importance of

the score distribution (Pallant, 2016). When the p -value is more than .05, it indicates a significant result.

Asynchronous Online Discussion Rubric Scores: Interrater Reliability and Mann-Whitney U Tests

Interrater reliability, which was examined by utilizing the kappa statistic, was applied to evaluate the level of agreement between the two learners' AOD raters, who graded according to an instructor-created rubric (see Appendix G). Each AOD submission was evaluated on a Likert-type scale ranging from 0–4 on three criteria, including critical analysis of the post (cognitive presence), participation in the learning community with replies (social presence), and communication and etiquette. When disagreement arose between the raters, the median score was employed for the analysis. Nonparametric Mann-Whitney U tests were conducted to analyze differences in AOD rubric scores between the treatment and control groups for four weekly AODs from the intervention period. This test was appropriate to examine differences between two groups on a continuous measure, as it compares median scores (Pallant, 2016). A p -value of more than .05 indicates a significant result.

Limitations

The limitations of this study include the lack of pretest data, attrition bias, and the potential of low generalizability (Campbell & Stanley, 1963). Without a pretest, the outcome measures could not be compared against pre-intervention scores for each group. Therefore, the effect of the intervention was unclear. For example, it would be beneficial to measure the difference in the dependent variable of AOT-E before and after intervention; however, this idea was weighed against the potential threats to internal validity if participants were sensitized or responsive to the purpose of the study (Gall et al., 2007). Further justification for a posttest-only

design is that it mitigates the potential for social desirability bias, the tendency in which respondents self-report items in ways that increase their social approval rather than responding according to their true feelings and beliefs (Ferrari et al., 2005; Krumpal, 2013). College learners are often the focus of studies that investigate socially desirable response biases (Ferrari et al., 2005), and these biases could be exacerbated or coupled with researcher demand bias, in which respondents perceive and seek to fulfill what they believe the researcher hopes to see (e.g., positive responses in self-reported course evaluation; Kennedy et al., 2022). For instance, researcher demand bias could lead to overly positive responses in self-reports from learners.

Moreover, since recruitment occurred after grading concluded for the semester, many learners did not respond to the call for participation. Similarly, potential participants who dropped the course or opted not to participate in the study may have caused the treatment and control groups to be unequal. For instance, those who agreed to participate in the study may have been different than those who did not participate; thus, the findings of the study may have less generalizability with low external validity.

A specific procedural limitation of the study regards the difference between the treatment and control groups. The treatment group had 5 weeks to focus on the CC-AOD learning strategy process. The control group had 3 weeks specifically dedicated to their argumentation paper, although they were encouraged to begin 5 weeks from the due date. The decision to differentiate the activities of the treatment and control groups was intended to allow an examination of the CC-AOD learning strategy compared to independent argumentation work. If the control group completed the same CC-AOD prompts independently, then the outcomes may have excessively mirrored the CC-AOD learning strategy version due to the constructivist nature of a COI. A follow-up study could investigate the impacts of a CC-AOD learning strategy that is completed

independently, in which learners are prompted to share both their arguments and their counterarguments in AODs. Shea et al. (2010) note that learners can reach the resolution phase in course activities outside of AODs, such as in final projects and group work. In this study, it was difficult to delineate whether learners' perceptions of the presences and their AOT-E was due to their discourse in AODs, their final paper, or other activities that preceded the final 5 weeks of the semester.

CHAPTER FOUR: RESULTS

Introduction

The purpose of this study is to determine the impact of a CC-AOD learning strategy on learners' critical thinking within a COI. The dependent variables include learners' perceptions of the COI, which include teaching presence, social presence, and cognitive presence, which were measured by utilizing the COI survey (Arbaugh et al., 2008); learners' critical thinking dispositions of open-mindedness, as measured by the AOT-E scale (Pennycook et al., 2020); and learners' AOD rubric scores from four weekly AODs during the intervention period, which measured cognitive presence, social presence, and communication and etiquette. The relationships between learners' perceptions of the COI, the COI presences, and AOT-E were also investigated.

The treatment group participated in the CC-AOD learning strategy, which is a structured and collaborative argumentation process in which paired learners seek a consensus position on a controversial issue after advocating for both sides of the issue (Johnson & Johnson, 1993). In past studies, the CC learning strategy has revealed increased perspective-taking skills, increased learning regarding oppositional perspectives, and greater positional change among learners (Bruen et al., 2016; Johnson et al., 2000). Additionally, researchers have demonstrated that consensus goals in collaborative argumentation produce a diminishment of learners' myside bias, which is a pervasive cognitive heuristic antithetical to open-mindedness (e.g., Villarroel et al., 2016). Thus, this instructional intervention is an appropriate strategy to support learners' increased engagement in the PI model phases (i.e., integration and resolution) that are cognitively demanding.

The treatment group completed the CC-AOD learning strategy and a collaboratively written argumentation paper in pairs, whereas the control group worked independently on both their AODs and argumentation paper. This chapter includes the statistical findings from the data collected and analyzed for the study. Results indicated that there was no statistically significant difference in learners' perceptions of the COI and the COI constructs of teaching presence, social presence, and cognitive presence between the treatment and control groups. Nonsignificant results were also found for between-groups differences in AOT-E. Consistent with previous studies, strong, positive correlations were found between the three COI presences. However, there were nonsignificant negative correlations between AOT-E, the COI, and the three presences despite the expected positive association between cognitive presence and AOT-E. Finally, in comparing the AOD rubric scores across the 4-week intervention period, the treatment group had higher scores for each rubric criterion. The criteria that reached statistical significance include cognitive presence (from AODs 2 and 3), social presence (from AOD 1), and communication and etiquette (from AOD 3).

Results

Sample Descriptive Statistics

The context of the study is an asynchronous, online disability studies course at Ocean State University during the fall 2021 and spring 2022 semesters. A nonprobability convenience sample was obtained from those who registered and completed the course. Learners were randomly assigned to treatment and control sections of the course. Those in the treatment group collaboratively completed the CC-AOD learning strategy, and control group learners independently completed AOD work. At the conclusion of each semester, participants completed a posttest to examine their perceptions of the COI and the three presences, learners' AOT-E, and

demographic information. In the survey, participants were allowed to opt out of their AOD work being utilized as data for the study. The two semesters included 43 learners from the treatment section and 38 learners from the control group; of these, 22 and 21 learners, respectively, agreed to have their survey data included in the study. Chapter 3 provides detailed descriptive statistics regarding demographic information disaggregated by group participants.

Community of Inquiry—Research Question 1

A one-way between-groups MANOVA was performed to answer the following research question: What differences, if any, exist in online learners’ perceptions of the COI after they participate in a CC-AOD learning strategy compared to those in independent AODs? Table 5 includes the means and standard deviations disaggregated by group, demonstrating that the treatment group had a slightly higher mean score for the COI and all three constructs of the COI framework. Additionally, Cronbach’s alpha for teaching presence, social presence, and cognitive presence was .94, .89, and .87, respectively, which indicates good to excellent internal consistency.

Table 5

Learners’ Perceptions of the Community of Inquiry and the Three Presences by Group (n = 43)

	Treatment (n = 22)		Control (n = 21)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Community of Inquiry	4.67	.383	4.56	.377
Teaching Presence	4.81	.418	4.78	.347
Social Presence	4.39	.636	4.16	.677
Cognitive Presence	4.73	.335	4.61	.353

Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity. Moreover, to conduct a MANOVA, a data set must have more cases in each

cell than there are dependent variables (Pallant, 2016, p. 291), which was the case with the data analyzed. Additionally, a MANOVA is reasonably robust to modest violations of normality when a sample size of at least 20 in each group is present (Tabachnick & Fidell, 2013, p. 253), unless the violations are due to outliers (Pallant, 2016, p. 292).

Both univariate and multivariate normality were checked, as were extreme outliers. Boxplots were graphed to identify outliers (i.e., any data point more than 1.5 box lengths from the box) and extreme outliers (i.e., any data point more than 3 box lengths from the box). The assumption of no extreme outliers was not tenable. The treatment group had one outlier (Case 14) and four extreme outliers (Cases 1, 2, 4, and 7) for the teaching presence dependent variable, and two outliers (Cases 1 and 7) for the social presence dependent variable. The control group had four outliers (Cases 5, 6, 9, and 10) for the teaching presence dependent variable.

While several cases did not fit the model (Faraway, 2015), the outliers were retained, as they appeared to be the responses of real learners rather than data entry errors. Moreover, the analysis was conducted with the exclusion and inclusion of the outliers, and the results were similar. Additionally, multivariate outliers (i.e., when participants have a strange combination of scores for the dependent variables) were also examined by utilizing the Mahalanobis distance (Pallant, 2016, p. 292). One case exceeded the critical value of 16.27 for three dependent variables with its Mahalanobis distance of 18.264. Since outliers had the potential to affect the results, as Weisberg (2014) suggests, the results of the MANOVA were further investigated both with and without the multivariate outlier. The outliers (univariate outliers and one multivariate outlier) were not found to influence the results; therefore, the reported results include the outliers.

Histograms (see Figures 4–7) and the Shapiro-Wilk test, which are appropriate for small sample sizes ($n < 50$), were charted to examine normality. An examination of the histograms revealed that the assumption of normality was not tenable for the three dependent variables of teaching presence, social presence, and cognitive presence for either the treatment or control group. The data for the three presences, for both treatment and control groups, were positively skewed. Participants exhibited high levels of agreement (e.g., mostly “agree” and “strongly agree” responses) in their perceptions of the COI, especially teaching presence. For the Shapiro-Wilk test, the assumption of normality is met when the significance level is more than .05 ($p > .05$). The dependent variables were not normally distributed, except for the control group’s social presence ($p = .157$). Across the three dependent variables, the treatment group had a significance of $p < .001$. The control group’s teaching presence was $p < .001$, and cognitive presence had a nonsignificant level of $p = .016$. Thus, normality was violated because of the p -values across the dependent variables. The decision was made to continue with the MANOVA even with the assumption violation because MANOVAs are reasonably robust to modest violations of normality when the sample size is at least 20 in each group (Tabachnick & Fidell, 2013, p. 253).

Figure 4

Histograms for Community of Inquiry Mean Scores by Group

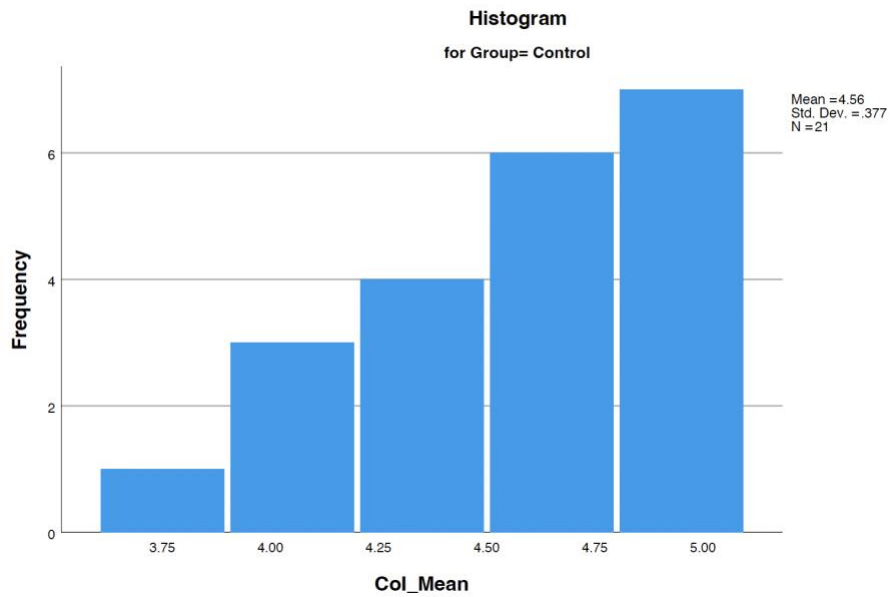
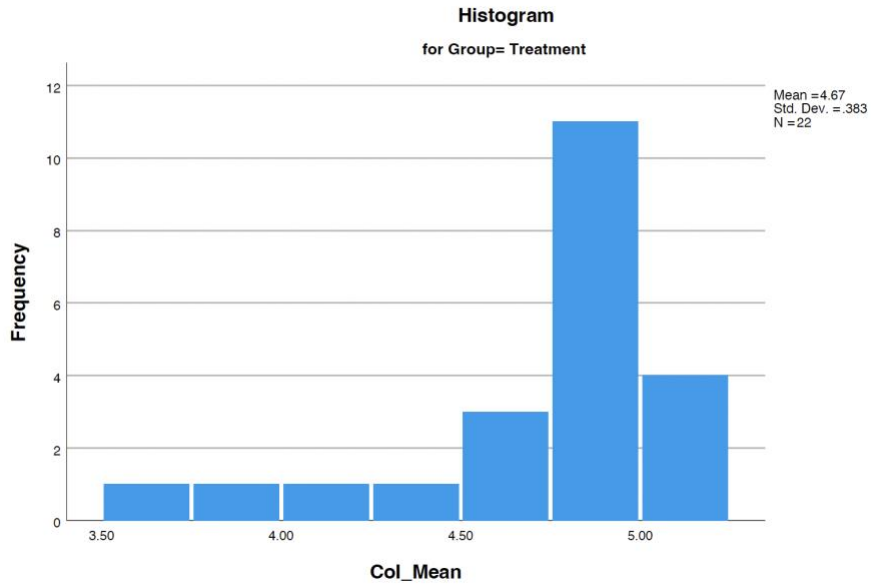


Figure 5

Histograms for Teaching Presence Mean Scores by Group

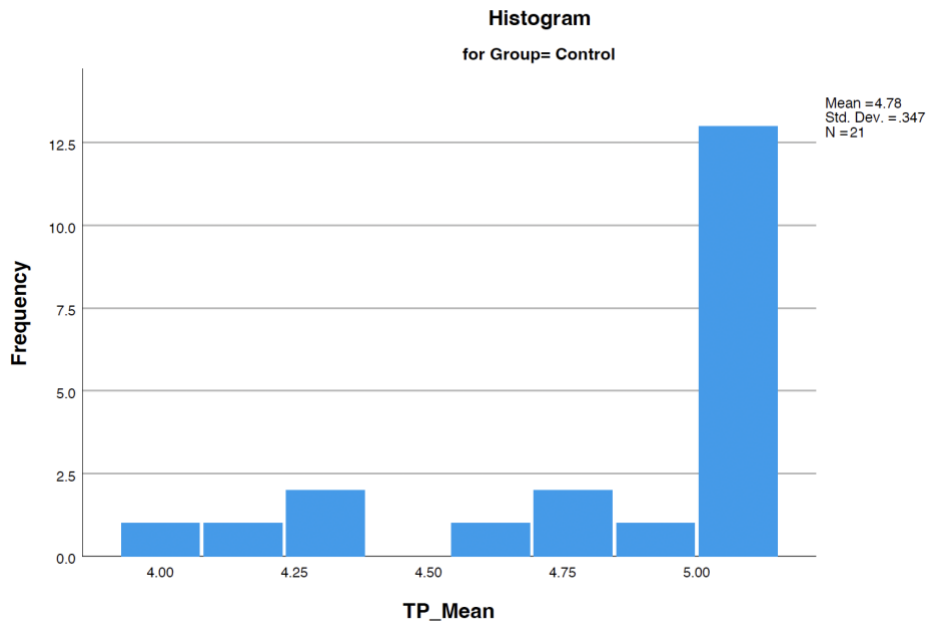
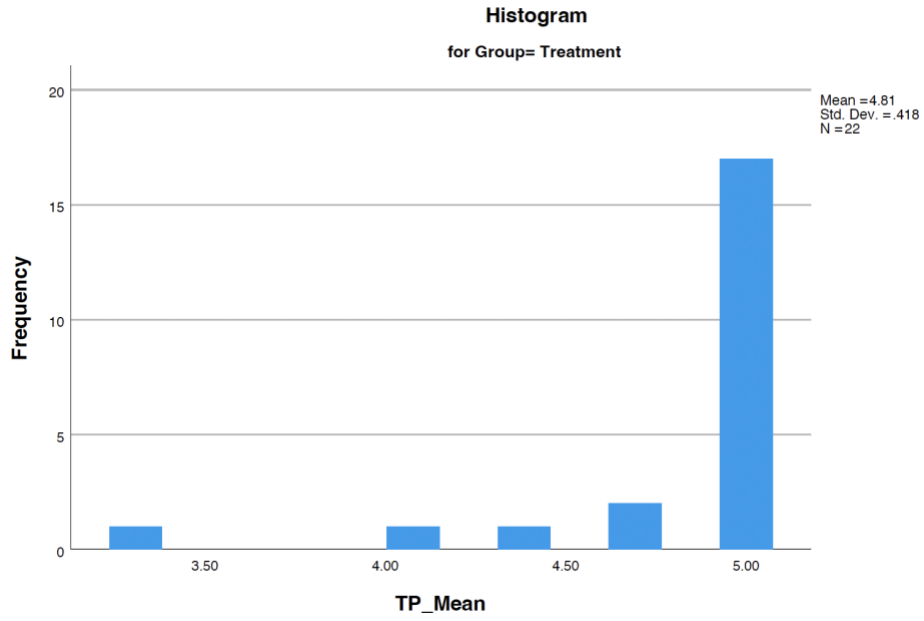


Figure 6

Histograms for Social Presence Mean Scores by Group

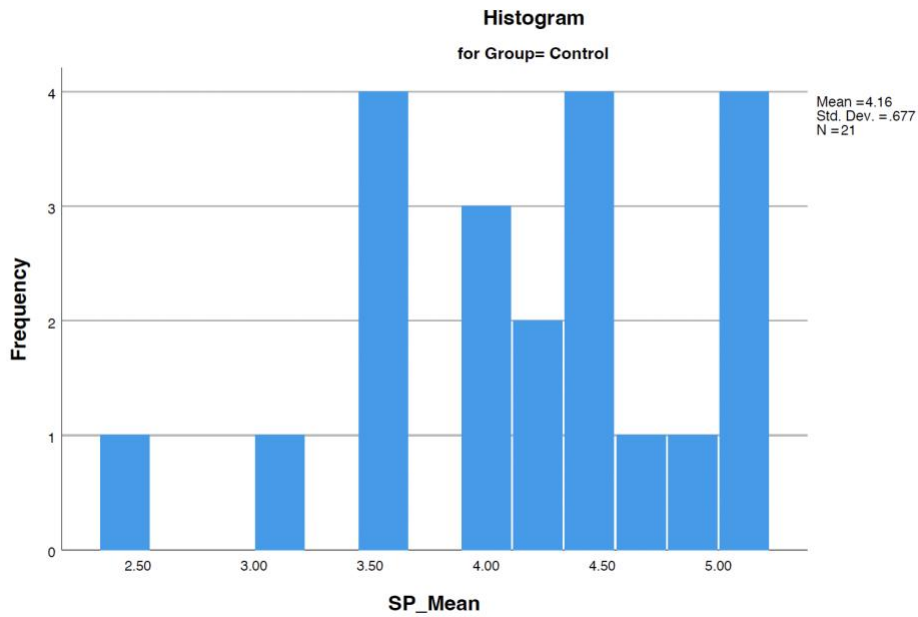
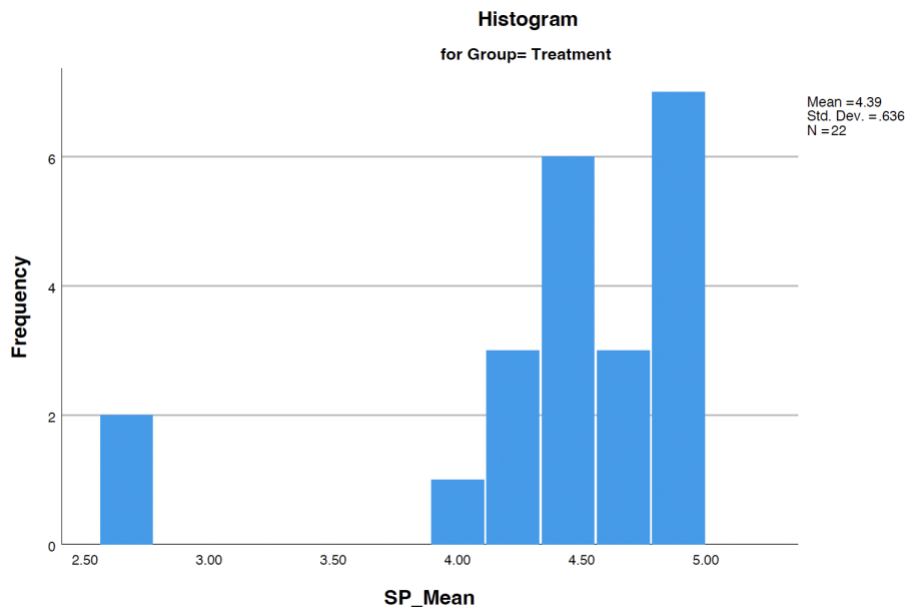
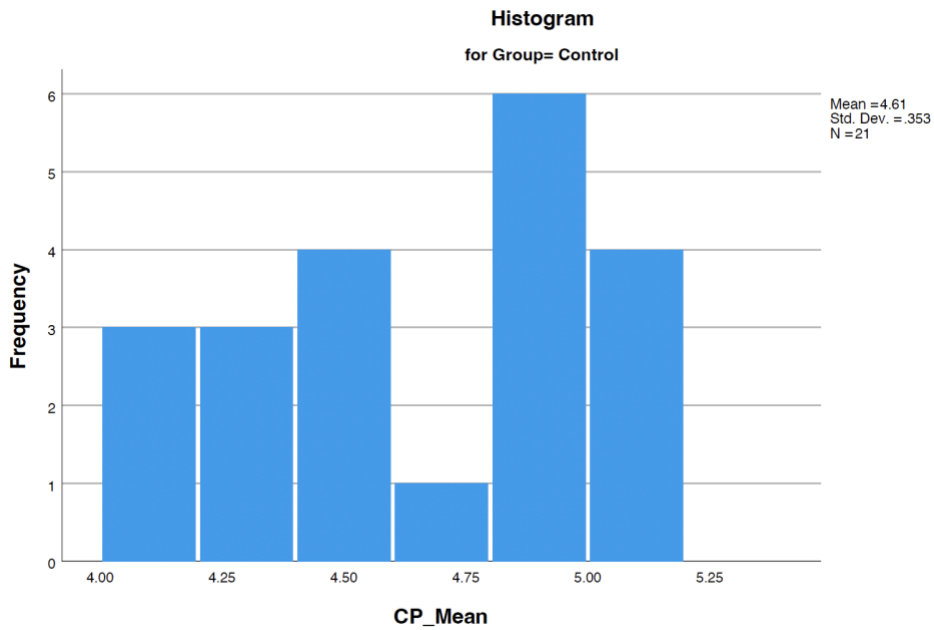
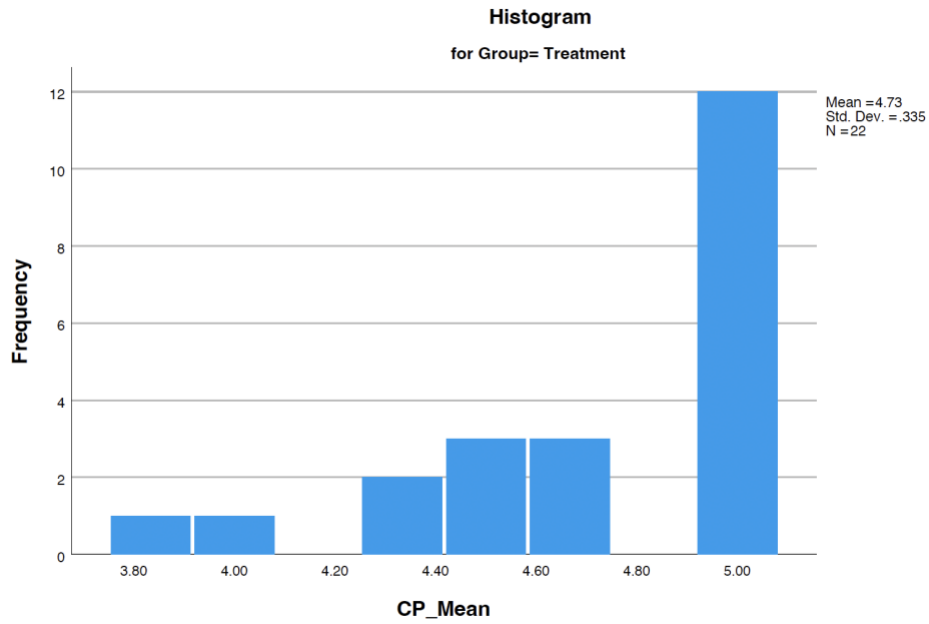


Figure 7

Histograms for Cognitive Presence Mean Scores by Group



Further assumption tests included examinations of no multicollinearity and a linear relationship among the variables. For a MANOVA, the dependent variables must be moderately

correlated but must not demonstrate multicollinearity ($r = .8$ or above; Pallant, 2016, p. 292).

Therefore, in this data set, the MANOVA was appropriate because the dependent variables had moderate to high correlations without multicollinearity (see Table 6). The assumption of linearity was tested by drafting scatterplots (see Figure 8). A positive, straight line on the scatterplot indicates a linear relationship. This assumption was not violated.

Table 6

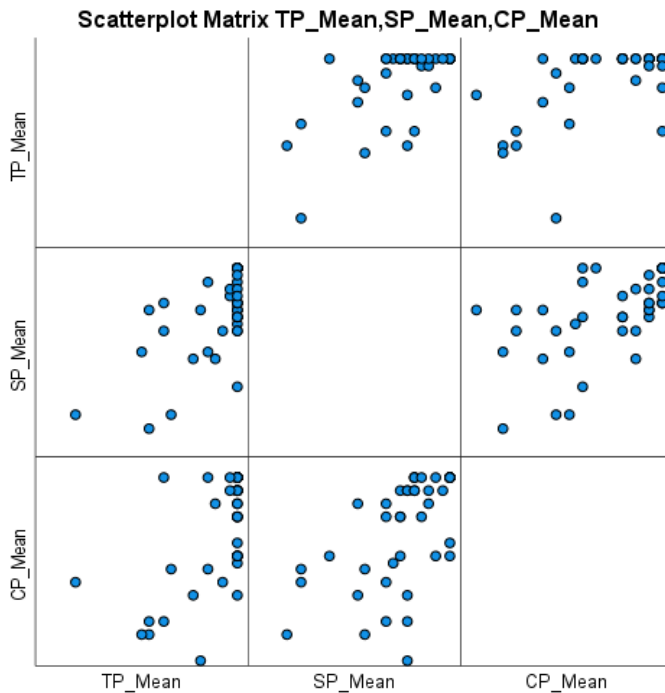
Pearson's Correlations Among Community of Inquiry Presences

	Teaching Presence	Social Presence	Cognitive Presence
Teaching Presence	-	.638**	.592**
Social Presence	-	-	.576**
Cognitive Presence	-	-	-

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

Figure 8

Scatterplot Matrix for Teaching Presence, Social Presence, and Cognitive Presence



Levene's test of equality of error variances was conducted to determine whether there were equal variances between the groups for each dependent variable. Significance values of less

than .05 violate the assumption. Since each dependent variable had a significant p -value ($> .05$; i.e., teaching presence [$p = .994$], social presence [$p = .408$], and cognitive presence [$p = .434$]), the assumption was not violated and equal variances were assumed. Box's test of equality of covariance matrices (Box's M) was employed to examine the tenability of the assumption of homogeneity of variance-covariance. The significance value ($p = .604$) was larger than .001 and therefore did not violate the assumption. Box's test ($M = 4.935$, $F[6, 12102.089] = .757$, $p = 6.04$) indicated that the homogeneity of covariance matrices across groups was assumed.

Tabachnick and Fidell (2013) generally recommend utilizing Wilks' lambda when conducting a MANOVA. However, when the data have problems, such as a small sample size or violation of assumptions, Pillai's trace is more robust (Tabachnick & Fidell, 2013, p. 271). For this study, Pillai's trace was appropriate to report due to the small sample size ($n = 22$ for the treatment group and $n = 21$ for the control group) and the assumption violations detailed previously. A significance level less than .05 means there is a difference between the groups. There was no significant difference between the treatment and control groups on the combined dependent variables (Pillai's trace = .056, $F(3, 39) = .777$, $p = .514$, partial $\eta^2 = .056$). Despite the lack of statistically significant results, the effect size was medium, according to Richardson (2011) and Cohen's (1969, p. 278–280) conventions; partial eta-squared values of .0099, .0588, and .1379 are benchmarks for small, medium, and large effect sizes, respectively.

Community of Inquiry—Research Question 2 Subquestions

Post hoc one-way between-groups ANOVAs were conducted to explore between-groups differences regarding perceptions of teaching presence, social presence, and cognitive presence. The post hoc ANOVAs were intended to address the Research Question 1 subquestions, which examined each presence separately for the treatment and control groups. There were

nonsignificant effects of the intervention on teaching presence ($F[1, 41] = .070, p = .793$), social presence ($F[1, 41] = 1.318, p = .258$), and cognitive presence ($F[1, 41] = 1.267, p = .267$). The effect sizes, which were calculated by utilizing eta-squared, were .002 for teaching presence, .031 for social presence, and .030 for cognitive presence. Each indicated a small effect size, as Cohen (1988, p. 284–287) classifies .01 as a small effect, .06 as a medium effect, and .14 as a large effect.

The MANOVA for the COI and the post hoc ANOVAs for each of the three presences had nonsignificant results. Additionally, there were no differences in the results of the parametric tests (e.g., ANOVA), both when the data were transformed and when the outliers were removed. However, the treatment group had higher scores across teaching presence, social presence, cognitive presence, and the elements of each COI construct. Table 7 presents the means for the dependent variables for the treatment and control groups, the difference scores, and the percentage differences.

Table 7

Between-Groups Percentage Differences for Community of Inquiry Presences and Categories

	Treatment ($n = 22$) <i>M</i>	Control ($n = 21$) <i>M</i>	Difference	% of Difference
Community of Inquiry	4.67	4.56	0.11	2.38
Teaching Presence (TP)	4.81	4.78	0.03	0.63
Social Presence (SP)	4.39	4.16	0.23	5.38
Cognitive Presence (CP)	4.73	4.61	0.12	2.57
Design and Organization—TP	4.88	4.85	0.03	0.62
Facilitation—TP	4.79	4.75	0.04	0.84
Direct Instruction—TP	4.77	4.76	0.01	0.21
Affective or Emotional Expression—SP	4.18	3.87	0.31	7.70
Open Communication—SP	4.53	4.37	0.16	3.60
Group Cohesion—SP	4.47	4.25	0.22	5.05
Triggering Event—CP	4.71	4.62	0.09	1.93

Table 7 (Continued)

Exploration—CP	4.80	4.70	0.10	2.11
Integration—CP	4.80	4.60	0.20	4.26
Resolution—CP	4.61	4.52	0.09	1.97

Teaching presence and each of its elements had the lowest percentage of differences between the group means. The teaching presence element of direct instruction had a 0.01 between-groups difference, with a .63% difference for teaching presence overall. The percentage of difference for cognitive presence and its four factors were less straightforward. The triggering event percentage of difference was low at 1.93%; resolution was similarly low at 1.97%. The exploration factor percentage of difference was 2.11%, and integration had the highest percentage difference at 4.26%. The cognitive presence dependent variable percentage difference was 2.57%. The percentage of difference for social presence was relatively high at 5.38%. The social presence attributes of open communication, group cohesion, and affective or emotional expression had percentage differences of 3.60%, 5.05%, and 7.70%, respectively. Affective or emotional expression had the highest between-groups difference overall. The percentage difference in learners' perceptions of the COI overall was 2.38%.

Actively Open-Minded Thinking About Evidence—Research Question 2

The independent samples *t*-test was applied to determine whether a statistically significant difference existed between the means of the treatment and control groups for the dependent variable of AOT-E. Specifically, the independent samples *t*-test was intended to answer the following research question: What differences, if any, exist in online learners' dispositions of AOT-E after they participate in a CC-AOD learning strategy compared to those in independent AODs? AOT-E was not included in the MANOVA, as this dependent variable was not significantly associated with COI and its constructs. The expectation, as established in

Chapter 2, was a correlation between cognitive presence and AOT-E, as both are related to the construct of critical thinking. However, a nonsignificant negative relationship was found (see Table 8) not only between AOT-E and cognitive presence ($r = -.172$) but also between AOT-E and teaching presence ($r = -.233$), social presence ($r = -.282$), and learners' perceptions of the COI ($r = -.275$). Additionally, the AOT-E scale for this sample demonstrated good internal consistency, as measured by Cronbach's alpha ($\alpha = .71$).

Table 8

Pearson's Correlations Between Actively Open-Minded Thinking About Evidence, the Community of Inquiry, and the Three Presences (n = 43)

	COI	TP	SP	CP	AOT-E
COI	-	.866**	.889**	.812**	-.275
TP	-	-	.638**	.592**	-.233
SP	-	-	-	.576**	-.282
CP	-	-	-	-	-.172
AOT-E	-	-	-	-	-

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

Note: COI = Community of Inquiry, TP = Teaching Presence, SP = Social Presence, CP = Cognitive Presence, AOT-E = Actively Open-Minded Thinking About Evidence

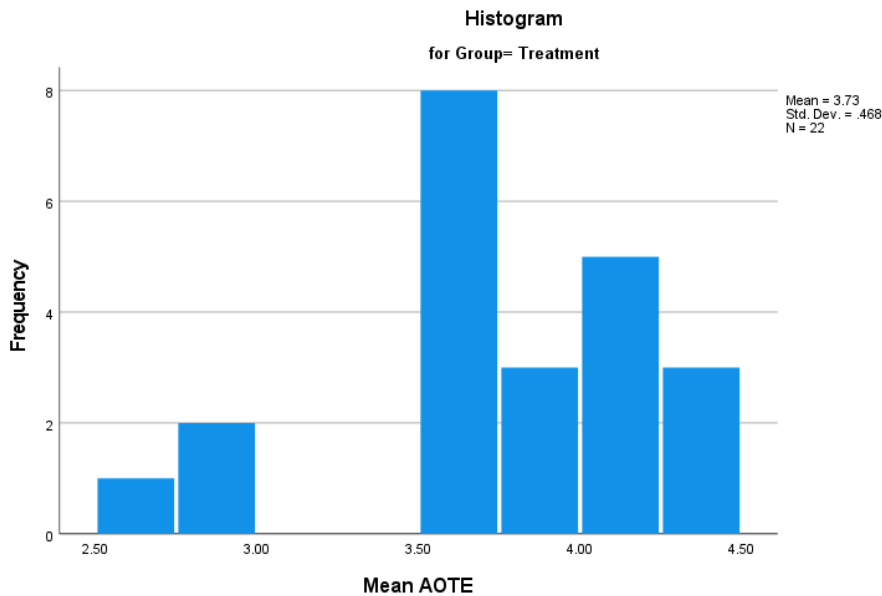
Requisite assumption testing was conducted prior to performing the independent samples t -test. First, boxplots were inspected to examine the assumption that there were no extreme outliers. The treatment group had two outliers (Cases 29 and 35), the control group had no outliers, and both groups had no extreme outliers. Since independent samples t -tests are sensitive to outliers, either no outliers should be present or outliers should be kept to a minimum. However, the primary concern is extreme outliers, and inspection of the boxplots indicated tenability of the assumption.

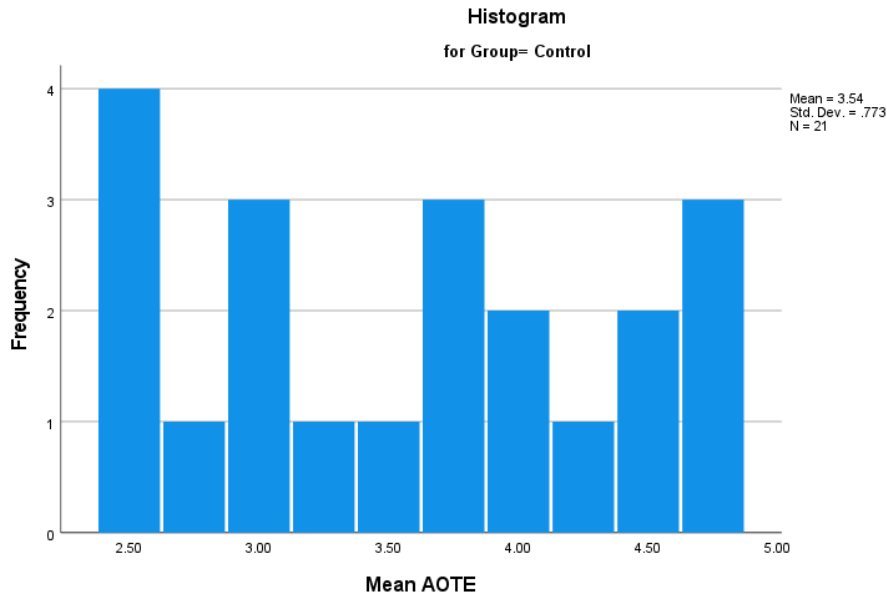
For an independent samples t -test, the dependent variables should also be approximately normally distributed within each group of independent variables; this is the assumption of

normality. The assumption of normality was evaluated by generating histograms (see Figure 9) and by conducting the Shapiro-Wilks test, which is appropriate for groups with less than 50 samples. A significance level of more than .05 is a nonsignificant result for the Shapiro-Wilks test and indicates the tenability of the assumption. The treatment group had a significance level of .018, and the control group's significance level was .054. Whereas the treatment group assumption of normality was not tenable, normality was assumed for the control group. However, an independent samples *t*-test can be robust to violations of normality, meaning the assumption can be somewhat violated and still provide valid results (Bradley, 1980).

Figure 9

Histograms for Actively Open-Minded Thinking About Evidence Mean Scores by Group





Levene’s test for equality of variances was utilized to examine the assumption that the population variances for the dependent variables were equal for all groups of the independent variables, as unequal variances can affect the Type 1 error rate. If the significance value is larger than .05, then equal variance is assumed, but if the significance value is .05 or less, then the variances for the two groups are not the same and the data violate the assumption of equal variance. The assumption was not tenable ($F = 9.090, p = .004$). This assumption violation as well as those previously mentioned prompted parametric and nonparametric analyses; the nonparametric analysis was employed to confirm the parametric results.

The results of the independent samples *t*-test demonstrated that those who participated (treatment group, $M = 3.73, SD = .468$) compared to those who did not participate in the CC-AOD learning strategy (control group, $M = 3.54, SD = .773$) did not statistically differ in their AOT-E scores. Although the control group had slightly lower AOT-E scores, with a mean difference of .194 and percentage difference of 5.23%, the results of the independent samples *t*-test demonstrated that the two groups did not statistically differ in their average AOT-E scores

($t[32.622] = .939, p = .355, \text{Cohen's } d = 0.29$). The effect size, based on Cohen's (1988) conventions, was small.

Because of the assumption violations revealed by the independent samples t -test, the nonparametric Mann-Whitney U test was conducted to determine any differences between the treatment and control groups' AOT-E scores. While the treatment group had higher scores, they were not at a statistically significant level. Median scores (treatment group $Mdn = 3.69$, control group $Mdn = 3.63$) were not significantly different between the control and treatment groups ($U = 201.00, z = -.733, p = .463$).

Asynchronous Online Discussion—Research Question 3

Two raters evaluated 4 weeks of AOD submissions for both the treatment and control groups to address the following research question: What differences, if any, exist in AOD rubric scores of participants in a CC-AOD learning strategy as compared to those in independent AODs? The AOD posts of 20 participants from each group were evaluated, as two participants from the treatment group and one participant from the control group did not provide informed consent to include their AOD work in the study. Employing the instructor-created rubric, each weekly AOD submission was evaluated on a Likert-type scale, ranging from 0–4 for three criteria: critical analysis of the post (cognitive presence), participation in the learning community with replies (social presence), and communication and etiquette. Interrater reliability, which was determined by utilizing kappa (see Table 9), demonstrated good reliability, with a range of 0.727 to 0.928. A value of .5 for kappa represents moderate agreement, above .7 represents good agreement, and above .8 represents very good agreement (Peat, 2001, p. 228). When evaluators did not agree, median scores were calculated for analysis. Then, the control and treatment groups' scores on each week's rating were compared by conducting Mann-Whitney U analyses.

Table 9

Asynchronous Online Discussion Rubric Scores Disaggregated by Group with Reliability and Mann-Whitney U Results

Variable	Treatment (<i>n</i> = 20)		Control (<i>n</i> = 20)		Reliability	<i>U</i>	<i>Z</i>	<i>p</i>
	<i>Mdn</i>	<i>SD</i>	<i>Mdn</i>	<i>SD</i>				
AOD 1: CP	3.45	.63	2.88	1.09	.727	137.50	6.476	.091
AOD 1: SP	3.18	1.35	2.28	1.48	.825	120.00	9.247	.030*
AOD 1: C&E	3.35	.67	2.78	1.19	.842	144.50	7.684	.134
AOD 2: CP	3.83	.34	3.05	1.04	.729	99.00	5.989	.006*
AOD 2: SP	2.80	1.28	2.58	1.43	.830	185.00	9.061	.698
AOD 2: C&E	3.25	.57	2.80	.95	.755	145.50	6.904	.142
AOD 3: CP	3.73	.44	2.73	1.24	.840	96.00	7.863	.004*
AOD 3: SP	2.90	1.44	2.53	1.45	.897	168.00	10.227	.398
AOD 3: C&E	3.50	.51	2.65	1.10	.916	100.00	8.052	.006*
AOD 4: CP	3.60	.53	3.00	1.28	.743	148.00	6.261	.165
AOD 4: SP	3.15	.88	2.55	1.61	.928	170.50	9.297	.429
AOD 4: C&E	3.28	.57	3.00	1.14	.779	193.50	6.355	.862

* $p > .05$

Note. AOD = Asynchronous Online Discussion, CP = Cognitive Presence, SP = Social Presence, C&E = Communication and Etiquette

For AODs 2 and 3, the treatment group scored significantly higher on the cognitive presence ratings (AOD 2 cognitive presence [$U = 99.00, z = 5.989, p = .006$]; AOD 3 cognitive presence [$U = 96.00, z = 7.863, p = .004$]). The treatment group also scored significantly higher in social presence for AOD 1 ($U = 120.00, z = 9.247, p = .030$) as well as in communication and etiquette for AOD 3 ($U = 100.00, z = 8.054, p = .006$). While no other scores reached statistical significance, the treatment group's scores were higher across each of the three rubric criteria for all four weekly AODs (see Figures 10–12). AOD 1 for the treatment group and AOD 3 for the control group were similar in nature; learners were prompted to post background information on the topic and reply to their peers by identifying missing background information or areas for

expansion as well as other stakeholders and potential arguments that learners could examine (see Appendix B). A comparison of median scores between the treatment group's AOD 1 and the control group's AOD 3 indicates that the treatment group earned higher scores for each criterion ([CP *Mdn* = 3.45, TP *Mdn* = 3.18, C&E *Mdn* = 3.35] compared to the control group [CP *Mdn* = 2.73, TP *Mdn* = 2.53, C&E *Mdn* = 2.65]).

Figure 10

Comparisons of Median Asynchronous Online Discussion Rubric Scores for Cognitive Presence

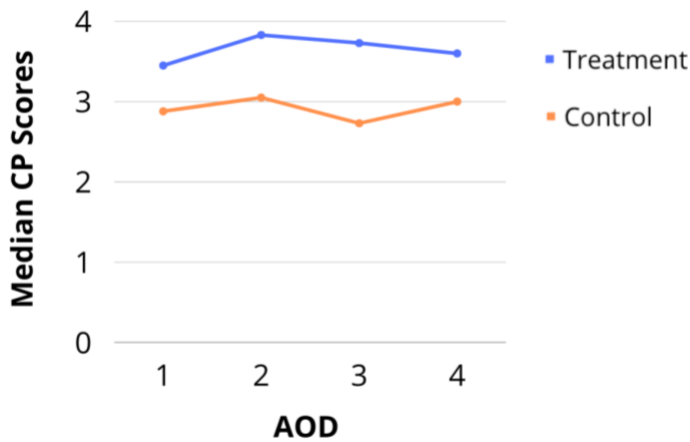


Figure 11

Comparisons of Median Asynchronous Online Discussion Rubric Scores for Social Presence

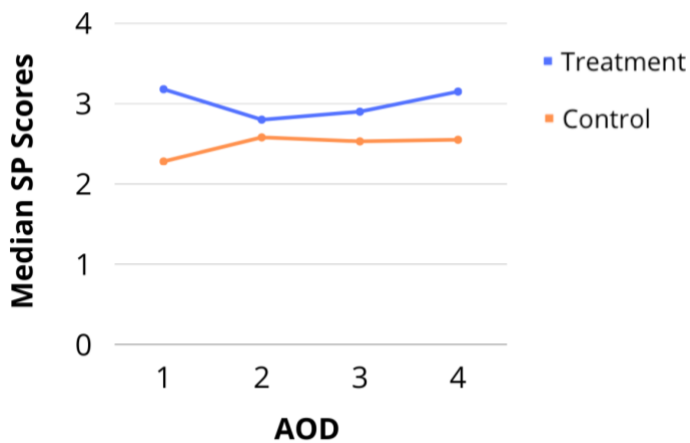
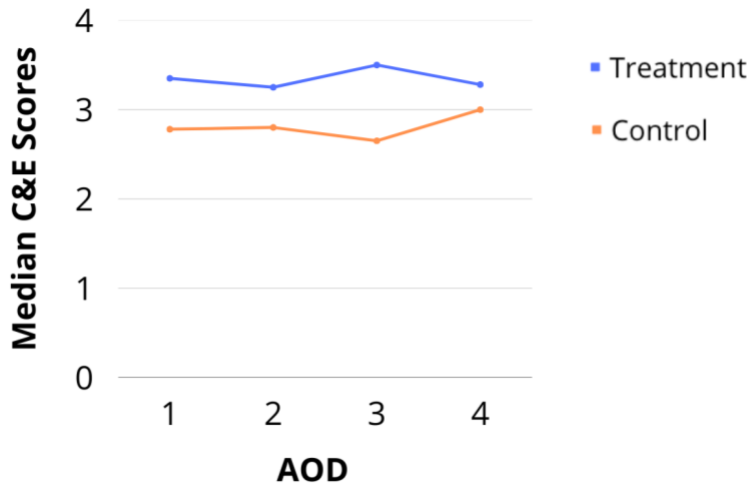


Figure 12

Comparisons of Median Asynchronous Online Discussion Rubric Scores for Communication and Etiquette



Summary

This chapter provides the statistical findings from this study. The MANOVA results indicated that there were no significant between-groups differences on the combined dependent variables for perceptions of the COI, including teaching presence, social presence, and cognitive presence. Post hoc ANOVAs were conducted to explore between-groups differences in learners' perceptions of each COI construct by itself. The results suggested nonsignificant effects of the intervention on the three presences. Although these parametric tests offered nonsignificant results, the treatment group earned higher scores across the three presences and for each of the facets of each presence.

The between-groups difference for learners' AOT-E was examined by performing an independent samples *t*-test. Although the treatment group had slightly higher AOT-E scores, the between-groups difference did not reach the level of statistical significance. The Mann-Whitney *U* test was conducted due to assumption violations revealed by the independent samples *t*-test.

Again, between-groups differences in the median AOT-E scores did not reach statistical significance. The relationships between these dependent variables were also explored. While there were strong, positive correlations between the three COI presences, there were nonsignificant negative correlations between AOT-E and the three COI presences.

The treatment and control groups' AOD rubric scores from four weekly AODs during the intervention period were compared by utilizing the Mann-Whitney *U* test. For AODs 2 and 3, the treatment group had significantly higher cognitive presence scores. The treatment group also scored significantly higher in social presence for AOD 1 and in communication and etiquette for AOD 3. No other scores reached statistical significance, but the treatment group's scores were consistently higher for each of the rubric criteria across the four weekly AODs. The final chapter provides a discussion of the practical and theoretical implications of these findings as well as limitations of this study and recommendations for practice and future research.

CHAPTER FIVE: DISCUSSION AND CONCLUSION

Introduction

The intent of this study is to address a problem of practice that stems from the COI framework, which is the most widely adopted structure in online educational research (Valverde-Berrocoso et al., 2020) and is focused on developing learners' critical thinking through teaching presence, social presence, and cognitive presence (Garrison et al., 2001). Cognitive presence is operationalized by the PI model, a four-phase, nonlinear process that becomes more cognitively demanding in the integration and resolution phases (Garrison & Arbaugh, 2007). The four phases of the PI model include a triggering event, exploration, integration, and resolution (Garrison et al., 2001). A persistent pattern in the COI research on AODs is the lack of learner engagement in the integration and resolution phases of the PI model (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). This study utilizes Lipman's (2003) ideals for a COI, which move beyond knowledge generation and confirmation within the PI model (Kaczko & Ostendorf, 2023) by underscoring the importance of engaging in *good judgment*, which includes cognitive dispositions, such as open-mindedness and curiosity.

This study identifies a learning strategy that supports teaching presence, social presence, and cognitive presence by targeting their dispositions toward open-mindedness in an AOD format that has previously been untested in the COI framework. The specific learning strategy is CC, a collaborative argumentation process in which learners work in a small team or in pairs to develop a consensus position on a controversial issue (Johnson & Johnson, 1993). Consensus goals in argumentation mitigate myside bias by supporting optimal argument schema (Christensen-Branum et al., 2019) whereby, for example, learners exhibit increased integration and synthesis of opposing-side arguments in their writing (Felton et al., 2015). Unique to the CC

learning strategy is the usage of structured perspective-switching to further support learners' AOT. This study presents a comparison of learners' perceptions of the COI as well as learners' AOT-E and AOD rubric scores based on participation (i.e., treatment group) and nonparticipation (i.e., control group) in the CC-AOD learning strategy. This final chapter provides an overview and summary of the study in addition to a discussion of the results and their implications for practice and future research.

Summary

The purpose of this quantitative experimental study is to compare the impact of the CC-AOD learning strategy on three outcome measures. The first outcome examined is learners' perceptions of the COI, which includes teaching presence, social presence, and cognitive presence, which were measured by utilizing the COI survey (Arbaugh et al., 2008). Next, learners' critical thinking dispositions toward AOT-E are examined by utilizing the AOT-E scale to measure their openness to changing their beliefs or opinions according to evidence (Pennycook et al., 2020). Whereas motivated reasoning is a bias toward one's beliefs (i.e., myside bias), AOT is the bias toward belief revision and an antidote to motivated reasoning (Stenhouse et al., 2018, p. 18). Finally, learners' AOD submissions from the intervention period were scored by utilizing an instructor-created rubric to measure cognitive presence, social presence, and communication and etiquette.

The context for the study was an asynchronous, online disability studies undergraduate course at Ocean State University, which was designed and taught by the researcher of this study. Because of this double agency or dual role of being both instructor and researcher (Ferguson et al., 2004), a posttest-only design diminished the risk of learners feeling undue pressure to participate in the study and decreased the likelihood of learners perceiving any conflict of

interest. Collecting data at the conclusion of the semester also controlled for the possibility of threats to the study's internal validity. For instance, a pretest could have sensitized participants to the purpose of the research and the study's hypotheses (Gall et al., 2007).

The study was replicated over two semesters (fall 2021 and spring 2022) to obtain a minimum of 15 participants per treatment and control group (Gall et al., 1996). A nonprobability convenience sample was employed. Learners were randomly assigned to the treatment and control sections after enrolling in the course. Participation in the CC-AOD learning strategy (either group) was the independent variable for the study (Creswell & Guetterman, 2019). Both sections of the course were identical with the exception of the final 5 weeks of the course, which comprised the intervention period. The treatment group participated in the CC-AOD learning strategy, a structured collaborative argumentation process in which an assigned pair of learners sought a consensus position on a controversial issue (Johnson & Johnson, 1993). This learning strategy culminated in the submission of a collaboratively written argumentation paper centered on the pair's consensus position. The control group participants completed their assigned AOD work and their argumentation paper independently.

The CC-AOD learning strategy included four weekly AODs (see Appendix B). Among their assigned pairs, learners self-designated as either Partner A or Partner B. Partner A assumed the for position, and Partner B assumed the against position for their assigned issue. For AOD 1, learners investigated their topic and position by gathering background information, such as the identification of relevant facts and stakeholders. For AOD 2, each learner's AOD post included three best case arguments with evidence according to their initial position (i.e., for or against). For AOD 3, learners switched positions with their partner and shared three best case arguments with evidence. For AOD 4, each pair developed a thesis statement with context regarding how

they developed their consensus position. Finally, the pairs submitted a collaboratively written argumentation paper for the course final assignment. Learners received a suggested outline to scaffold and model effective argumentation. The outline included the following components: (a) an introduction with background information and a thesis statement, (b) at least three arguments with supporting evidence, (c) at least three counterarguments with supporting evidence and refutations, and (d) a conclusion with a summary and description regarding how they developed their consensus position.

This study design required a comparison of the collaborative argumentation work from the treatment group and the independent work from the control group. The treatment and control groups differed only in the intervention period, which occurred in the final 5 weeks of the course (Weeks 12–16). Learners in the control group were also assigned a controversial topic but worked independently. While the treatment group worked on AODs 1 and 2, which pertained to the first two steps of the CC-AOD learning strategy, the control group completed two area-of-interest AODs. For AODs 3 and 4, the control group completed weekly AODs that corresponded with their argumentation paper. AOD 3 related to the background information for their topic and position, which was similar to AOD 1 for the treatment group. For AOD 4, learners in the control group wrote their thesis statement and their three best case arguments with evidence for their position. AOD 4 for the control group was similar to AODs 2–4 for the treatment group. Control group participants were also provided with the same suggested outline for their argumentation paper, although group process-related information, which was relevant only to the treatment group, was excluded.

This study is underscored by the researcher's desire to further explorations into learning strategies that are proven to be effective in developing critical thinkers through inquiry (e.g.,

critical thinking skills) and disposition (e.g., open-mindedness) while confirming that a strong correlation exists among the constructs of the COI framework and examining the association between the COI elements and AOT-E. Between-groups differences in learners' AOD rubric scores were also inspected to compare objective outcome measures of cognitive presence, social presence, and learners' communication and etiquette for four weekly AODs from the intervention period. The main analyses included a one-way between-groups MANOVA to examine differences in learners' perceptions of the COI, including their sense of teaching presence, social presence, and cognitive presence. Post hoc ANOVAs were conducted to investigate between-groups differences in perceptions of each of the three presences by themselves. Since the COI constructs and AOT-E were found not to be associated, an independent samples *t*-test was performed to compare the group means for AOT-E; a follow-up Mann-Whitney *U* test was conducted due to assumption violations. Finally, the AOD rubric scores from the four weekly AODs that occurred during the intervention period were compared by performing the Mann-Whitney *U* test. The findings revealed no significant differences between the treatment and control groups in learners' perceptions of the COI constructs or in learners' AOT-E. The treatment group scored significantly higher in the cognitive presence criteria for two of the four AODs (AODs 2 and 3), in one AOD for social presence (AOD 1), and in one AOD for communication and etiquette (AOD 3). The next section presents a discussion of the findings, including implications for practice and areas for future research.

Discussion of the Findings

In the posttest survey, participants self-reported perceptions of teaching presence, social presence, cognitive presence, and AOT-E. Learners did not statistically differ on these constructs based on their participation in the CC-AOD learning strategy. In fact, the mean scores for each

presence for both the treatment and control groups were very high and positively skewed, and the AOT-E means for the treatment group ($M = 3.73$) and control group ($M = 3.54$) were also positively skewed and quite high. Consistent with previous studies (e.g., Kozan & Richardson, 2014), significant, positive correlations were found between the three presences within the COI. However, each presence had a nonsignificant negative correlation with AOT-E. It remained notable, nonetheless, that the treatment group's mean scores for the COI, for every presence and their respective elements, and for AOT-E were higher than the control group. While not statistically significant, there remained a positive difference as a result of participation in the CC-AOD. Moreover, there were statistically significant differences in AOD rubric scores as well as in objective outcome measures of cognitive presence, social presence, and communication and etiquette.

The participant learners' mean scores for the COI, including both groups ($n = 43$), were $M = 4.80$, $M = 4.28$, and $M = 4.67$, for teaching presence, social presence, and cognitive presence, respectively. Compared to other studies that utilize the COI survey, these mean scores are very high. For example, Archibald (2010) investigates whether an online learning resource and online discussion fostered learners' knowledge about educational research design and critical thinking within a COI among 189 participants from 10 research methods courses and workshops. The resulting mean perceptions were relatively much lower than this study's results with $M = 3.80$, $M = 3.46$, and $M = 3.48$ for teaching presence, social presence, and cognitive presence, respectively. Akyol and Garrison (2011) compare learning outcomes, perceived learning, satisfaction, and perceptions of the COI among Master of Education learners who were either in an online or blended course. For those in the online course, the mean scores were as follows: teaching presence ($M = 4.15$), social presence ($M = 3.94$), and cognitive presence ($M = 4.07$).

The results of Chen et al.'s (2017) study, which examines the impacts of an AOD protocol for a large online undergraduate business course ($n = 450$), portray similar mean scores for teaching presence ($M = 4.27$), social presence ($M = 4.10$), and cognitive presence ($M = 4.07$).

The higher self-reported ratings in this study were perhaps not surprising given the purposeful design and facilitation of both course sections according to the COI and collaborative argumentation literature coupled with the specific cultural context for the study. A discussion follows regarding the potential impacts of the course design, social desirability bias (Ferrari et al., 2005; Krumpal, 2013), the cultural value of saving face across Asian cultures (Lalwani et al., 2006), and the university's institutional values regarding the community's sense of place. A consideration of the conceptual mismatch between the COI framework and AOT-E is proposed, followed by a discussion regarding the study design and participant characteristics. These ideas proffer practical and theoretical implications as well as opportunities for important future research.

Purposeful Design and Facilitation

The results of the COI survey illustrated that teaching presence across both groups was learners' highest perceived presence, which indicates the value learners placed on the role of the instructor as a designer, facilitator, and guide. Theoretically, teaching presence can be felt and led by any participant in a COI, such as a "more capable peer" (Vygotsky, 1978, p. 86); however, the COI survey items explicitly ask about teaching presence in relation to the instructor. Learners' perceptions of social presence for both groups was the lowest among the three presences and featured the highest percentage difference between the two groups; the treatment group mean was 5.38% higher, which is a fitting result. Although learners in both groups obtained critical feedback from their peers on their AOD submissions, the requirement of

working in pairs for the CC-AOD heightened the treatment group participants' sense of social presence. Learners in the low-collaboration group (i.e., control group) were not reliant on peers (due to independent assignments that did not require peer interaction) and were more dependent on instructor interaction and feedback, while learners in the high-collaboration group (i.e., treatment group) relied on other learners rather than solely on the instructor to complete assignments. Learners' perceptions of cognitive presence mean scores were lower than teaching presence but higher than social presence. There was a 2.57% difference in mean scores between the treatment and control groups.

The treatment and control groups' learning strategies may have been insufficiently differentiated. The instructional design for both groups was purposeful and was implemented around a COI's requisite features to create an equitable learning experience. Such elements included AODs designed to support a sense of collaboration (i.e., social presence to enhance group cohesion) and course activities that piqued learners' curiosity (i.e., cognitive presence summoned by a triggering event; Arbaugh et al., 2008). The lack of significant between-groups differences in the COI and AOT-E calls into question whether the CC-AOD strategy was a worthwhile approach since the control group had similar outcomes; however, statistically significant differences were noted in learners' AOD rubric scores during the intervention period, and the treatment group—without exception—had higher mean scores for every dependent variable. Increased differentiation between the treatment and control groups' AODs would likely render more significant results, especially with an increased sample size. For instance, it would be worthwhile to compare the CC-AOD learning strategy to other AOD approaches, such as case-based AODs and open-ended prompts, similar to Richardson and Ice's (2010) study. Other dependent variables to extend the literature on the CC-AOD learning strategy could include final

course grades as a learner outcome and an analysis of the final argumentation paper. The latter was beyond the scope of this study and excluded from the IRB protocol; however, final paper analysis may provide evidence of integration and resolution in alignment with Shea et al. (2010), who indicate that resolution may occur outside of AODs in final projects and group work.

The CC-AOD learning strategy within a COI was complementary yet distinctive from the collaborative argumentation literature, which includes argumentation-based computer-supported collaborative learning (e.g., Noroozi, 2020) and collaborative argumentation-based learning (e.g., Baker et al., 2013). Kuhn (2019) posits that critical thinking is dialogic and evidenced by processes and practices of argumentation. This study tested the impact of the CC-AOD, a dialogic argumentation learning strategy with consensus goals, according to the COI's conceptualization of critical thinking skills (e.g., cognitive presence). Utilizing consensus goals in a CC-AOD furthers the work of Nussbaum (2008), Villarroel et al. (2016), and others who have examined win-win resolutions instead of adversarial intents based on persuasion and a win-lose approach (Iordanou & Rapanta, 2021). This study focused on learners' epistemic change with specific attention to their open-mindedness (i.e., belief in opinion change according to evidence). This experimental study allowed for graded assignments so that learners invested authentic efforts toward their learning activities, which is often unachievable when studies do not have course-embedded interventions (Valero Haro et al., 2022). Future scholars interested in furthering the research on the CC-AOD can investigate the learning strategy's impact on conceptual change (e.g., Asterhan & Schwarz, 2009), the learner outcome differences in a persuasion control condition after perspective-switching, or the results of incorporating argumentation competence measures, such as knowledge, behavior, and attitude (Valero Haro et al., 2022).

Social Desirability Bias and Cultural Influences

Participants' high scores in the posttest survey may have been due to social desirability biases in which they self-reported items to increase social approval or liking instead of responding truthfully (Krumpal, 2013). A cultural orientation toward this bias is relevant to this study since a majority of the learners ($n = 26$, 60.47%) identified as Asian. People in collectivist cultures are more likely to engage in face-saving behaviors to maintain relationships; they are also more likely to employ deception to manage public impressions (Lalwani et al., 2006). This is in contrast to individualists, who are more likely to self-disclose and seek authenticity through self-image management. Ethnicity, thus, is a proxy for collectivism, and is associated with social desirability bias; Asian Americans engage in this bias at higher rates than White Americans. Social desirability bias threatens the validity of self-reported surveys, such as the COI survey and AOT-E scale. This bias could also be coupled with researcher demand bias, in which respondents seek to fulfill the hopes of the researcher by, for example, providing overly positive responses to items (Kennedy et al., 2022).

Future researchers can examine the relationship between the COI constructs, measures of thinking dispositions such as AOT-E, and social desirability. A social desirability scale is often applied to control for response distortion (Lanz et al., 2022). From a review of the literature, no COI survey studies to date have examined social desirability. The associations between teaching presence, social presence, and social desirability may illuminate online learners' characteristics and the intersection of their perceptions with their cultural influences. Stanovich and West (1997) do not find a correlation between AOT and social desirability, which is unexpected since one could argue that a survey on open-mindedness is similar in nature to a measure of social desirability.

The high COI scores across both the treatment and control groups from a sample with a majority who identified as Asian suggest the likelihood of a social desirability bias among respondents. However, this simplistic view requires further investigation. While this bias is more likely among collectivist cultures, COI studies conducted in Asia have presented relatively lower levels of the three presences compared to findings from studies conducted in the US. For instance, in Ma et al.'s (2017) study, 350 Chinese undergraduates from the humanities department had mean scores of 3.60, 3.61, and 3.60 for teaching presence, social presence, and cognitive presence, respectively. This aligns with other studies that have compared learner ethnicity to perceptions of online learning (e.g., Ashong & Commander, 2012); additionally, Ma et al. (2017) hypothesize that Chinese learners are less inclined to engage in inquiry-based learning because they are less critical and opinionated in AODs than American learners (Thompson & Ku, 2005). Similarly low COI scores are portrayed in a study of 124 first-year English first-language learners at a South Korean university (Mo & Lee, 2017). Relatively moderate perceptions of each presence are revealed, with teaching presence being highest ($M = 3.73$), followed by cognitive presence ($M = 3.39$) and social presence ($M = 3.14$). Both studies (e.g., Ma et al., 2017; Mo & Lee, 2017) utilize a translated COI survey. Ma et al. (2017) note that learners may have had difficulty understanding the survey items and how to respond appropriately to these items. The findings from these studies nonetheless suggest that social desirability stemming from Asian cultures is worthy of further examination to better understand the complexity of learners' perceptions and the potential biases to which they are susceptible.

Sense of Place and Community

Beyond the ethnic makeup of the sample, the sense of community and thus perceptions of the COI may have been high across both groups due to the cultural context of the study setting

and the learners' overall sense of place from the university. This study was located in the Pacific United States. No other COI research studies have investigated the theoretical framework within the context of the Pacific and Polynesia. It is thus unclear whether the perceptions of the COI were inflated or merely reflective of the specific cultural context. For example, the university in which the study occurred is foundationally a Native Hawaiian place of learning. The three essential pathways for the university include (a) *A'o*: learning from one another, (b) *Alu*: connecting with each other, and (c) *'Auamo*: working together (Native Hawaiian Place of Learning Advancement Office, 2023). These pathways map onto a constructivist paradigm for learning; accordingly, they align with the tenets of a COI. Thus, learner perceptions of the COI may have been high, as a result of not only their course experiences but also their inclusion in the university community overall.

Community of Inquiry and Actively Open-Minded Thinking About Evidence

Understanding the variables that underpin online learners' education and achievement has been the focus of many studies, with authors proposing the importance of examining the variables that may influence the three elements of effective online learning that are proposed within the COI model. Some researchers have even suggested the expansion of the model and the addition of constructs such as learning presence, which supports regulation processes and thus deeper stages of cognitive presence (Shea et al., 2012; Shea et al., 2022). However, the three-element model must be continually validated across various populations. The results of this study confirm the existence of strong pairwise correlations between constructs within the COI framework. As hypothesized, teaching presence and social presence were significantly correlated with cognitive presence. However, learners' AOT-E was not significantly associated with any element of the COI framework; thus, the extent to which learners believed that they engaged in

the indicators of cognitive presence was not associated with or dependent upon their AOT-E. This does not mean that AOT-E is not a component of understanding the effectiveness of online learning. It simply may not be a construct that is associated with the COI model.

Initially, this may seem unreasonable; however, deep consideration of the constructs' conceptualization may explain the nonsignificant correlations. Consistent with theory and previous research, teaching presence and social presence were posited to be associated with cognitive presence, which was demonstrated. Additionally, AOT research demonstrates more extensive information seeking (i.e., exploration) and an openness to change one's mind in the face of facts (i.e., integration); therefore, the expectation for the study was that AOT-E would be predictive of the categories of cognitive presence (Svedholm-Häkkinen & Lindeman, 2018). While the CC-AOD increased integration, albeit at a nonsignificant level, the overall results of the study indicate that cognitive presence and AOT-E are separate and do not moderate the relationship between instructional intervention and the COI constructs. Consequently, AOT-E is not a requisite for perceptions of cognitive presence.

The conceptual mismatch may stem from the PI model's focus on resolution as the ultimate phase of inquiry, whereas AOT-E focuses on cognitive flexibility and openness to alternative ideas. For instance, AOT is associated with a reduced need for closure or the tendency to reach decisions or conclusions quickly and often prematurely (Mellers et al., 2015). The context—a semester-long course and especially within a weeks-long instructional intervention that has finite time due to course deadlines—requires quick resolution. For the CC-AOD, learners were scaffolded through a process to achieve a consensus position with their assigned partner. Thus, the requirement to reach a consensus position through integration and resolution within a finite time period may have led to a conflict in effective support of AOT-E.

Likewise, participants in the control group may have also experienced a need for closure due to time constraints imposed by course deadlines.

One could argue that thinking dispositions are habitual and constant rather than malleable, thus making them more appropriate to examine within a longitudinal study (Facione, 2000; Pennycook et al., 2020). With that logic, learners' static AOT-E could explain differences in perceptions of their cognitive presence; however, the data do not support this line of inquiry. Instead, the data proffers more questions and opportunities for research. A future study could employ a pretest-posttest design to illuminate the amount of change, if any, that results from the CC-AOD learning strategy. Overall, cognitive presence, as a measure of critical thinking skills and inquiry, and AOT-E, as a measure of the critical thinking disposition of open-mindedness, are necessary for a critical thinker; however, they are not requisites for one another. Further investigation regarding why AOT-E is not associated with exploration and integration is necessary, as these constructs appear to be both conceptually and practically related.

Study Design and Participant Characteristics

The positively skewed data generate questions about participants' characteristics beyond the cultural influences previously discussed. Although a majority of learners opted to participate in the study (53.09%), participants may have been different from the nonparticipants. For example, those who agreed to participate may have been learners who had a more positive experience in the course. Ewing (2012) finds that course evaluation scores are positively correlated with learners' expected course grades. A suggested reason for this association is that learners who are expected to fail the course are not likely to evaluate the instructor as excellent regardless of whether they believe the instructor is excellent. Conversely, if a learner expects a high grade, then they may rate the instructor as more positive.

Utilizing incentives may have also impacted participants' characteristics for the study. Participants received a \$10 Amazon.com electronic gift card upon completion of the posttest. Incentives increase response rates to surveys and can either increase or decrease nonresponse bias (Singer & Ye, 2013). While relatively few scholars have investigated the effect of incentives on response quality (Singer & Ye, 2013), Meade and Craig (2012) report that, on average, 10%–12% of undergraduates provide data results that reveal careless reporting; their finding is based on consistency indices and response patterns that include repeated responses of the same answer (e.g., “5”). Thus, in addition to including social desirability measures on self-reported surveys, screener questions can also verify that participants are paying attention to the questions and the specific wording of each item. Overall, survey-related biases that may have been present could be minimized in a replication study with a larger sample size across a variety of courses, subjects, and instructors. This study met the minimum number of participants per group according to research conventions, although the sample size was small. The power of the statistical analysis and potential generalization of the results are therefore limited.

The characteristics of learners who would be inclined to enroll in a disability studies course and the nature of disability studies as a field are worth mentioning. Disability studies adopt an interdisciplinary approach that is inherently social, intersectional, participatory, and values-based (Ferguson & Nusbaum, 2012). They therefore align with constructivism and may attract learners who are inherently open-minded. Furthermore, disability studies and the COI framework feature a shared interest in critical inquiry and challenging existing knowledge. The disability studies course employed for this research was at the 300-level, in which most learners were juniors and seniors from complementary majors, such as social work. The upper-level course and the learners' years of experience render different results compared to first-year

learners or enrollees in a lower-level course. Thus, the nonsignificant between-groups differences in learners' perceptions of the COI and AOT-E could be explained by the course goals and objectives, which depreciated the measurable effectiveness of the CC-AOD. However, the instructional strategy's effectiveness is evidenced by the between-groups differences in AOD rubric scores for learners' cognitive presence, social presence, and communication and etiquette.

The time frame (2021–2022) in which the study occurred may have impacted learners' perceptions of the COI and AOT-E. The fall 2021 and spring 2022 semesters were during the COVID-19 pandemic, when a majority of classes were transitioned to an online implementation. This may have inflated learners' perception of the COI, as individuals throughout the world experienced increased isolation, and the online course as well as intentional, planned collaboration activities may have offered learners a heightened sense of community, as seen in their high COI scores. A further examination of the pandemic's influence on learners' AOT-E and their ability to develop critical inquiry skills are important areas for research due to the spread of misinformation and the importance of discerning truth based on evidence (Bonafé-Pontes et al., 2021).

Conclusion

The COI framework is a practical and theoretical model for creating deep, meaningful online learning, and AODs are the typical medium utilized to ensure productive discourse (Garrison et al., 2000). The goal of a COI is to engage learners in critical thinking and knowledge construction through inquiry processes, although an ongoing pattern across a variety of AOD types is that learners exhibit low levels of integration and resolution via self-reports in survey responses and content analysis (Darabi et al., 2011; Liu & Yang, 2014; Richardson & Ice, 2010). Engagement in these higher-order processes of cognitive presence does not occur without

purposeful design and facilitation (Sadaf & Olesova, 2017). Therefore, the purpose of the study was to examine the effects of the CC-AOD learning strategy, which was intended to support cognitive presence by specifically targeting learners' critical thinking inquiry skills as well as their intellectual character of open-mindedness (i.e., AOT). The outcome measures—learners' perceptions of teaching presence, social presence, cognitive presence, and AOT-E—were compared between those who participated in the paired CC-AOD learning strategy and a control group who completed their work independently. Learners' AOD rubric scores were examined across four weekly AODs during the intervention period. Although the treatment group had higher mean scores in every self-reported dependent variable, the between-groups differences were nonsignificant. Learners in the treatment group, however, earned significantly higher cognitive presence rubric scores in two weekly AODs as well as higher social presence and communication and etiquette in one weekly AOD each.

Another purpose in this study was to determine a practical solution for educational designers and instructors to utilize an argumentation strategy that produces high cognitive presence and AOT-E by mitigating myside bias through consensus goals. The results suggest that participation in the CC-AOD learning strategy promotes teaching presence, social presence, cognitive presence, and AOT-E. However, given the sample size limitation and the lack of between-groups differentiation, a follow-up study with a larger sample and addition of a true control condition may render different results. A mixed-methods approach to compare the self-reported data, learners' grades, and AOD content analysis data would be a more robust approach to answer the study's hypotheses. Further investigation into the ways in which learners' culture and their sense of community and place impacts perceptions of a COI and AOT-E, specifically

within the Native Hawaiian and Pacific Islander context, would offer compelling and meaningful results.

Learners' high perceptions of teaching presence, social presence, cognitive presence, and AOT-E suggest that this study contributes to the field of instructional design and to the literature on the COI framework, critical thinking and dispositions, and AODs. Despite potential respondent biases in the self-reported items in the posttest survey, the high ratings may still indicate that effective course design and facilitation supported learners' perceptions and actual outcomes. Finally, the foundational purpose of this study was to contribute to the literature on learning strategies that develop effective critical thinkers, especially in promoting open-mindedness to mitigate harmful biases. An openness and consideration of the perspectives and life experiences of others can promote more inclusive and empathetic learners in the classroom; these skills and dispositions can transfer to the real world.

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APPENDIX A: CONSTRUCTIVE CONTROVERSY TOPICS

1. Should parents choose for their child to receive a cochlear implant, or is a cochlear implant a form of forced assimilation by the hearing world?
2. Should the US sign and ratify the UN CRPD?
3. Should people be allowed to seek assistance in ending their lives, or does legalizing assisted suicide present too great a threat to vulnerable people, such as persons with disabilities?
4. Should audiences reject actors without disabilities who play persons with disabilities, or should “disabled” roles be open to all kinds of performers?
5. Should people with disabilities (e.g., Oscar Pistorius, Kayla Montgomery) be allowed to use assistive technology to compete alongside people without disabilities?
6. Should person-first or identity-first language be utilized when talking to or about a person with disabilities?
7. Should autism spectrum disorder (ASD) be classified as a disability or a feature of diversity/neurodiversity?
8. Should students with learning disabilities generally be mainstreamed with other students?
9. Should people with disabilities be viewed as inspirational for overcoming an obstacle, or should viewing people with disabilities as inspirational be rejected?
10. Should people cease utilizing the word *crazy* and similar descriptors, or is society becoming overly sensitive (i.e., politically correct) to semantics?
11. Should “corrective” surgery be performed on a baby (e.g., cleft palate), or should parents wait until the child can decide?
12. Regarding twice-exceptional students, should educational provisions for students’ needs concern disabilities first or talents and potential first?

APPENDIX B: DISCUSSION PROMPTS FROM INTERVENTION PERIOD

Treatment Group Discussion Prompts

1. CC-AOD Step 1: Topic Background Information (AOD 1)

Discussion 12: Disability Studies Topic Step #1 #13

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

We are working on Step 1 of the Disability Studies Topic Paper this week where you will begin investigating your topic. In your post, **identify relevant facts and the stakeholders and their primary concerns for your topic and position**. If you are using the handout (highly recommended!), you fill out the applicable sections.

Replies

In your reply, use the following prompts as a basis to offer suggestions for your peer(s):

- What background information is missing or might need to be expanded?
- Who are other stakeholders that may be impacted by this topic?
- What are potential arguments that your peer can look into for Step #2?

Note: While you can respond to your teammate, respond to at least two people outside of your team.

2. CC-AOD Step 2: Three Arguments for Initial Position (AOD 2)

Discussion 13: Disability Studies Topic Step #2 #14

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

State your selected topic and position. Remember, the side of the debate you signed up for does not need to align with your actual views and opinions. Provide three “best case arguments” with corresponding evidence. Use in-text citations that correspond to your arguments and evidence. If you are using the handout, you fill out the “for” or “against” column.

Replies

Reply to peers who have a topic different from your own. Provide areas for improvement in their arguments. Perhaps you can provide suggestions for examples or other areas to explore. This is the time to be critical, constructive peers.

3. CC-AOD Step 3: Three Arguments for Switched Positions (AOD 3)

Discussion 14: Disability Studies Topic Step #3 #15

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

This week, you have switched positions with your partner and will repeat what we did in Step #2. State your topic and (new) position. Provide three “best case arguments” with corresponding evidence. Do your best to generate three arguments different from what your partner offered last week. Use in-text citations that correspond to your arguments and evidence. If you are using the handout, you fill out the “for” or “against” column.

Replies

Reply to peers who have a topic different from your own. Provide areas for improvement in their arguments. Perhaps you can provide suggestions for examples or other areas to explore. This is the time to be critical, constructive peers.

4. CC-AOD Step 4: Thesis Statement for Consensus Position (AOD 4)

Discussion 15: Disability Studies Topic Step #4 #16

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

Step #4 is to be done collaboratively with your partner. Share a draft of your thesis statement, and provide context around how you and your partner developed this stance. Note: Only one person per team needs to post, but everyone must reply twice.

If you are using the handout, you and your partner can combine your handout drafts (if you both used it) and collaborate to generate a list of possible solutions and the common ground you reached. This will help you to develop your thesis statement and your final paper.

Replies

Provide feedback on a thesis statement other than your own. Consider this an opportunity to give and receive peer feedback that can help to improve your final paper. Use the rubric to shape your feedback and ask questions, offer suggestions, and offer helpful critiques, as needed.

Control Group Discussion Prompts

1. Area of Interest AOD 1 (AOD 1)

Discussion 12: Area of Interest #1 #13

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

Based on your area(s) of interest, select an article from Lesson 13. Summarize the article in 1 - 2 paragraphs. Reflect and make connections to the article from models and concepts from earlier in the semester in 1 - 2 paragraphs.

Replies

Ideally you will respond to an article that was different from the article you selected.

- If you responded to a different article, you can discuss how you would make different or similar connections to the article based on their summary.
- If you responded to the same article, you can discuss the similarities and differences.

2. Area of Interest AOD 2 (AOD 2)

Discussion 13: Area of Interest #2 #14

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

Based on your area(s) of interest, select an article from Lesson 13. Summarize the article in 1 - 2 paragraphs. Reflect and make connections to the article from models and concepts from earlier in the semester in 1 - 2 paragraphs.

Replies

Ideally you will respond to an article that was different from the article you selected.

- If you responded to a different article, you can discuss how you would make different or similar connections to the article based on their summary.
- If you responded to the same article, you can discuss the similarities and differences.

3. Topic Background Information AOD (AOD 3)

Discussion 14: Disability Studies Topic Background Information #15

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

State your selected topic and position. Begin investigating your topic. In your post, identify relevant facts and the primary stakeholders and their concerns for your topic and position.

Replies

In your reply, use the following prompts as a basis to offer suggestions for your peer(s):

- What background information is missing or might need to be expanded?
- Who are other stakeholders that may be impacted by this topic?
- What are potential arguments that your peer can look into?

4. Topic Thesis Statement AOD (AOD 4)

Discussion 15: Disability Studies Topic Thesis Statement #16

Discussion

Post due Thursday. Replies to two peers on different days by Sunday.

Post

Share a draft of your thesis statement, and provide context around how you developed this stance. Also, provide three “best case arguments” with corresponding evidence, and use in-text citations that correspond to your arguments and evidence.

Replies

Provide feedback on the thesis statement and arguments. Consider this an opportunity to give and receive peer feedback that can help to improve your final paper. Use the rubric to shape your feedback and ask questions, offer suggestions, and offer helpful critiques, as needed.

APPENDIX C: GRAPHIC ORGANIZER FOR CONSTRUCTIVE CONTROVERSY

Disability Topic Paper Handout

Issue:

Relevant Facts:

Stakeholders and their primary concerns:

Main Argument(s) For:

1.

2.

3.

Main Argument(s) Against:

1.

2.

3.

List possible solutions:

Common ground reached (use to develop thesis statement):

APPENDIX D: COMMUNITY OF INQUIRY SURVEY INSTRUMENT

The following is a list of the 34 items reflected in the COI survey in the order presented by the authors (Arbaugh et al., 2008, p. 135). The three presences—teaching presence (TP), social presence (SP), and cognitive presence (CP)—are listed according to the item and category.

Item	Presence and Category
1. The instructor clearly communicated important course topics.	TP: Design and Organization
2. The instructor clearly communicated important course goals.	TP: Design and Organization
3. The instructor provided clear instructions on how to participate in course learning activities.	TP: Design and Organization
4. The instructor clearly communicated important due dates and time frames for learning activities.	TP: Design and Organization
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that enabled me to learn.	TP: Facilitation
6. The instructor was helpful in guiding the class toward understanding course topics in a way that enabled me to clarify my thinking.	TP: Facilitation
7. The instructor maintained course participants' engagement and participation in productive dialogue.	TP: Facilitation
8. The instructor kept the course participants on task in a way that enabled me to learn.	TP: Facilitation
9. The instructor encouraged course participants to explore new concepts in this course.	TP: Facilitation
10. The instructor's actions reinforced the development of a sense of community among course participants.	TP: Facilitation
11. The instructor focused discussions on relevant issues in a way that enabled me to learn.	TP: Direct Instruction

12. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.	TP: Direct Instruction
13. The instructor provided feedback in a timely fashion.	TP: Direct Instruction
14. Getting to know other course participants gave me a sense of belonging in the course.	SP: Affective Expression
15. I was able to form distinct impressions of some course participants.	SP: Affective Expression
16. Online or web-based communication is an excellent medium for social interaction.	SP: Affective Expression
17. I felt comfortable conversing through the online medium.	SP: Open Communication
18. I felt comfortable participating in the course discussions.	SP: Open Communication
19. I felt comfortable interacting with other course participants.	SP: Open Communication
20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	SP: Group Cohesion
21. I felt that my point of view was acknowledged by other course participants.	SP: Group Cohesion
22. Online discussions help me to develop a sense of collaboration.	SP: Group Cohesion
23. Problems posed increased my interest in course issues.	CP: Triggering Event
24. Course activities piqued my curiosity.	CP: Triggering Event
25. I felt motivated to explore content related questions.	CP: Triggering Event
26. I utilized a variety of information sources to explore problems posed in this course.	CP: Exploration
27. Brainstorming and finding relevant information helped me resolve content related questions.	CP: Exploration
28. Online discussions were valuable in helping me appreciate different perspectives.	CP: Exploration

29. Combining new information helped me answer questions raised in course activities.	CP: Integration
30. Learning activities helped me construct explanations/solutions.	CP: Integration
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.	CP: Integration
32. I can describe ways to test and apply the knowledge created in this course.	CP: Resolution
33. I have developed solutions to course problems that can be applied in practice.	CP: Resolution
34. I can apply the knowledge created in this course to my work or other non-class related activities.	CP: Resolution

APPENDIX E: ACTIVELY OPEN-MINDED THINKING ABOUT EVIDENCE SCALE

The following is a list of the eight items reflected in the AOT-E scale in the order presented by the authors (Pennycook et al., 2020, p. 479).

Item	Subscale
1. A person should always consider new possibilities.	AOT
2. People should always take into consideration evidence that goes against their beliefs.	AOT
3. It is important to persevere in your beliefs even when evidence is brought to bear against them. (rev)	Belief Identification
4. Certain beliefs are just too important to abandon no matter how good a case can be made against them. (rev)	Belief Identification
5. One should disregard evidence that conflicts with your established beliefs. (rev)	Belief Identification
6. Beliefs should always be revised in response to new information or evidence.	Belief Identification
7. No one can talk me out of something I know is right. (rev)	Dogmatism
8. I believe that loyalty to one’s ideals and principles is more important than “open-mindedness.” (rev)	Openness Values

Items 3, 4, 5, 7, and 8 are reverse scored.

APPENDIX F: DEMOGRAPHIC SURVEY

Item	Options
1. How would you describe your gender?	<ul style="list-style-type: none"> • Female • Male • Other (specify below)
2. What is your age?	<ul style="list-style-type: none"> • 18–24 • 25–34 • 35–44 • Over 45
3. What is your ethnic background? (Select all that apply.)	<ul style="list-style-type: none"> • White or Caucasian • Asian • Hispanic • African American • Native American • Mixed race • Other
4. Which of the following best describes your year in college as of [current semester]?	<ul style="list-style-type: none"> • Freshman • Sophomore • Junior • Senior • Other (specify below)
5. Indicate your preference for course format.	<ul style="list-style-type: none"> • Online asynchronous (self-paced; no virtual live classes) • Online synchronous (virtual live classes at least monthly) • Hybrid (a combination of online and in-person offerings) • In-person classes • Other (specify below)
6. How many online asynchronous classes have you completed (including DIS 380, [current semester])?	<ul style="list-style-type: none"> • 1–2 • 3–4 • 5–6 • 7+

APPENDIX G: DISCUSSION RUBRIC

Critical Analysis of Post (Cognitive Presence)	
Excellent (4 points)	<p>Post displays excellent understanding of the required readings and underlying concepts. Post integrates course materials and relevant research to support key points.</p> <p>Well-edited quotes are cited appropriately.</p> <p>No more than 10% of the post is a direct quotation.</p>
Good (3 points)	<p>Post demonstrates understanding of the required readings and underlying concepts, including correct usage of terms and proper citation.</p>
Acceptable (2 points)	<p>Post repeats and summarizes basic, correct information but does not connect readings to outside references or relevant research and does not consider alternative perspectives or connections between ideas.</p> <p>Sources are not cited.</p>
Unacceptable (1 point)	<p>Post reveals little or no evidence that readings were completed or understood.</p> <p>Post is largely based on personal opinions or feelings; is without supporting statements from the readings, outside resources, or relevant research; or lacks specific, real-life application.</p>
No Contribution (0 points)	<p>No post was made.</p>
Participation in the Learning Community with Replies (Social Presence)	
Excellent (4 points)	<p>Replies inspire further discussion by building on peers' posts, adding to a focused argument around a specific issue, asking a new related question, or agreeing or disagreeing with experience or related research.</p> <p>Post and two replies are submitted on time.</p>

<p>Good (3 points)</p>	<p>Replies contribute to conversations by referring to relevant research, asking related questions, or offering agreement or disagreement that is supported by experience or related research.</p> <p>Discussion post is submitted on time, but one or more replies are submitted late.</p>
<p>Acceptable (2 points)</p>	<p>Replies sometimes contribute to class conversations by affirming statements, referring to relevant research, asking related questions, or making an oppositional statement that is supported by experience or related research.</p> <p>Two or more contributions are not submitted on time or only one reply is submitted.</p>
<p>Unacceptable (1 point)</p>	<p>Replies do not contribute to ongoing conversations; replies of either support or disagreement comprise less than a paragraph.</p> <p>Contributions are posted only on the last day of the week.</p>
<p>No Contribution (0 points)</p>	<p>No post or replies.</p>
<p>Communication and Etiquette (C&E)</p>	
<p>Excellent (4 points)</p>	<p>Written interactions demonstrate respect and sensitivity to disability, gender, cultural and linguistic background, sexual orientation, and political and religious beliefs.</p> <p>Written responses are free of grammatical, spelling, or punctuation errors. The style of writing facilitates communication.</p> <p>Person-first language is utilized.</p>
<p>Good (3 points)</p>	<p>Written interactions demonstrate respect and interest in the viewpoints of others.</p> <p>Written responses are largely free of grammatical, spelling, or punctuation errors. The style of writing usually facilitates communication.</p>

	<p>Person-first language is usually utilized.</p>
<p>Acceptable (2 points)</p>	<p>Some of the written interactions demonstrate respect and interest in the viewpoints of others.</p> <p>Written responses include some grammatical, spelling, or punctuation errors that distract the reader.</p> <p>Person-first language is sometimes utilized.</p>
<p>Unacceptable (1 point)</p>	<p>Written interactions demonstrate disrespect for the viewpoints of others.</p> <p>Written responses contain numerous grammatical, spelling, or punctuation errors. The style of writing does not facilitate effective communication.</p> <p>Person-first language is not utilized.</p>
<p>No Contribution (0 points)</p>	<p>No post or replies.</p>

APPENDIX H: INSTITUTIONAL REVIEW BOARD APPROVALS

Institutional Review Board approvals from the University of Hawai‘i at Mānoa and the University of Memphis for fall 2021 and spring 2022.



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Office of Research Compliance
Human Studies Program

DATE: December 08, 2021
TO: Takahashi, Kiriko, University of Hawai
at Manoa, Center on Disability Studies
Lum Ho, Lauren, MSW, MEd,
University of Hawai at Manoa, Center
on Disability Studies
FROM: Rivera, Victoria, Dir, Ofc of Rsch
Compliance, Social&Behav Exempt
PROTOCOL TITLE: Exploring the effects of goal type on a
community of inquiry in asynchronous
online discussions
FUNDING SOURCE: None
PROTOCOL NUMBER: 2021-00539
Approval Date: December 08, 2021 Expiration Date: August 01, 2071

NOTICE OF APPROVAL FOR HUMAN RESEARCH

This letter is your record of the Human Studies Program approval of this study as exempt.

On December 08, 2021, the request for IRB approval of changes to your exempt project noted above has been reviewed and approved. The proposed amendments will be added into your current project file. The proposed changes do not alter the exempt status of your project. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CFR 46.101(b) 1, 2.

This approval does not expire. However, please notify the Human Studies Program when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the Human Studies Program by phone at 956-5007 or email uhirb@hawaii.edu. We wish you success in carrying out your research project.

IRB #: PRO-FY2021-460

Title: Exploring the effects of goal type on a community of inquiry in asynchronous online discussions

Creation Date: 6-4-2021

End Date:

Status: **Approved**

Principal Investigator: Lauren Lum Ho

Review Board: University of Memphis

Sponsor:

Study History

Submission Type	Initial	Review Type	Exempt	Decision	Exempt
Submission Type	Modification	Review Type	Exempt	Decision	Approved
Submission Type	Modification	Review Type	Exempt	Decision	Approved

Key Study Contacts

Member	Amanda Rockinson	Role	Co-Principal Investigator	Contact	rcknsnsz@memphis.edu
Member	Lauren Lum Ho	Role	Principal Investigator	Contact	llumho@memphis.edu
Member	Lauren Lum Ho	Role	Primary Contact	Contact	llumho@memphis.edu

APPENDIX I: RECRUITMENT LETTER



As a student in DIS 380: Foundations in Disability and Diversity, you are being asked to participate in a research study exploring the effects of goal type in asynchronous online discussions. Your participation is based on your experiences from the 16-week class. If you volunteer to participate, you will complete an online survey, in which will be presented with statements about your thinking styles and your perceptions of the online learning environment. You will use a Likert scale to answer these questions. The survey will also collect demographic data. You can skip any question that makes you uncomfortable, and you can end your participation in the study at any time. Your discussion posts will also be analyzed as part of this study; however, you may opt out of this. Your name and any identifying information will be removed to ensure your privacy and confidentiality.

Students who volunteer for the study will receive an electronic \$10 Amazon gift card. You may not have direct benefits as a participant beyond the gift card; however, this study may add to educational research on critical thinking and community in online higher education learning environments. There is no alternative to participation.

Lauren Lum Ho, of the University of Hawai‘i at Mānoa, College of Education (faculty member) and University of Memphis (doctoral student) is conducting this study as a requirement for a doctoral degree. Her faculty advisor, Dr. Amanda Rockinson-Szapkiw, is a faculty member of the University of Memphis and co-principal investigator of the study. Dr. Kiriko Takahashi is serving as the principal investigator of the study and is a faculty member of the University of Hawai‘i at Mānoa.

If you are willing to participate, you will complete a statement of consent. You can email laurenh@hawaii.edu to opt out of the study.

Best,

Lauren Lum Ho
University of Memphis Doctoral Candidate
University of University of Hawai‘i at Mānoa Faculty

APPENDIX J: INFORMED CONSENT



Institutional Review Board
315 Administration Bldg.
Memphis, TN 38152-3370
Office: 901.678.2705
Fax: 901.678.2219

Consent for Research Participation

Title	Exploring the effects of goal type on a community of inquiry in asynchronous online discussions
Researcher(s) and Contact Information	<p>Lauren Lum Ho, University of Memphis (Doctoral Student), University of Hawai'i at Mānoa (Faculty) laurenlh@hawaii.edu (808)224-9044</p> <p>Dr. Kiriko Takahashi (Principal Investigator) University of Hawai'i at Mānoa kiriko@hawaii.edu (808)956-4457</p> <p>Dr. Amanda Rockinson-Szapkiw (Advisor, Co-Principal Investigator) University of Memphis rcknsnsz@memphis.edu (901) 678-1432</p>

The box below highlights key information to consider when deciding if you want to participate. More detailed information is provided below the box. Please ask the researchers any questions about the study before you make your decision. If you volunteer, you will be one of about 30 people to do so.

Key Information for You to Consider

Voluntary Consent: You are being asked to volunteer for a research study. It is up to you whether you choose to participate or not. There will be no penalty or loss of benefit to which you are otherwise entitled if you choose not to participate or discontinue participation. As a student, if you decide not to take part in this study, your choice will not impact your academic status or grade in the class. Lauren Lum Ho was your instructor for DIS 380 this past semester. Your participation will not impact your grades, class standing, your instructor-student relationship, or your relationship with the university.

Purpose: The purpose of this research is to explore the effects of goal type in asynchronous online discussions.

Duration: Your participation will last about 20 minutes, which is the expected duration to complete the online survey. The survey will be based on the 16-week class you participated in.

Procedures and Activities: If you volunteer to participate, you will complete an online



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survey. You will be presented with statements about your thinking styles and your perceptions of the online learning environment. For each question, you will be presented with a Likert scale for you to indicate which statements best apply. The survey will also collect demographic data. You can skip any question that makes you uncomfortable, and you can stop at any time. As part of the survey, you will be asked whether you consent to have your discussion posts be used as data for the study. Only the names of those who consent to the use of their discussion posts will be collected. This consent form includes participation in both the survey and use of your discussion posts; however, you must opt in via the survey to confirm the use of your discussion posts as data. Students who completed the class will be asked to participate in this research.

Risks: Some of the foreseeable risks or discomforts include a time commitment to complete the survey and survey fatigue. You may also experience stress if you feel there are too many statements to read through and answer.

Benefits: Students who volunteer for the study will receive an electronic \$10 Amazon gift card. You may not have direct benefits as a participant beyond the gift card; however, this study may add to the educational research on critical thinking and community in online higher education learning environments.

Alternatives: There are no alternatives to participation in the study.

Who is conducting this research?

Lauren Lum Ho is a graduate student at the University of Memphis in the Instructional Design and Technology program and is conducting this study as a requirement for earning a doctoral degree. She is also a faculty member at the University of Hawai'i at Mānoa, College of Education. Her faculty advisor is Dr. Amanda Rockinson-Szapkiw and is a co-principal investigator of the study. Dr. Kiriko Takahashi is serving as the principal investigator of the study. There may be other research team members assisting during the study. Members of the research team do not have a financial interest or conflict of interest related to the research.

Why is this research being done?

The purpose of this research is to explore whether the goal type in an online asynchronous discussion impacts student perceptions of the community of inquiry. You are being invited to participate because you were a student in the selected research setting, which is an online course which uses asynchronous online discussions.

How long will I be in this research?

The research will be conducted online. It should take about 20 minutes to complete the survey, and your survey responses will be based on your experiences from the 16-week course you completed.



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What happens if I agree to participate in this research?

If you agree you will be asked to:

- Complete an online survey comprised of statements about your thinking styles and your perceptions of social presence, teaching presence, and cognitive presence from your experience in the course. For each question, you will be presented with a scale from which you will indicate which statements best apply using a Likert scale. The survey will also have demographic questions related to gender, age, ethnicity, etc.
- You can skip any question that makes you uncomfortable, and you can stop at any time.
- You can determine whether you consent to your discussion posts being used as data for the study.
- Participants in this study are expected to complete the same course assignments and curriculum. That is, students will have completed the same (assigned) class activities regardless of participation in the research project.

What happens to the information collected for this research?

Information collected for this research will be used to generate findings and educational recommendations for publication and/or presentation. Your name will not be used in any papers or presentations. Although the results of the research will be used for publication and/or presentation, any identifying information you provide will remain confidential.

How will my privacy and data confidentiality be protected?

We promise to protect your privacy and the security of your personal information as best we can, although you need to know about some limits to this promise. Measures we will take include:

- Utilizing Qualtrics to administer the survey. The University of Memphis subscribes to Qualtrics and access to Qualtrics requires a university-issued username and password. Only the Primary Investigator will have access to the survey on Qualtrics.
- The survey link will be sent to participants' university-issued email addresses directly via Qualtrics. Students must use their university-issued username and password to access their email account.
- The settings in Qualtrics will be manually changed to ensure that participant Internet Protocol addresses are not collected.
- Individuals and organizations that monitor this research may be permitted access to inspect the research records. These individuals and organizations include the University of Memphis Institutional Review Board and the research team. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

Survey Only: Participant information will remain confidential. Survey data will be anonymous as the participant's name will not be collected and associated with their responses.

Survey and Discussion Posts: The participant's name will be collected in the survey to associate with



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their discussion posts; however, the data will be de-identified to ensure participant confidentiality and privacy. Pseudonyms for both the participants and the university will be used.

What if I want to stop participating in this research?

It is up to you to decide whether you want to volunteer for this study. It is also ok to decide to end your participation at any time. There is no penalty or loss of benefits to which you are otherwise entitled if you decided to withdraw your participation. Your decision about participating will not affect your relationship with the researcher(s) or the University of Memphis/Hawai'i. If, at any time, you wish to end your participation in this study, please send an email to Lauren Lum Ho at laurenlh@hawaii.edu.

Will it cost me money to take part in this research?

There are no costs associated with participation in this research study.

Will I receive any compensation or reward for participating in this research?

For taking part in this research, you will receive a \$10 electronic Amazon gift card.

Who can answer my question about this research?

Before you decide to volunteer for this study, please ask any questions that might come to mind. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Lauren Lum Ho at laurenlh@hawaii.edu, my advisor, Dr. Amanda Rockinson-Szapkiw at rcknsnsz@memphis.edu, or Dr. Kiriko Takahashi, the principal investigator, at kiriko@hawaii.edu. If you have any questions about your rights as a volunteer in this research, contact the Institutional Review Board staff at the University of Memphis at 901-678-2705 or email irb@memphis.edu. We will give you a signed copy of this.

You may also contact the UH Human Subjects Program at (808) 956-5007 or uhirb@hawaii.edu to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/6PA> for more information on your rights as a research participant.

STATEMENT OF CONSENT

I have had the opportunity to consider the information in this document. I have asked any questions needed for me to decide about my participation. I understand that I can ask additional questions through the study.

By signing below, I volunteer to participate in this research. I understand that I am not waiving any legal rights. I have been given a copy of this consent document. I understand that if my ability to consent for myself changes, my legal representative or I may be asked to consent again prior to my continued participation.

Name of Adult ParticipantSignature of Adult ParticipantDate



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Researcher Signature (To be completed at the time of Informed Consent)

I have explained the research to the participant and answered all of their questions. I believe that they understand the information described in this consent and freely consent to participate.

Name of Research Team Member

Signature of Research Team Member

Date

Please print or save a copy of this page for your reference.

APPENDIX K: PERMISSION FOR COMMUNITY OF INQUIRY GRAPHIC

Re: Requesting Permission to use Col Figure

D. Randy Garrison <garrison@ucalgary.ca>

Sun 9/25/2022 4:53 PM

To: Lauren Lum Ho (llumho) <llumho@memphis.edu>

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and trust the content is safe.

Lauren,
You have my permission to reprint the Col figure for your dissertation.
Best wishes,
DRG

Sent from my iPad

On Sep 25, 2022, at 8:51 PM, Lauren Lum Ho (llumho) <llumho@memphis.edu> wrote:

[ΔEXTERNAL]

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I am requesting permission to reprint the Community of Inquiry figure for my dissertation from your article, Critical inquiry in a text-based environment: Computer conferencing in higher education.

Thank you very much for your time and consideration. Please let me know if you need further information.

Best,
Lauren

Lauren Lum Ho, MEd, MSW



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APPENDIX L: PERMISSION FOR CONSTRUCTIVE CONTROVERSY GRAPHIC



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