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Reducing Cognitive Load: Applying the Community of Inquiry (CoI) Framework to LMS Discussion Boards

By [Carrie Dickison](#), Wichita State University

<1>In the months following the shift to remote learning in March 2020, instructors have been inundated with resources to help them navigate teaching during the COVID-19 pandemic. At the beginning of the pandemic, publications like *Inside Higher Ed* and *The Chronicle of Higher Education* put out guides for how to migrate courses online. At my institution, Wichita State University (WSU) in Kansas, the instructional design team developed a beginner's guide to remote instruction as well as dozens of tutorials showing faculty how to navigate Blackboard, Zoom, Panopto, and other educational technologies. On social media, instructors continue to exchange tips on using Zoom features, captioning video lectures, and structuring group projects in an online environment.

<2>However, few of these resources provide a robust theoretical framework for designing and teaching online or blended courses, especially in composition and literature. The Community of Inquiry (CoI) framework can help fulfill this need with attention to equity. First proposed in 1999 by D. Randy Garrison, Terry Anderson, and Walter Archer, the CoI framework theorizes three interconnected aspects of online learning: social presence (the formation of community); teaching presence (the design, facilitation, and direction of learning); and cognitive presence (the construction of meaning through interaction). Since its initial proposal, CoI theory has become a foundational framework for digital pedagogy scholars. For example, Michelle Miller's *Minds Online: Teaching Effectively with Technology* (2014) draws on the idea of social presence, and Flower Darby and James M. Lang's *Small Teaching Online: Applying Learning Science in Online Classes* (2019) cites the CoI framework as a model for structuring student interactions (Darby and Lang 82).

<3>I first encountered the CoI framework at the 2019 Conference on College Composition and Communication (CCCC) in a workshop sponsored by the Online Writing Instruction (OWI) Standing Group. CoI seemed especially relevant to me since my position includes designing the curriculum for my department's online first-year composition courses, training the graduate teaching assistants (GTAs) and adjunct instructors who teach these courses, and teaching my own online courses. Although I was familiar with the CCCC Position Statement of Principles

and Example Effective Practices for OWI, most of my instructional design training was limited to the Quality Matters (QM) rubric. The QM rubric, which de-couples course design from course delivery, is based on the principle of alignment, encouraging course developers to align course content, activities, and assessments with measurable learning objectives.⁽¹⁾ While I found aspects of the rubric useful, I was eager for a framework that explicitly addressed critical thinking. As a result, I was drawn to the emphasis CoI theory places on the collaborative construction of meaning through critical inquiry in online classrooms.

<4>My interest took on a new urgency in March 2020 when my institution moved to remote instruction in response to the COVID-19 pandemic. As online coordinator for my department, I provided technical support and training for instructors in our first-year composition sequence, most of whom are graduate assistants teaching two courses a semester or adjunct instructors teaching up to four courses a semester. I also developed a hybrid curriculum for WSU's first-year composition sequence that was used in Fall 2020 and Spring 2021, and I continued to support instructors responsible for these classes as they adapted their instructional practices to meet the unique challenges posed by the pandemic. The CoI framework provided a valuable theoretical foundation for my work. Instead of seeking to duplicate the structure of our face-to-face classes in a remote setting, I focused on using digital tools to foster community, guide students through the learning process, and facilitate meaningful interaction, and I encouraged the instructors I supported to do the same.

<5>In this essay, I introduce the CoI framework and highlight key texts and resources that instructors may find useful as they respond to similar challenges. I pay particular attention to research and resources that apply CoI theory to LMS discussion boards and provide concrete examples of how I have drawn on the CoI framework when designing LMS discussion boards. In my experience, LMS discussions are one of the most challenging aspects of online learning, and they are playing an increasingly important role in the pandemic classroom. When designing LMS discussions, online instructors negotiate the often-competing goals of providing students with clear expectations and promoting spontaneous, free-flowing dialogue, which is difficult in a highly structured environment. As critical digital pedagogy scholars Sean Michael Morris and Jesse Strommel note, detailed rubrics and draconian rules about the length and frequency of posts can turn discussion forums into "bus stops" with participants "stopping by, saying a few words, and going on their way" (87). By focusing on the twin goals of establishing community and engaging students in the critical inquiry process, CoI theory provides instructors with a framework for navigating these challenges and promoting their students' deeper engagement with LMS discussions boards.

The Community of Inquiry (CoI) Framework

<6>CoI theory is grounded in a social-constructivist understanding of learning that privileges the collaborative construction of meaning.⁽²⁾ As discussed above (and seen in Fig. 1), the CoI framework emphasizes three interrelated core elements: (1) social presence, (2) cognitive presence, and (3) teaching presence. The first element, social presence, addresses "the ability of participants to identify with a group, communicating purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities" (Garrison, *E-Learning* 23). The second element, cognitive presence, considers "the

extent to which learners are able to construct and confirm meaning through sustained reflection and discourse” (Garrison et al., “Critical Inquiry” 89). The third and last element is teaching presence, which includes instructional design and organization, facilitation of discourse, and direct instruction. Teaching presence provides “the essential leadership dimension that keeps a learning community functioning effectively and efficiently” (Garrison, *Thinking Collaboratively* 61). To borrow Garrison’s metaphor, social presence can be understood as the soul of a community of inquiry, cognitive presence functions as its heart, and teaching presence as its backbone (76).

Community of Inquiry

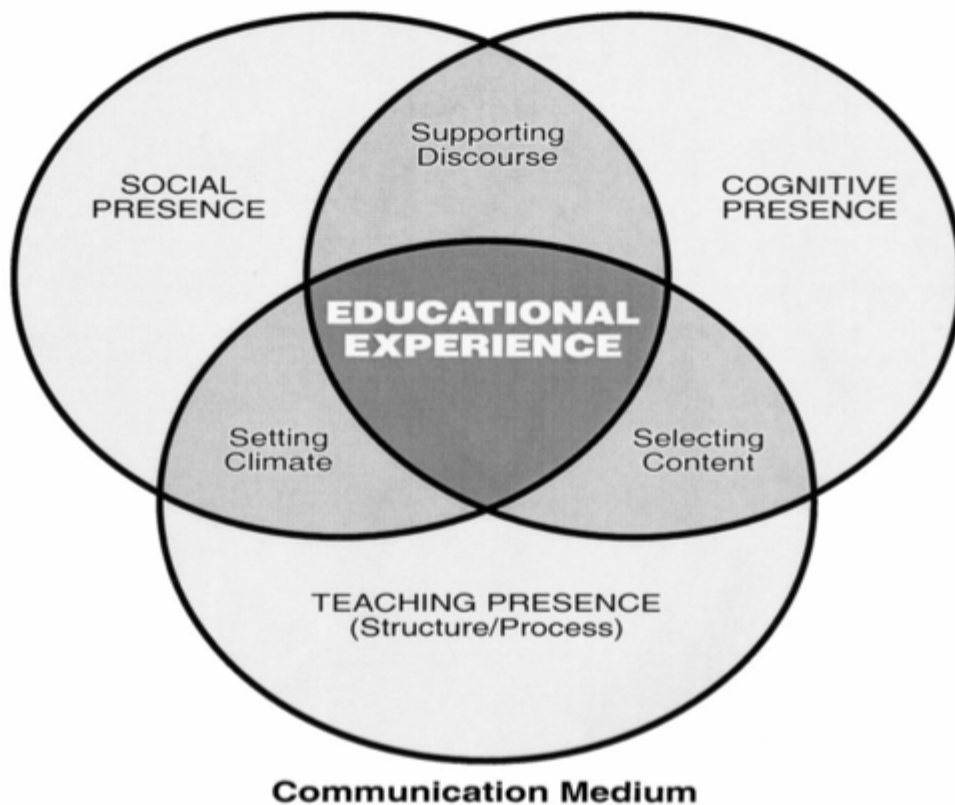


Figure 1: The Community of Inquiry Framework, first published in “Critical Inquiry in a Text-Based Environment” by Garrison et al. (88).

According to this framework, the construction of knowledge happens through a four-stage process modeled on John Dewey’s practical inquiry model. As seen in Table 1, the first phase of this process is a triggering event, such as a question or scenario, that fosters a sense of puzzlement or curiosity (Garrison, *Thinking Collaboratively* 63). This phase is followed by exploration, in which learners search for and share relevant information. Students may begin sharing ideas and conclusions during this phase, but they are “primarily based on personal experience or are otherwise unsupported by extensive information” (Hoster and Arend 154).

Exploration is followed by integration, in which learners construct meaning from ideas they encountered during the exploration phase. During this phase, students “connect and build on the ideas of others” and “demonstrate synthesis or convergence in their thoughts and comments” (156). The fourth phase of cognitive presence is resolution, in which learners apply their acquired knowledge in order to answer the original question or solve the original problem.

Descriptors and Indicators of Cognitive Presence		
Phase	Descriptor	Indicators
Triggering Event	Evocative (inductive)	Recognize problem Puzzlement
Exploration	Inquisitive (divergent)	Divergence Information exchange Suggestions Brainstorming Intuitive leaps
Integration	Tentative (convergent)	Convergence Synthesis Solutions
Resolution	Committed (deductive)	Apply Test Defend

Table 1. Descriptors and Indicators of Cognitive Presence, adapted from “Understanding Cognitive Presence in an Online and Blended Community of Inquiry: Assessing Outcomes and Processes for Deep Approaches to Learning” by Akyol and Garrison (240).

<8>In the field of composition and writing studies, Mary K. Stewart and Lyra P. Hilliard have published several articles applying CoI theory to online and blended composition courses, and many aspects of their work can be extended to literature courses, which are often also writing-intensive. (3) Stewart, in particular, suggests that “writing courses are ideally suited for functioning as CoIs” due to composition studies’ emphasis on social learning and the collaborative nature of knowledge construction (“The Community of Inquiry Survey” 40). She also provides a useful discussion of how CoI theory aligns with the CCC Position Statement of Principles and Example Effective Practices for OWI, particularly Principle 11, which states that “Online writing teachers and their institutions should develop personalized and interpersonal online communities to foster student success.” As Stewart notes, CoI theory offers composition

instructors and scholars a framework for developing collaborative, student-centered communities (“The Community of Inquiry Survey” 40).(4)

<9>As a pedagogical theory, the CoI framework—the notion of the classroom as a community of inquiry structured by social, cognitive, and teaching presence—can create more collaborative, inquiry-based online classrooms when applied to discussion board assignments. It shifts the focus from content delivery and assessment of outcomes (i.e., a QM approach) to the collaborative creation of new knowledge while, as I will discuss, providing clear principles to guide this process. As a course developer, a mentor to new instructors, and an instructor myself, I have found its application to discussion boards especially useful for emergency remote teaching.

LMS Discussion Boards and the Emergency Remote Classroom

<10>Social, cognitive, and teaching presence intersect in the discussion forum, which is a digital space, designed and moderated by an instructor, where participants build community and construct meaning through primarily textual interaction. There are a range of tools and platforms that instructors can use to conduct asynchronous discussions, but LMS discussion boards are the most common, largely because they are already integrated into each LMS and have been integral parts of online courses since the 1990s. Furthermore, LMS discussion boards are also playing an increasingly important role in face-to-face and blended courses during the pandemic in order to meet the needs of diverse student populations. Such is the case in my composition program. Forty percent of our students are first-generation college students, a population that is more likely to be low-income or live in poverty than their peers, and eighty-seven percent of our students live off campus, which means that they need to travel to campus to use university resources like computer labs and campus internet (Wichita State University, “Demographics” and “Wichita State University Student Life”). When the university moved to remote instruction in March 2020, many students did not have reliable access to high-speed internet or devices with web cameras, making it difficult for them to participate in synchronous video conferences. As a result, many of WSU’s composition instructors used LMS discussion boards to discuss readings and conduct peer reviews since they were an asynchronous option that did not require incorporating new technologies. In Fall 2020, a host of WSU’s instructors continued to use LMS discussion boards for these purposes, often—but not always—supplementing them with weekly Zoom meetings. This semester, some instructors have let students choose between attending face-to-face classes and participating on discussion boards. About half of the students in these sections have chosen to attend face-to-face classes, the other to participate on discussion boards.

<11>While additional technologies are available to facilitate asynchronous discussions, most of our instructors have opted to use LMS discussion boards because both instructors and students are familiar with them.(5) In a typical year, familiarity would be a much less significant factor in selecting a learning tool, as instructors would have time to teach students to use new tools, and students would have time to learn them. However, WSU’s students and instructors are already under a high cognitive load.(6) Most WSU students work part- or full-time jobs, and many have families.(7) They are balancing employment, child-care responsibilities, and coursework while navigating the additional challenges of the pandemic. The GTAs who teach these courses are also struggling to balance their teaching load and their coursework. They teach two courses a semester, with as many as twenty-five students per section (a number significantly higher than

the CCCC recommendation of a fifteen-student limit for writing-intensive classes ["Principles"]). Using the familiar LMS discussion boards helps moderate the cognitive burden of remote instruction for all parties involved.

<12>Our instructors also use LMS discussion boards to ensure accessibility. As Greta Anderson explains in a recent *Inside Higher Ed* piece, the shift to remote instruction has been especially challenging for students with disabilities and the programs that support them. As part of a legal agreement with the National Federation for the Blind, WSU requires that all course materials and educational technologies "be accessible to students with disabilities" regardless of whether students with disabilities are enrolled in the course (Wichita State University, 8.11). The same policy also requires websites and web-based applications to satisfy Web Content Accessibility Guidelines (WCAG) 2.0 AA. Not all web tools are compatible with these technologies, and students with disabilities may still struggle to use tools that purport to be compatible. Furthermore, WSU also has a large population of non-traditional students, many of whom need additional support with educational technologies. Using university-supported technologies ensures that these students have access to robust support services.

<13>While LMS discussion forums are limited, their familiarity, accessibility, and potential to be used in a variety of ways make them an important tool in the pandemic instructor's toolkit. In WSU's composition program, they have moved to the center of the classroom, often replacing synchronous meetings as the central means of interaction. As I will explain below, CoI theory provides instructors with a useful framework for making these interactions more collaborative and exploratory since it highlights the importance of creating a sense of community and provides principles for fostering sustained dialogue that moves beyond simply exchanging information.

Designing, Facilitating, and Sustaining Critical Inquiry through Discussion Boards

<14>As any online instructor will tell you, LMS discussion boards are not the same as face-to-face classroom discussions. When I began teaching first-year composition online, I noticed that my students were quick to summarize and praise classmates' points but needed additional prompting to challenge peers' arguments, extend classmates' ideas, and re-consider their own assumptions and positions after reading peers' posts. Early studies based on the CoI framework suggest that this experience is common and that students often engage in "serial monologues" instead of challenging or building on participants' ideas (Pawan et al.).(8)

<15>However, other research shows that LMS discussions *can* reach higher levels of cognitive presence when supported by the CoI framework.(9) In the second edition of *E-Learning in the 21st Century* (2013), Garrison introduces seven principles for establishing social and cognitive presence through design, facilitation, and direct instruction (the three areas associated with teaching presence), several of which are directly applicable to discussion forums.(10)

<16>On an LMS discussion board, social presence builds a sense of community: when participants share personal information and stories and refer to each other by name, and the class as a "we" (Stewart, "Communities of Inquiry" 69). To create this environment, instructors must first "plan for open communication and trust" (Garrison, *Thinking Collaboratively* 88). Specific practices include creating a discussion protocol, incorporating expectations for the frequency and

length of posts, and developing activities that promote community. For example, students might compose a letter or develop a video in which they introduce themselves and post it to an initial discussion board.(11) As a discussion progresses, instructors should actively “establish community and cohesion” by modeling social cues, such as using participants’ names in discussion, providing encouragement, and sharing their own experiences (90).(12) Instructors may also need to intervene in discussions that become heated or overly critical (90). Thus, applying CoI’s notion of social presence means creating low-stakes discussion boards that facilitate student-student and student-teacher social interaction not solely focused on course material and promoting interactions that affirm discussion board participants as members of a classroom community.

<17>Cognitive presence includes evidence of discussion participants’ moving through the critical inquiry process: grappling with problems, negotiating different perspectives, integrating classmates’ ideas with their own, and applying their new understandings to the original problem.(13) To achieve this progression, Garrison claims, instructors must first “plan for critical reflection and discourse” (*Thinking Collaboratively* 88). This includes ensuring that discussion forums are not too large, perhaps breaking large classes up into smaller discussion groups, and giving students ample time to discuss and reflect on ideas. Garrison also recommends avoiding “general questions with unclear expectations” and structuring activities to reflect the phases of critical inquiry, with “opportunities for exploration, integration and application of ideas for purposes of resolution” (91, 92). Kim Hosler and Bridget Arend’s contribution to *Educational Communities of Inquiry: Theoretical Framework, Research, and Practice* (2013) offers particularly useful ideas for designing discussions.(14) They stress the value of beginning discussions with questions that “invite curiosity, elicit interest, and encourage different perspectives,” including questions that invite comparison, contrast, and evaluation (153). They also encourage instructors to experiment with scenario-based questions that present a problem or dilemma and ask students to develop a viable solution, and with online debates that divide students into small groups and ask them to take a side on a content-related question (154). Such strategies shift the discussion board from a “bus stop” model to one in which students practice critical inquiry; clear guidelines in such instances do not restrict discourse but instead provide a framework for robust, sustained dialogue.

<18>In addition to planning for critical inquiry, instructors should also “establish inquiry dynamics” and “sustain inquiry that moves to resolution” (Garrison, *Thinking Collaboratively* 88). In discussion forums, this includes posing critical and reflective questions and summarizing ideas that emerge from discussion, tasks that can be distributed directly to students in the class. As Garrison notes, peer facilitators are often less intimidating, and peer facilitation can increase cognitive engagement in a discussion (94). Even more importantly, discussion moderation can function as a valuable metacognitive activity in which students learn “when to intervene, when to move the discussion along, and when to summarize achievements” (94). This type of assignment also decenters the instructor, inviting students to actively guide and synthesize the ideas that emerge from discussion.

<19>Hosler and Arend also draw on CoI research to provide useful guidelines for discussion moderation to establish teaching presence while creating a more egalitarian discussion space through modeling and guided questions. They encourage facilitators to wait one or two days

before responding to student comments and to refrain from responding to every post or answering every question. Instead, they advise facilitators to post general comments that summarize key points and refocus the discussion. When possible, they recommend that facilitators specifically reference student posts, offering this example: “Kevin said this . . . while Sasha said that. But Maria brings in this other point . . . it seems there is a common theme of . . . but we’re looking for reasons why this occurs . . . what do the rest of you think” (154-55). Hosler and Arend also urge instructors to guide students through the practical inquiry model. During the early exploration stage, facilitators might pose questions that ask for more evidence, like, “What evidence is there to support this position, idea or claim?” (155). Another possibility is to ask students to consider other perspectives, such as, “What voices are missing?” (155). As the discussion progresses towards integration, the facilitator might move the discussion towards synthesis and convergence with questions like, “[I]s there any connection between what you just said and what X said?” and “What are one or two important ideas that emerged from this discussion?” (157). These pointed questions ask students to synthesize discussion board conversations and thus push them beyond the standard responses that tend to affirm the quality of peers’ posts without furthering the discussion.

<20>CoI theory also emphasizes that discussions are ultimately only one part of a course and should work in tandem with course materials, activities, and assignments to progress students through the critical inquiry model.(15) Stewart’s application of the CoI framework to assessing a first-year composition class provides an excellent example of how discussion forums can be used to scaffold the critical inquiry process.(16) In the course Stewart studied, the GTA teaching used an LMS discussion board to prepare students for an argumentative essay on intellectual property. Stewart’s analysis of the discussion board posts and essays shows that students returned to ideas generated in discussion in their final essays, building on these ideas and integrating them into their arguments. She thus shows that, while not traditional in-person discussion, asynchronous conversations that begin in discussion boards can, and in this study do, extend well beyond it.

<21>By bringing together social, cognitive, and teaching presence, these scholars’ application of CoI theory provides a framework for fostering meaningful discussions through a familiar LMS, reducing extrinsic cognitive load for students trying to learn in a situation where standard stressors have been exacerbated by the pandemic and the shift to emergency remote learning. Using an already-accessible LMS for these discussions also importantly ensures that all students can participate in these conversations regardless of ability.

My Application of CoI

<22>While having students post to an introduction forum in the first week is a common practice to foster community in online courses, I adapt it to build social presence between my students and myself. I ask students to post pictures of themselves in addition to writing about anything else they wish to share. I model this form of introduction by posting pictures of myself and my cats. Students often respond with pictures and stories of their own pets. By allowing students to see their classmates and their instructor as more than digital text, these interactions build a sense of community and generate more excitement in the responses. These opportunities for connection have been especially important during the pandemic—a time when students are isolated and learning outside of traditional classroom communities.

<23>I also use discussion boards to engage my students in the practical inquiry process, using guided questions to redefine how students cognitively engage in the response posts that follow the standard initial post. For example, the second course in WSU's first-year composition sequence focuses on argumentation, so I ask students to evaluate an argument about a current issue in their initial post and then choose classmates who took a *different position* on the issue for their responses. In their responses, students are encouraged to discuss (1) what arguments or evidence their classmates identified that they did not initially notice and (2) how their classmates' analysis enriched or changed their perspective on the issue. This approach to discussion responses encourages students to move past merely agreeing or disagreeing with classmates' points (the second stage of the practical inquiry model) and begin reconsidering their own positions in light of new perspectives and synthesizing others' ideas with their own (the third stage of the practical inquiry model). Such scaffolding provides a low-stakes way to practice asking the types of questions and engaging in the kind of synthesis expected for larger projects. The clear directions and expectations also reduce student anxiety and enable students to use their time efficiently, which is vital for students struggling to negotiate the additional demands of the pandemic.

<24>I also use discussion boards to generate ideas for writing projects, building additional social and cognitive presence. For instance, the first course in WSU's first-year composition sequence includes a multimodal project. Many of the students in this course are unfamiliar with the idea of multimodality and initially nervous about this project. To help them, I dedicate an entire discussion board to proposing and discussing ideas for the multimodal project. Students are asked to post their initial ideas, no matter how tentative, and they receive feedback from their classmates and their instructor before moving forward with the project. This discussion exposes participants to the range of possibilities for this assignment (the second phase of the practical inquiry model) and provokes new ideas that students would not have generated on their own (the third phase of the practical inquiry model)—experiences that are especially important during a time when students cannot easily solicit feedback from peers. It also provides an opportunity for students to share their creativity with the class and affirm the creativity of their classmates, strengthening the sense of community.

<25>Since all iterations of this online class include this activity, I encourage the instructors I mentor in my capacity as Assistant Director to actively moderate these discussions, posing questions to prompt deeper thinking and summarizing ideas that emerge out of discussions to increase teaching presence and further build social presence. I strive to do the same. In some of my courses, I distribute part of this responsibility to students in order to encourage students' cognitive presence. Students select one weekly discussion board to co-moderate. During the week, they are responsible for regularly checking the discussion, posting follow-up questions, and identifying connections between classmates' posts—all activities that I have modeled in previous discussions. I also maintain an ongoing record of important or interesting points that participants raise during discussion, copying and pasting insightful comments into a Word document. At the end of the discussion, I share these comments as part of a "wrap-up" post in which I highlight key ideas and address questions that emerged out of the discussion and offer clear takeaways from discussions. These summaries are particularly useful during the pandemic as many students do not have the time or cognitive resources to carefully read each classmate's posts. They also develop a form of teacher presence that is missing in many pandemic

classrooms; for instance, one student recently told me my summaries make them feel they are in a “real” class for the first time since the pandemic began.

Continuing Forward: Accessible, Engaged Discussions Using CoI

<26>While more structured than free-flowing face-to-face discussions, these examples highlight some of the ways I draw on the CoI framework to foster community and promote meaningful discourse in our LMS discussion boards. Through design choices, discussion facilitation, and strategic intervention, instructors can create an atmosphere in which students feel comfortable expressing themselves, exchanging ideas, and constructing new meanings through interaction. Using a familiar and already-accessible LMS to facilitate this interaction reduces the cognitive load placed on students during the COVID-19 pandemic and ensures that all students can participate in these conversations, regardless of whether they have a documented disability. However, these principles are not exclusive to LMS discussion boards. Course designers and instructors have applied the CoI framework to a range of digital tools and learning environments, and many of the activities I describe can be easily adapted for the face-to-face classroom. Ultimately, CoI theory invites those using it to consider how they can use the tools at hand—digital or otherwise—to create a community of inquiry in which participants generate new knowledge through collaboration with one another.

Notes

(1)Garrison, one of the architects of the CoI framework, offers a useful critique of QM’s approach to online learning, asserting that “the focus on outcomes reinforces the impression that knowledge can be transmitted from the teacher to the student in whole, which John Dewey categorically rejected. The risk of an outcome focus is that outcomes will take precedence over the means, at the cost of meaningful discourse and deep understanding” (*Thinking Collaboratively* 55).(^)

(2)There is an extensive body of scholarship dedicated to the CoI framework. See Garrison, *Thinking Collaboratively* and *E-Learning*, for comprehensive discussions of the framework and its application to online and blended courses. The CoI website also provides a useful distillation of its framework as well as links to books, articles, and blog posts by different scholars interested in the CoI framework.(^)

(3)Readers interested in blended courses may also find Hilliard and Stewart useful.(^)

(4)Stewart expands on the alignment between CoI theory and the CCCC Position Statement of Principles and Example Effective Practices for OWI in “Community Building.”(^)

(5)See Morris and Strommel; and Vestri for compelling cases for the use of alternative asynchronous tools, such as Disqus, social media platforms, and Slack.(^)

(6)Several popular think pieces have been written applying cognitive load theory to people’s experiences during the pandemic, including Jarrett’s 2020 BBC article. See stress researchers Boals and Banks for a useful summary of how the pandemic may affect cognition.(^)

(7)32.2% of our student population is twenty-five years-old or older, which is much higher than the national average. This age difference means that our students are more likely to be working full time and are more likely to have children than their peers at other institutions (“Wichita State University Student Life”).(△)

(8)In four separate analyses of discussion forums, researchers coded over fifty percent of the contributions to threaded discussions as exploration, the second phase of the practical inquiry model, suggesting that these discussions did not reach higher levels of cognitive presence. See Garrison, Anderson, and Archer; Meyer; Pawan et al.; and Park.(△)

(9)For examples of this research, see Shea and Bidjerano; and Garrison and Cleveland-Innes.(△)

(10)Garrison elaborates on these principles in *Thinking Collaboratively*.(△)

(11)See Vaughn et al. 28, for a list of community-building activities.(△)

(12)Darby and Lang 83-84 discuss common discussion protocols.(△)

(13)This is not to say that online discussions need to reach resolution—the fourth stage of the critical inquiry process—to be effective. In one study, Akyol and Garrison note that resolution can also be reached in other parts of the course, such as individual projects.(△)

(14)See Hosler and Arend.(△)

(15)Vaughan et al. explicitly encourages instructors to use discussion board content in later activities and assignments (59).(△)

(16)Stewart describes this study in “Communities of Inquiry: A Heuristic for Designing and Assessing Interactive Learning Activities in Technology-Mediated FYC” (2017).(△)

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