(Meta) Cognitive Presence for Graduate Student Teacher Training

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Abstract

This qualitative study examines cognitive presence in a graduate-level online pedagogy course that introduced students to the Community of Inquiry (CoI) framework. Students wrote weekly reflections that described their own learning and speculated on how they could apply what they learned to create positive online learning environments for future students. This article focuses on a reflection students wrote about cognitive presence in which they analyzed their own engagement with the four phases of practical inquiry during the week they read articles that theorized cognitive presence. The results illustrate the value of metacognition about cognitive presence as a teacher training tool. The CoI framework gave students a vocabulary to describe their own learning and prompted them to reflect on when that learning was or was not visible to the instructor. This knowledge positively impacted their plans for designing learning environments to help their future online students move through the four phases of practical inquiry.

Keywords: Community of inquiry, cognitive presence, graduate student teacher training, online pedagogy, first-year writing

Stewart, M. K. (2023). (Meta) Cognitive presence for graduate student teacher training. *Online learning, 27*(4), 232-251. DOI: 10.24059/olj.v27i3.3416

The Community of Inquiry (CoI) framework (Garrison et al., 2000; Garrison, 2017) is commonly employed as a heuristic for instructional design (Shea & Bidjerano, 2009). Instructors use the three components of the CoI framework—teaching presence, social presence, and cognitive presence—to develop instructional materials and activities that leverage teaching presence to promote social presence in a way that facilitates cognitive presence. This study builds upon that work by using the CoI framework as a teacher training tool in a graduate-level online pedagogy course. More specifically, this study qualitatively analyzes an assignment asking graduate students to reflect on the extent to which they engaged in the four phases of cognitive presence (triggering event, exploration, integration, resolution) and then apply their own experiences as students to their plans for teaching online in the future. Ultimately, the study advocates for metacognition about cognitive presence as a teacher training tool.

Review of Relevant Literature

The Community of Inquiry (CoI) framework was constructed based on the findings of a content analysis of asynchronous discussion forums (ADFs). Randy D. Garrison and his co-authors, Terry Anderson, Walter Archer, and Liam Rourke, coded ADF transcripts in search of evidence that collaborative learning was viable in asynchronous online environments. They found evidence of students interacting with one another and concluded that knowledge co-construction was possible online, further concluding that three components were necessary to make that learning likely: teaching, social, and cognitive presence. Teaching presence is the instructional design that organizes an online course, social presence is the interpersonal interactions that make knowledge co-construction possible, and cognitive presence is the collaborative learning that ideally results from courses that are designed as communities of inquiry (Garrison, 2017).

Cognitive Presence

Garrison et al. (2001) explain that their research began with an assumption that education should be "both collaborative and reflective"; consequently, they sought to develop "the means to assess the nature and quality of critical, reflective discourse that occurs within a text-based educational environment" (p. 7). Their goal was to design a tool for measuring learning, and their first step was to look for evidence of "critical, reflective discourse" in an online course. Because most student-student interaction occurred within ADFs, they coded ADF transcripts, questioning whether those transcripts contained evidence of students not just interacting with one another, but interacting in a way that demonstrated knowledge co-construction.

Their findings led them to define "cognitive presence" as a component of the CoI framework. They grounded this construct in literature on critical thinking and operationalized it via Dewey's model of Practical Inquiry (1993), which includes four phases: the *triggering event* initiates the process, leading learners to engage in *exploration*. When their understanding of a concept begins to shift based on the results of that exploration, they experience *integration*. The process concludes when learners demonstrate their newly constructed knowledge via *resolution*. Garrison et al. also recognized that the process of critical thinking is not linear. While the four phases of practical inquiry are useful for measuring and discussing cognitive presence in online courses, they "must not be seen as immutable" (p. 9). Instead, students move between phases and may encounter new triggering events throughout the process.

In the two decades since Garrison and his colleagues' initial publications, many scholars have engaged with the Community of Inquiry framework (Swan & Ice, 2010; Garrison, 2017). Most of the research on cognitive presence either employs the CoI Survey or replicates Garrison and colleagues' methods of reporting the frequency counts that result from applying content analysis to code ADFs for the four phases of practical inquiry (Moore & Miller, 2022). In Sadaf and colleagues' recent "Advances in Cognitive Presence" special issue of *Online Learning Journal* (2022), the editors argue that, across the scholarship on cognitive presence, one consistent conclusion arises: "higher levels of cognitive presence can be achieved in the environments where cognitive presence phases based on the Practical Inquiry Model are intentionally incorporated into a learning task or the course design" (p. 3). This conclusion implies two goals of cognitive presence scholarship. The first is to measure the extent to which higher levels of cognitive presence (i.e., learning) occur, and the second is to understand and facilitate intentional instructional design strategies. Accordingly, this literature review first discusses scholarship on cognitive presence that aims to *measure learning*, and then discusses scholarship that *evaluates instructional design*.

Cognitive Presence as a Measurement of Learning

The primary goal of most cognitive presence research is to measure student learning, and this is often achieved through coding ADFs for the four phases of practical inquiry. In the initial article, Garrison and colleagues (2001) analyzed ADFs from a graduate-level course in Workplace Learning. They found ample evidence of exploration (42% of coded responses) but fewer instances of the other three phases (4-13% of coded responses). Subsequent research consistently confirms that exploration is often visible in ADFs, while the other three phases are less frequent; resolution is especially infrequently demonstrated in ADFs (Akyol & Garrison, 2011; Galikyan & Admiraal, 2019; Moore & Miller, 2022; Wilkinson, 2022). The general conclusion from this research is that the design of many ADFs do not require or invite resolution. This might be a teaching presence issue resolved by more intentional instructional design. Or it might be a constraint of the ADF, which may not permit time for the reflection required to facilitate higher levels of cognitive presence. The latter implies that ADFs can be a productive space for observing exploration—the sharing and comparing ideas—but they may not be the best space to observe the full process of practical inquiry.

Accordingly, some scholars look for resolution in final course projects instead of weekly activities like ADFs (Kim, 2016). In the specific case of teacher education, researchers also recognize that students may not have "had the chance to test a solution to an issue in their real-life teaching" (Galikyan & Admiraal, 2019, p. 5). Scholarship on learning transfer provides support for this point, indicating that the application of learning (i.e., resolution) may not occur until after a course is complete (Brent, 2011; Wardle, 2007).

Other scholars supplement their content analysis of ADFs with other methods, such as interviews and surveys to measure perceived versus actual learning (Akyol & Garrison, 2011), network analysis to measure the impact of learner interaction on academic performance (Galikyan & Admiraal, 2019), epistemic network analysis to study the relationship between social and cognitive presence (Rolim et al., 2019), and linguistic analysis to study "the psychological processes indicative of different phrases" of cognitive presence (Joksimovic et al., 2014, p. 4). These more complicated methods for measuring the nature and quality of learning in ADFs offer useful insights into the many factors that impact the learning that is (or is not) observable in ADFs. This scholarship also reinforces Garrison and colleagues' (2001) original

argument that cognitive presence is a *process*. Measuring learning via ADF transcripts, even when triangulated with other data, provides merely a snapshot of a moment in that process, and ADFs are always "a significantly less-than-complete record of the learning that has taken place" (Garrison et al., 2001, p. 13).

Like other CoI research, this study involved coding student writing for the four phases of cognitive presence with the goal of measuring the extent to which the students experience or engage with triggering events, exploration, integration, and resolution. There are two key differences between this study and previous scholarship. First, instead of examining ADFs, I code weekly reflections designed to help students metacognitively examine their learning in the course, including their assessment of whether they experienced the four phases of practical inquiry during an asynchronous discussion activity. Second, while studying cognitive presence in teacher training courses is not unusual, most previous research focuses on student learning in content areas separate from CoI. In my study, the course aims to teach future teachers about the community of inquiry framework so that they can apply the framework as a heuristic for instructional design. As such, this study not only uses cognitive presence to measure learning, but also measures students' learning *about* cognitive presence, as articulated in research question #1: "What does examining their own cognitive presence teach graduate students about learning?"

Intentional Instructional Design to Facilitate Cognitive Presence

The second research question goes beyond measuring whether and what students learned to also consider how they might apply that learning as future teachers: "To what extent can metacognition of cognitive presence serve as a teacher training tool?" This research question aligns with the second goal of cognitive presence research: evaluating instructional design.

Shea and Bidjerano (2009) are frequently cited researchers of this approach. They review several models for pedagogical training and conclude that CoI is optimal because it "focuses on the intentional development of an online learning community with an emphasis on the processes of instructional conversations that are likely to lead to epistemic engagement" (p. 544). To translate the CoI framework into an instructional design strategy, Shea and Bidjerano examined the relationships between the three presences as represented in CoI Survey data. Their findings show that teaching and social presence predict cognitive presence, and social presence is the mediating factor. Applied as a heuristic for instructional design, this means that instructors should begin with teaching presence, creating course environments that explicitly foster the types of social presence that will enable cognitive presence. When we focus more narrowly on cognitive presence, the instructional design heuristic is tied to the four phases of practical inquiry: teachers intentionally construct activities to facilitate triggering events, invite students to engage in exploration, guide students towards integration, and create opportunities for resolution.

Cognitive presence research in this area questions the extent to which specific activity designs are likely to facilitate cognitive presence. As with the scholarship on cognitive presence as a measurement of learning, most of this scholarship focuses on ADFs. Găsević et al., (2015) study scaffolding and ADF role assignment in graduate-level Engineering courses, Olesova et al., (2016) study scripted ADF roles in undergraduate Nutrition courses, Chen et al., (2019) study peer-facilitated ADFs in graduate-level Education courses, Kilis and Yildrim (2019) study scenario-based ADFs in undergraduate Information Technology courses, and Snyder and Dringus (2014) study metacognitive patterns and peer-facilitated ADFs in a graduate-level course on Communities of Practice. Less commonly, some scholars investigate activity design beyond the ADF. Kim and Lin (2019), for example, study supportive versus reflective

scaffolding in a mixed undergraduate and graduate-level course on instructional design; instead of ADFs, they examine students' performance on quizzes and writing projects. McCarroll and Hartwick (2022) also move away from ADFs, studying the extent to which instructors' lesson plans aligned with the four phases of practical inquiry. Across this literature, scholars consistently offer evidence for the critical role of teaching presence in facilitating cognitive presence. When activities are deliberately designed to lead students through the four phases of practical inquiry, including the types of questions/tasks and the level of peer or instructor facilitation, learners are more likely to experience cognitive presence.

The emphasis on deliberate and intentional instructional design provides a compelling argument for training teachers to employ the CoI framework as a heuristic for instructional design. Researchers like Rosser-Majors et al. (2022) have responded with studies that examine the effectiveness of "self-paced interactive training modules highlighting specific methods designed to enhance TP, SP, and CP in the online classroom" (p. 13). They found that "instructors' exposure to, and application of IP [instructor presence] practices in the classroom, positively and significantly affect course pass rates and drops, which in turn affect student success and retention" (p. 14). My project does similar work, but through a smaller-scale qualitative study, like Ozogul and colleagues' (2022) case study of an online course that was deliberately designed to foster cognitive presence. They conducted a linguistic analysis of students' posts to ADFs, then interviewed students about what kept them cognitively engaged in the course. They ultimately recommend that instructors "encourage self-expression and frequent opportunities to reflect on [students'] perceptions of the course" (p. 50), and that researchers solicit "detailed qualitative feedback from students" instead of relying on survey data (p. 50).

In my study, I not only deliberately designed a course with the goal of fostering cognitive presence, but I also aimed to teach students about CoI as an instructional design heuristic. My students read about the CoI framework throughout the course and used what they learned to design their own instructional materials. I also asked students to reflect on the ways in which my design of the course enacted the theory of CoI, and to reflect on the extent to which the theory of CoI helped them make sense of their personal experiences as learners. Near the end of the course, students analyzed the extent to which they did or did not engage with the four phases of cognitive presence, and then reflected on how this knowledge might inform their future approaches to instructional design. This study analyzes those students' reflections about cognitive presence to examine metacognition about cognitive presence as a tool for teacher training.

Research Questions

1. What does examining their own cognitive presence teach graduate students about learning?

2. To what extent can metacognition of cognitive presence serve as a teacher training tool?

Methods

This IRB-approved teacher-researcher study qualitatively examined reflective writing that 19 graduate students produced during two sections of an online writing pedagogy course that I taught in Spring 2020 and Summer 2020.

Research Context

The course, Hybrid and Online Writing Pedagogy, was offered to students pursuing doctoral degrees in Composition and Applied Linguistics at a four-year public institution in the Mid-Atlantic region of the United States. The readings and major projects for both sections were largely the same, but course designs varied.

- The Spring 2020 course began as a hybrid class, with alternating face-to-face, asynchronous, and synchronous online meetings. In response to the COVID-19 pandemic, the course was converted to alternate between synchronous online and asynchronous sessions. The students composed reflections during the asynchronous weeks of the 14-week course.

- The Summer 2020 course was initially scheduled to be face-to-face but, on account of the pandemic, was designed as an emergency remote course. Each week of the 4-week course included asynchronous discussion forums, a group project, an optional synchronous video chat, and an individual reflection.

The dataset for this study includes students' final reflections, submitted in week 13 of the spring semester and in week 4 of the summer course.

Both groups of students were asked to submit a 400-500 word reflection that responded to this prompt:

> Analyze your experience this week in light of the four phases and related indicators of cognitive presence. Did you engage in all four phases? How do you know? Can you point me to a particular moment in the online forums where I could see evidence of this learning? What elements of the learning can I *not* see?

Prior to completing the reflection, students participated in an ADF that asked them to locate a sample teaching philosophy, create a forum post that analyzed the philosophy, and then respond to two peers. The goal was to collectively generate an understanding of the genre conventions for teaching philosophies. The Spring students additionally completed a second asynchronous activity by posting a draft of their teaching philosophies and engaged in peer review. The Summer students did not draft and peer review philosophies.

Participants. After each course was complete and final grades were submitted, I emailed the students and invited them to participate in the research study. A total of 21 students consented, 7 of the 8 Spring 2020 students and 14 of the 15 Summer 2020 students. Participation entailed granting me permission to download and analyze their weekly reflections. Two of the Spring students did not submit their final reflections, so this article analyzes 19 reflections, 5 from spring and 14 from summer.

Students who consented to participate in the study were also invited to complete a demographic survey. They selected pseudonyms and were instructed to skip any questions they did not wish to answer. Students also had the opportunity to indicate that they did not want any demographic information disclosed; I will refer to the three students who selected this option as

Participant 1, Participant 2, and Participant 3. Table 1 summarizes the self-reported demographic data and includes Participant 1, Participant 2, and Participant 3 in the "not reported" percentages.

Table 1

Participant Demographics

Section	**69% summer 2020** **31% spring 2020**
Year in PhD Program	5% first year 70% second year 10% third year 15% Not Reported
Gender Identity	75% female 10% male 15% Not Reported
Racial Identity	40% Caucasian 10% Asian 10% Arabic 5% Latina 35% not reported
Ethnic Identity	30% American 30% Middle Eastern 15% International-Confidential 10% Southeast Asian 15% Not Reported
Number of Languages Spoken	25% three or more languages 55% two languages 5% one language 15% Not Reported
Age During Course	40% age 27-32 15% age 33-37 30% age 38-48 15% Not Reported
Prior Experience with Online Learning or Teaching	25% limited experience 35% some experience 25% substantive experience 15% Not Reported

Note: These data were reported through open-ended questions on the survey which I organized into the broad categories in Table 1 to protect participant confidentiality.

Most participants identified as female (75%) and spoke more than one language (80%). Participants also represented a variety of ethnicities (30% American, 30% Middle Eastern, 15% International-Confidential, and 10% Southeast Asian) and age ranges (40% between 27-32 years of age, 15% between 33-37, and 30% between 38-48). Finally, participants differed in their previous experience with online learning: 25% reported limited experience, 35% reported some experience, and 25% reported substantial experience.

Data Analysis. To qualitatively analyze the student reflections, I engaged in a multi-step coding process. First, I descriptively coded the weekly reflections in Dedoose, a qualitative data

analysis software. This led me to realize that the final reflections offered an unusual insight into cognitive presence as a tool for teacher training. I then revisited the CoI literature, beginning with three articles that had previously shaped my thinking about cognitive presence: Garrison et al., (2001), Shea and Bidjerano (2009), and Akyol and Garrison (2011). I also searched for recent articles about cognitive presence in *Online Learning Journal*, *Internet and Higher Education*, and *Computers & Education*.

After reading the literature, I engaged in deductive coding of the 19 reflections, seeking instances of student discussion about the four phases of practical inquiry (triggering event, exploration, integration, and resolution). My intention was to document not only how students defined the phases, but also how their understanding of the phases was impacting their future plans as instructional designers. This process resulted in five coding categories: triggering event, exploration, integration, resolution, and CP for teacher training. I exported the excerpts and drafted narrative explanations of how students described each category. The integration of excerpts into a narrative led me to identify several sub-categories for each code and, due to a high amount of code co-occurrence, to collapse exploration and integration into a single code category. I used the results to create a code book which guided a third round of coding in Dedoose. I conducted a fourth and final coding pass during the revise and resubmit process for this article, which resulted in a few minor modifications to the code book and the final frequency counts listed in Table 1. The frequencies describe how many participants mentioned each concept at least once in their reflection.

Table 1

Final Code Book with Frequency Counts

Triggering Events (n=19)	**Discussion forum prompt (n=17)** **Interacting with peers (n=7)**
Exploration/Integration (n=17)	Locating a Teaching Philosophy (n=11) Drafting Posts (n=10) Reading & Responding to Peers Posts (n=15) Exploration/Integration Overlap (n=7)
Resolution (n=18)	Activity-Level Resolution Achieved in forum (n=7) Somewhat achieved, but not visible, in forum (n=5) Achieved when drafting/revising teaching philosophy (n=5) Course-Level Resolution (n=6) Beyond-Class Resolution (n=4)
Cognitive Presence for Teacher Training (n=16)	CoI as Heuristic for Instructional Design (n=12) Not All Learning is Observable (n=12)

Limitations. Like all small-scale qualitative research, this study is limited to its context. Some of that context is like other CoI studies, that is, students were pursuing graduate degrees, the class sizes were small, and the class content focused on pedagogy/teacher training. Unlike most CoI research, however, these students had pre-existing, face-to-face relationships because they were part of a face-to-face graduate program. This dataset also represents a predominantly international and multilingual student population.

This study is additionally limited by the nature of the data and the methods for data analysis. The reflections are ostensibly accurate representations of students' experiences in the course, but it is entirely possible that students were influenced by social desirability. While

reflections were not evaluated for quality, completing them contributed to the students' course grade and, as such, their awareness of my role as an authority figure may have influenced their responses. When analyzing this data, I engaged in qualitative coding as a solo researcher, which means I am unable to report inter-rater reliability.

Finally, this study is unusual because it took place during the COVID-19 pandemic. While I intended to design the courses in the hybrid format to give students experience with online learning in their online pedagogy course, the spring section was disrupted mid-semester by the pivot to emergency remote instruction, and the summer section was redesigned into a fully online format because of the pandemic. Students' reflections on their own experiences as online learners in the middle of a pandemic may have heightened their awareness of how tools like the CoI framework can inform their future work as online instructional designers. Replications of this pedagogical strategy are necessary to determine if similar levels of metacognition are achieved in less extreme educational environments.

Results & Discussion

This section characterizes students' experiences with the four phases of practical inquiry, first measuring what they learned about cognitive presence (RQ1) and then evaluating how this learning impacted their plans for instructional design (RQ2).

> *RQ1: What does examining their own cognitive presence teach graduate students about learning?*

To answer this question, I coded students' written reflections according to the four phases of practical inquiry. I used the results to define and discuss the four phases, demonstrating how the students' self-examination impacted their understanding of how learning happens. By putting these findings in conversation with existing literature, I also expand and complicate definitions of the terms in CoI scholarship.

Triggering Events

All of the students (n=19) discussed or described triggering events in their reflections, with the majority (n=17) explaining that the asynchronous discussion forum (ADF) prompt served as a triggering event. As Stephanie wrote, "the triggering event is the assignment in which we were asked to analyze a teaching philosophy." Or, as Enna put it, "the trigger[ing] event for the class this week was the discussion board post asking us to find a teaching philosophy statement." Some students additionally acknowledged the instructor role in designing that prompt; Gabriella noted, "you, as the instructor, decided on these tasks" while Nina commented, "the first assignment definitely was a triggering event due to the way it was designed by the instructor." For Lana, the instructor's role was actually a hinderance to learning, as she states, "at the beginning I thought that I was engaged in the four phases but when I thought of it for the second time, I am not sure if I did engage in all of this. This is because the trigger[ing] event, which is the task, was not my choice but it was created by Dr. Stewart." Lana recognized that the task was required for a class, which she believed limited her potential to fully engage in practical inquiry.

Lana's insights help explain why the prompt was not the only triggering event the students described. Several students (n=7) additionally argued that they encountered additional triggering events during the week as a result of interacting with peers. As Ava wrote, "in writing

my discussion and then the replies to it, I found that a new issue had come up—a more specific triggering event." Or, as Participant 2 wrote, "seeing the philosophies that others in the class had analyzed caused me to restart the cognitive presence cycle." Some of the Spring students also noted that the second activity, in which they submitted their teaching philosophies for peer review, prompted triggering events. Any noted, "I knew that my draft would be reviewed by Lana, and I will engage in the whole phases of cognitive presence again." For Cassia, the act of reviewing others' work was the trigger: "reviewing my partner's teaching philosophy provided me with another 'triggering event.'"

The process of identifying triggering events for their own learning helped these future online instructors understand the complexity of triggering events. They can occur as specific moments that initiate learning (an ADF, a weekly reflection, a response to a peer), or as overlapping and nonlinear events that are defined by both in-class and out-of-class contexts. This finding corroborates CoI scholars' arguments that learning is a process that cannot be fully captured in a single discussion forum (Garrison et al., 2001) and complicates our understanding of triggering events—they might be "wicked problems" (Marback, 2009) that require complex collaboration to solve, but can also be required classroom tasks that spark unexpected questions within and beyond the classroom. The implication for instructors and CoI researchers is to determine what kinds of short- and long-term triggering events a particular activity or assignment or course is aiming to induce.

Exploration and Integration

Two students (Sarah and Jacky) did not explicitly discuss exploration or integration in their reflections, but the other 17 students did. When they wrote about exploration and integration, they described the process of locating a teaching philosophy (n=11), drafting their own posts (n=10), and reading/responding to peers' posts (n=15). Several students also often described overlaps between the two phases (n=7), which is why I present them together in this section. This decision also mirrors other qualitative research on cognitive presence, which finds overlaps between exploration and integration (McCarroll & Hartwick, 2022). My

Many of the students (n=11) described locating and analyzing a teaching philosophy as the catalyst for exploration. Jack wrote, "the exploration phase started when I looked for a statement to analyze its rhetorical moves and content." Ava similarly explained that "exploration in this activity involved figuring out what makes an effective and successful teaching philosophy." While most students characterized this analysis as exploration, a few described it as integration. Stephanie explained, "I rejected a number of teaching philosophies before I found one that felt similar enough to my background and expertise to be a good fit for analysis. The analysis helped move me from exploration to integration because I was looking at discourse level features of the text and connecting them with my existing background knowledge of my field." Students in this study tended to characterize locating and analyzing a philosophy as closer to exploration than integration, but they also perceived overlap between the two phases.

Several students similarly described the process of drafting their forum posts as part of the exploration and/or integration process (n=10), with more students characterizing this as integration than as exploration. Like Stephanie, Participant 2 described integration as analyzing the philosophy, which culminated in writing the forum post: "I engaged in the third phase, integration, as I assessed the philosophy and constructed an analysis discussion post." Or, as Carl more succinctly stated, "the integration involved writing my response." For others, drafting the

response simultaneously involved exploration and integration. Enna noted that "exploration and integration phases started when I wrote my own analysis…and posted it."

In addition to locating/analyzing philosophies and drafting forum posts, the majority of students described reading and responding to peers' work (n=15) as exploration and/or integration. When they described this process as exploration, they tended to focus more on reading than on responding to peers, which seemed to be due to reading their peers' work before posting their own. As Ava explained, "even before posting my discussion, I shifted to the social part of exploration and read through what others had written to begin to see what they believed made a philosophy effective." Lana had the same experience: "I was not sure how or what to write in the discussion. I took a look at Nina's post and I was able to understand what to write. I believe these are all examples of the exploring phase."

After their own responses were posted, they tended to describe reading and responding as an act of integration. Gabriella explained, "I see peer responses to peer responses as a form of integration because of their intended purpose to reflect on and intuitively synthesize the all perspectives." Or, as Stephanie wrote, "as colleagues posted their responses and interpretations of my post in comparison with their own, I was able to integrate new understandings of what makes a teaching statement effective." This finding aligns with McCarroll and Hartwick's (2022) recommendation to facilitate integration during asynchronous activities that require students to respond to peers.

While most students gravitated towards integration when describing their experience of responding peers' posts, Enna described a process that involved both exploration and integration:

> When I went back into the discussion forums…I found that I had analyzed the same teaching philosophy as Elsae. I had one of those moments where I felt a sense of panic—reading Elsae's analysis—that I was wrong in my own. But part of exploration was then re-reading the teaching philosophy, my analysis, and Elsae's analysis again in a sort of three-way conversation. The act of synthesizing those three voices helped me puzzle out what I valued…I wasn't necessarily wrong; I was figuring out what I value and how I would present my own statement to certain audiences. Integration also happened when I considered what Elsae valued in the statement that I actually missed myself. Then, when I read Jacky's feedback about the philosophy and read others, I was able to solidify in my mind why I tend to value teaching philosophy statements that are student-centered over teacher-centered.

For Enna and several of her peers (n=7), exploration and integration happened simultaneously. If pushed to differentiate between the two, they characterized exploration as the search for and discovery of new ideas, and integration as a shift in understanding, but tended to describe these behaviors as two sides of the same coin. Elsae explains it well:

> The model is dynamic. Moving through the process at any phase puts the trajectory…in multiple phases at any given moment. For example, right now I am working on deciding which pieces of evidence to include to demonstrate a component of analysis. This could be considered part of exploration and integration. Once I make the decision, resolution has taken place, but if I choose to edit some evidence I initially included, I am back into other components of the cognitive presence.

These students describe both exploration and integration as processes that involve overlapping individual and social actions. Exploration occurs when they locate and read and write responses about what they have read, and it also occurs when they read and respond to their classmates' posts. Integration occurs when they put their experiences in conversation with the texts they read, as well as when their thinking is challenged and changed by their classmates. The iterative and overlapping nature of these cognitive processes make them difficult to pin down in a specific, observable moment, hence the challenges described by previous CoI scholars in measuring cognitive presence (Moore & Miller, 2022). This discovery was important for these future online instructors because it provided a concrete example of the ways that heuristics like CoI do not capture the non-linear nature of learning. Instructional designers use the four phases of practical inquiry (and the three presences of CoI) to conceive of activities and organize courses (Rosser-Majors et al., 2022), but these models are much tidier than the actual student experience (Ozogul et al., 2022).

Resolution

As with their discussions of triggering events and exploration/integration, the students in this study described resolution as a complex, multi-faceted phenomenon. Their descriptions of personal experiences with resolution can also be categorized into activity-level resolution (weekly discussion forums, future class activities), course-level resolution (final projects), and beyond-classroom resolution (future courses, future teaching).

Most students talked about activity-level resolution as it related to discussion forums. Seven students argued that they experienced resolution in the forum, describing the ways their forum posts or replies to peers' posts expressed what they had learned from reading and analyzing teaching philosophies. Any explained, "I mentioned what I learned from the teaching philosophy samples and analyses and how I would integrate them into my own philosophy." For Cassia, the resolution was more present in replies to peers: "in suggesting…feedback for revision, I also had to make use [of] my own understanding of rhetorical moves." Some students seemed confident in their conclusions about resolution, but others hedged. For example, Lana wrote, "I am not sure about the resolution phase but I believe that posting the analysis and the peer review I did are good examples of showing what this experience taught me and which I shared with the class." Others struggled to differentiate between integration and resolution. Participant 2 wrote, "resolution occurred when I responded to posts about the other teaching philosophies (or maybe the responses are still considered part of the integration phase?)" These students' difficulty in concretely identifying whether they experienced resolution in the discussion forums echoes the CoI research that reveals limited evidence of resolution in ADFs (Akyol & Garrison, 2011; Galikyan & Admiraal, 2019).

A few students in this study directly reflected on that difficulty of observing resolution in asynchronous discussion forums (n=6). Carl writes:

> I wouldn't have considered my response pure resolution…. I find my post is a way for me to discover what I think. I usually submit what feels like a complete post, but I also read other posts, on all the readings to check my beliefs and understandings with my classmates. After that, I usually revisit the texts to identify quotes or ideas they analyzed that I didn't remember or focus on. At that point, I organize my weekly notes with a synthesized understanding of what's been said. I'll usually copy and paste parts of

> responses I like and might add a few of my thoughts if something comes to mind. This document serves more as my resolution of inquiry because at that point it's time to move onto the next focus, and also at that point, I feel more confident in my understanding. I'm ready to explore the next idea.

For Carl, the nature of the ADF, which is "a way for me to discover what I think," makes it unlikely for him to reach resolution through drafting and submitting a post. Instead, his resolution, which he characterizes as the moment that he is "confident in [his] understanding" and "ready to explore the next idea," occurs after he has read his classmates' posts, revisited the readings, and written in his personal notes sheet.

Carl does not believe that resolution will be visible in his ADF posts, but he describes achieving a sense of resolution—at least enough to move on to the next idea. The important caveat is that this resolution exists in his notes sheets and individual thinking, not in the artifacts submitted for instructor to review. As Carl put it, "I don't reveal my notes to the class." Phoebe added that, just as instructors cannot see notes, they are often unaware of the conversations students have outside of class; she felt that "most of my learning happened outside of the course LMS in one-on-one conversations" with peers. Nina made a similar point, arguing, "this last stage is also hard to track, since my own resolution could be based off not only what I have learned from the sequence of tasks but from my other experiences of learning in other courses, readings, and so on."

In addition to the discussion forum, the Spring students in this study had a second activity: posting a draft of their teaching philosophy for peer review. The majority of those Spring students (4/5) explained that they would achieve resolution during that second activity. Nina wrote, "the task of writing our own philosophies was set up as a resolution, because based on the previous activity, our prior knowledge, our collaborate replies to each other about philosophies, I was able to implement some of the previously experienced aspects of the genre." Cassia similarly explained that writing her own philosophy involved resolution because she "had to apply [her] consolidated understanding of appropriate rhetorical and genre awareness." Or, as Any put it, "when I revised my teaching philosophy to be reviewed, I tried to integrate what I learned previously in the analysis…. By doing this, I perhaps engaged in the phase of immediate resolution." Summer students were not required to submit a teaching philosophy for peer review, but one student still commented that she expected to experience resolution through the drafting and revising of her teaching philosophy: "resolution came from the insights I developed and will take back to revising my own teaching statement." I suspect more summer students would have made this argument if they had been required to write a philosophy for the class.

Any's comment that she was experiencing "immediate resolution" is also important—she understands the weekly activities as one cycle of cognitive presence, which she expects will be restarted as the class progresses. Other students described something similar, suggesting a distinction between activity-level and course-level resolution. The students in this study described course-level resolution as something that occurs in the final project (n=6) and tended to describe this as an alternative to activity-level resolution. Gabriella wrote, "I am not sure if I will get to the resolution phase in relation to the specific activities this week…. I suppose resolution in our case is our application of these ideas to our final projects/papers." Enna similarly noted, "I do not think you will see resolution, for me at least, in the posts. But I do think you will see it in the final paper." In contrast, one participant saw course-level resolution as something that occurs in addition to (and perhaps because of) activity-level resolution.

Participant 1 characterized the ADFs as a "'testing' version…[that] will allow you to identify the level of knowledge acquired from the initial activities of the course scaffolded through to its end in the new context of the final project." This finding corroborates McCarroll and Hartwick's (2022) recommendation that teachers scaffold resolution throughout a class: "when the resolution phase carries over into subsequent, graded activities, the teachers should articulate and make explicit connections for the students the value of practice in lower stakes assignments…in relation to performance on higher stakes assignments" (p. 93-94).

Other students understood the course as something that would scaffold towards learning outside of class, which I am calling beyond-class resolution (n=4). Gabriella speculated that resolution might occur in a future course: "Next semester, I will be taking Dr. [Name]'s Teaching Writing course and I do wonder how my exploration and integration in this class at the moment may inform the teaching philosophy and/or the course syllabus we design in that course." Phoebe looked further into the future, reflecting, "I know I will find resolution in terms of the paper as a deliverable, but I feel like it will take until I have started teaching online using what I learned in this course to understand who I am as an online teacher."

Reflecting on resolution is a critical part of learning about cognitive presence because it prompts instructors to question the role and purpose of assessment. The students in this study understood learning as an ongoing process and suggested that a teacher's job is not to certify that learning is finished but to confirm that the ongoing process of learning has been stimulated. The goal is to create activities and assignments that stimulate additional triggering events, explorations, and integrations which are temporarily resolved and then re-triggered in the future. In the case of ADFs, this involves recognizing that prompts may or may not lead to activity-level resolution (discussion forums, future class activities), course-level resolution (final projects), or beyond-class-resolution (future courses, future teaching). As Any concluded, "reflecting on these processes is pretty complicated. I was not even sure about the phases of my own cognitive presence. But then perhaps critical inquiry is all about interrogating and complicating experiences to keep pushing boundaries and not to stay in the same state, especially in education when the purpose is to change one's ways of thinking." Future research might explore this further by putting the concept of resolution in conversation with scholarship in the learning sciences that differentiates between "near transfer" and "far transfer" (Brent, 2011, p. 397).

More broadly, the findings related to Research Question 1 contribute to existing conversations about cognitive presence by providing a qualitative account of the complicated and overlapping nature of the four phases of practical inquiry. In this way, the study responds to calls for research that moves beyond survey data and content analysis to contextualize students' experiences of cognitive presence in communities of inquiry (Ozogul et al., 2022; Sadaf et al., 2022).

RQ2: To what extent can metacognition of cognitive presence serve as a teacher training tool?

In addition to understanding what students learned about the four phases of cognitive presence, this study aimed to understand how engaging in metacognition about cognitive presence can serve as a teacher training tool. The data indicate that asking students to analyze their own engagement with cognitive presence as a culminating activity in a course that explicitly teaches students about the Community of Inquiry framework is an effective way to

train student-teachers to use CoI as a heuristic for instructional design (n=12). The data additionally illustrate that the activity taught participants that not all learning is visible (n=12).

CoI as Heuristic for Instructional Design

In their final reflection of the course, most students reported that studying the CoI Framework in an online pedagogy course was an effective teacher training strategy (n=12). Carl wrote, "I am sold on CoI…. I'm going to keep analyzing my courses within that framework." Elsae noted, "I am interested in doing more with improving my teacher presence and cultivating relationships with students." Or, as Jacky put it, "I managed to emerge at the end of this condensed course as an informed teacher: someone on the right path. I still have so much to learn and do, but I have a solid foundation and feel more informed about the theoretical frameworks that inform my design and my pedagogical practices." For these students, learning about CoI in an online pedagogy course gave them a vocabulary to analyze and enact their own instructional design as future online educators.

Several students additionally noted that the course was effective because of multiple layers of modeling. Students studied about online learning in an online environment and studied about CoI in a course designed to function as a CoI. As Participant 3 explained, "the course was a good learning experience for me because it helped me see what taking a course online may feel like for my students." The fact that the course was designed to function as a community of inquiry "in both design and application, as well as in how you interacted with us" (Jacky), deepened the students' experience. As Participant 3 put it, "the assignments you gave helped me think of how the theories and the ways you model the concept in our course relate to one another and my teaching."

Jessica was particularly aware of the role of modeling in the final reflective assignment. She explains:

> I noticed the last post I am more in the exploration process as I start to think of how I can incorporate Community of Inquiry and student-centered course design. So, it is clear you can see the learning evolve in the discussion posts. Dr. Stewart, is this part of the cognitive presence thing? You are asking us to investigate our learning trajectory and use the practical inquiry model to help us understand how a[e]ffective the course was? I see what you are doing here! I am kidding, but it is exciting to see my learning experience through the practical inquiry mode. The light bulb just turned on with this weekly reflection.

Enna, who had a similar experience when working to describe the resolution that I could not see in the forums, said, "I think the resolution that you will not see…are the notes I have taken about my course shell and materials…that I still want to change and revise to enact aspects of CoI that I would not have realized without the teaching philosophy statement. Come to think of it, I think your assignment also facilitated some significant learning transfer there as well. Cool." What made cognitive presence an effective teaching training tool was that they not only read and talked about the concept, but they also experienced an online course designed to facilitate cognitive presence, and they applied what they had learned and experienced to a self-assessment of their own experiences with the four phases of practical inquiry.

This finding corroborates Alwafi (2022), who asked MA-level online students to engage with feedback-based learning analytics, which made them aware of their "level and quality of interaction and their role in building knowledge in an online learning community" (p. 80). The students who became metacognitively aware of their learning experienced higher levels of cognitive presence than their peers who did not interact with learning analytics. While my study does not include a control group, it does similarly suggest that metacognitive awareness of CoI enhanced participants' understanding of the framework and their plans for using CoI as an instructional design heuristic in the future.

Not All Learning is Observable

In addition to learning about the CoI framework and coming to see this framework as a valuable heuristic for instructional design, the students in this study articulated another key take-away from the course: not all learning is observable (n=12). This conclusion was prompted by my question in the reflective writing prompt, "Can you point me to a particular moment in the online forums where I could see evidence of this learning? What elements of the learning can I *not* see?" In response, the students described instances of non-observable learning related to all four of the phases of practical inquiry.

- **Triggering Event**. Stephanie wrote, "although you created the triggering event in the form of the assignment, you couldn't know how students would take up that task. Would they select the first teaching philosophy they found? Would they spend time conducting a cursory analysis of multiple philosophies before they found one that was a good fit?"
- **Exploration**. After describing her process for locating teaching philosophies, Lana concluded, "these are all examples of the exploring phase which Dr. Stewart as a teacher cannot see"; Any similarly wrote, "I think I engaged in exploration, and I think this was not observable" and Participant 1 stated, "the exploration phase is not detectable in the online forums themselves."
- **Integration**. Gabriella reflected that "integration, or the meaning-making construction that follows our exploration, is not easily visible and often inferred," while Carl noted, "I think it's challenging to actually see evidence of the discourse that is involved with integration."
- **Resolution**. As described in the findings related to RQ1, many students felt that resolution was un-observable, either because resolution existed in private notes that were not shared (e.g., Carl), or because resolution is not likely until after the course is complete (e.g., Phoebe), or because resolution was impacted by external factors (e.g., Nina).

Some students also reflected on the difficulty of observing learning in general. Cassia commented that "the element of learning that cannot be seen here is probably the kind of personal understanding or tacit knowledge that is difficult to articulate or demonstrate." Stephanie similarly noted that, "unfortunately, a great deal of the learning process is obscured to teachers." She argued that part of why the learning process is obscured is because teachers don't know how students will interpret their activity prompts, and notes that sometimes good learning occurs when students veer away from instructor expectations. She further speculates that "off-topic remarks" might actually be "more indicative of exploration/integration/resolution because…[they show] students making an attempt to accommodate and adapt to new information

in existing schemas." Jacky provides an example of this when she comments, "what I am trying to say is that I might not have gotten out of that reading what you had intended for us to get, but I did engage with it in a critical way. It did trigger my critical tendencies and prove to be a great learning experience for me."

These findings contribute to existing scholarship by showcasing the value of metacognition about cognitive presence as a teacher training tool. Analyzing their own experience with cognitive presence can help student-teachers design activities that intentionally guide students towards the four phases of practical inquiry. Such analysis also helps teachers recognize that they will not have full knowledge of how their students engage with the course, including whether they fully experience community-based inquiry. The goal of instructional design is to create environments where transferable learning is possible, but course facilitators must also be prepared to pivot in response to their students' interpretations of that course design and be comfortable with not knowing exactly what the students take away from the course.

Conclusion

This study examined students' self-reports on their engagement with the four phases of practical inquiry. The results illustrate a complicated conception of cognitive presence. Triggering events can take the form of a discussion forum prompt, but they can also occur when students' curiosity is piqued as they read their classmates' posts, read for other classes, and see overlaps between course content and their lives. Exploration and integration are simultaneously individual and social actions difficult to parse, and that difficulty highlights the non-linear and iterative nature of learning. Resolution can take the form of activity-level, course-level, and beyond-class resolution; it is also difficult to observe because learning is a process that builds upon itself as students resolve one idea only to proceed to the next. These findings reinforce CoI arguments that critical thinking is a non-linear process that requires students to move between the phases of practical inquiry (Garrison et al., 2001).

This study also demonstrates the value of focusing on the theory of CoI in an online pedagogy course and of guiding students to use the four phases of practical inquiry to analyze their own experience with cognitive presence in the course. Previous scholarship argues that participating in an online course when learning about online pedagogy is beneficial (Cook, 2007). This study additionally illustrates that participating in an online course designed to function as a community of inquiry while learning about the CoI framework as an instructional design heuristic creates ample opportunities for metacognition and learning transfer.

Declarations

The authors declare no conflicts of interest for this study.

The authors declare no funding sources for this study.

*Human subjects approval for this study was granted by Indiana University of Pennsylvania, USA where the research was conducted—data analysis and findings were written at the author's current institution.

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