Facilitating *Cognitive Presence* Online: Perception and Design

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Abstract
In this paper, we focus on perceived cognitive presence (CP) in three sections of an intermediate level English for Academic Purposes (EAP) course facilitated online. The researchers intend to demonstrate how lesson design, scaffolding, and a blend of synchronous and asynchronous delivery create perceived CP. Data was collected from the CoI survey (Arbaugh et al., 2008), administered to both student and instructor participants, as well as an analysis of the lesson plans. Focusing on the survey questions related to the four phases of CP, researchers assigned numerical values to responses reported by participants (cf. Arbaugh et al., 2008). Student participants consistently reported *lower* levels of CP than teachers in the *triggering event* and *exploration* phases. Student participants in two of the three sections also reported *lower* levels of the *integration* and *resolution* phases than the teacher, but students in the third section reported *higher* levels. Moreover, student-reported experiences of CP in all four phases, except the exploration phase, increased with each iteration of the lesson plan. In addition, we analyze the weekly lesson plans in relation to the four phases of CP. Results demonstrate the relationship between lesson plans and perceived CP and will help to inform best practices in online learning contexts.

Keywords: Community of Inquiry (CoI), CoI survey, English for Academic Purposes (EAP), lesson plans, online learning

The COVID-19 pandemic pushed many into unfamiliar teaching and learning contexts in which classroom delivery of content and interactive learning scenarios suddenly moved online. This unexpected shift was disruptive in that teachers had little time, and perhaps little knowledge or experience, to shift their familiar physical classroom-based practice to a purely online delivery. Students too were suddenly interacting through headsets and video conferencing tools which lacked the three-dimensional affordances of a physical classroom that allowed for spontaneous opportunities to interact through voice, movement, or gestures.

Forced into this context with little time to consider best practices for online design and delivery, teachers persevered, but they suddenly needed to consider the affordances of digital tools and online contexts in the design and delivery of content and class time. As a result, a critical question emerged: How can educators best engage students online to facilitate cognitive presence?

A challenge for many teachers, particularly in language learning contexts, was to create and maintain a sense of community where students not only felt at ease but were also motivated to interact and contribute as they engaged with course content through language and experience. This sense of community and view of language learning assumes a social lens in which the learner is part of a community that purposefully interacts to exchange ideas and complete tasks (cf. Lave, 1996; van Lier, 2000; Vygotsky, 2012). As practitioners, we understand that language develops when the context presents conditions that are social, dynamic, engaging, and flexible (cf. Chaiklin & Lave, 1996; Lave, 1996; van Lier, 2000); consequently, effective learning opportunities emerge through purposefully designed tasks that consider the affordances of online spaces and digital tools (Hartwick, 2018; Hartwick & Fox, in press). Similarly, as researchers, we believe that language develops through practice and interaction, which are necessary conditions of language development (cf. Vygotsky, 2012). Further, language development is not solely about the attainment of discrete skills, like vocabulary acquisition, but includes skills like collaboration, problem solving, and critical thinking (Dede, 2010). These beliefs very much shape our teaching practices and have motivated this study.

This study was designed in response to the new challenges for creating strong learning communities in digitally mediated spaces brought about by the COVID-19 pandemic and the resulting transfer of teaching in the fall 2020 to strictly online contexts. The researchers reflected on their teaching practice in relation to the *Community of Inquiry* (CoI) framework (Garrison et al., 2000), focusing on *cognitive presence* (CP). Moving away from text-based analysis used in earlier studies (cf., Garrison et al., 2000; Oriogun et al., 2005; Vaughan & Garrison, 2005), we looked at the types and timing of technologically mediated tasks in relation to the four phases of CP: *triggering event, exploration, integration,* and *resolution.* Thus, participant texts were not analyzed for evidence of CP as described in earlier studies (Garrison et al., 2000). Instead, we analyzed our lesson plans in relation to the four phases of CP.

This became important as many teachers did not have the time to reconsider their practice according to pedagogically sound practices intended to guide the delivery and design of online teaching, nor did they have time to consider the affordances of the space and tools, often new to the teacher, as important mediators of successful social interactions online (cf. Lantolf & Thorne, 2007). We chose the CoI framework as an analytical tool. We wanted to understand how the

designed tasks impacted student perception of CP with respect to the four phases. Importantly, teachers in this study did not design their lesson plans with the CoI framework in mind.

At time of writing, a Google Scholar search showed that Garrison et al.'s (2000) seminal paper on the CoI framework had over 7,000 citations. Yet, Garrison (2017) reports that few research papers focus on CP as compared to social and teaching presence. Citing Noteboom and Claywell (2010), Choo et al. (2020) argue that CP in an online environment might be the most difficult element in terms of measuring and facilitating. Further, studies to date (Garrison et al., 2000; Oriogun et al., 2005; Vaughan & Garrison, 2005) largely assess the CoI by coding the asynchronous written texts. To date, we are unaware of any studies that consider topic material in relation to the four phases of CP. This study looks for evidence of these elements and planned opportunities for thinking, listening, and expression through an analysis of lesson plans. The teacher-researchers in this study evaluated the teaching materials and workflow of their three sections to establish how teaching presence may have emerged to facilitate CP.

This study seeks to answer the following question: How does weekly task design and the facilitation of lesson plans, either synchronously or asynchronously, impact student and teacher perception of CP based on the four phases: triggering event, exploration, integration, and resolution?

We begin with an overview of literature related to the CoI framework, an explanation of our methodology, a description of the study context and analysis, followed by results and discussion. We reflect on the study's limitations as well as implications for best practices and possibilities for future research.

Literature Review

As noted, our research is primarily motivated and best understood through a social theoretical lens wherein language develops best when learners interact as part of a social group who share experiences and collaborate.

Community of Inquiry Framework

The CoI framework (Garrison et al., 2000) asserts that deep and meaningful educational experiences occur when a community of learners, who assume both the role of teacher and learner, are successfully engaged in learning activities (Garrison, 2017). The framework is based on a collaborative constructivist perspective, reflecting the view that "collaboration and constructivism respectively correspond to the teaching and learning responsibilities of an educational experience" (Garrison, 2017, p. 9). Citing John Dewey, Garrison explains that "through purposeful collaboration, ideas are communicated, and knowledge is constructed and confirmed" (p. 10). The achievement of this educational experience occurs when the three mutually reinforcing dimensions of the CoI framework (teaching, social, and cognitive presence) converge (Vaughan, et al., 2013).

Teaching presence is a necessary, unifying presence responsible for the design, facilitation, and direction of the social and cognitive presences (Anderson, et al., 1999; Garrison, 2017; Vaughan et al., 2013). Importantly, both teachers and learners assume the responsibility of teaching presence in a community of learners, with the overarching goal being for learners to gradually assume more of the teaching presence role as they develop the ability to construct and

reflect on meaning (Garrison, 2017). Based on our interpretation of the framework and for the purpose of analysis, we see teaching presence as a first step in the creation of meaningful learning opportunities (Figure 1). The design of the learning context helps to create a comfortable environment where learners engage with ease to facilitate collaboration, critical thinking, and achievement of outcomes. This design process is iterative, flexible, and constantly moving.

Figure 1
Presences in Motion
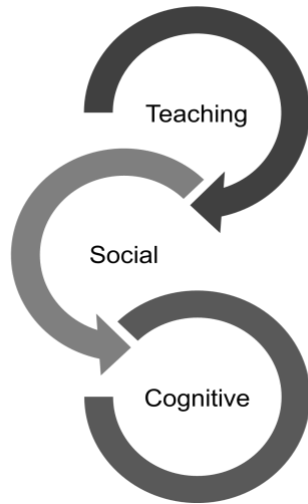
Note. Researchers' interpretation of interconnectedness of three CoI presences.

Social presence refers to learning environments characterized by "trust, open communication, and group cohesion" (Vaughan et al., 2013, p. 11). It is the students' perception of comfort and ease as they interact within a community of learners (Anderson et al., 1999). Social presence in digitally mediated contexts lacks the social and non-verbal cues typical of face-to-face interactions but may afford greater opportunity for students to "speak-up" and participate anonymously (Anderson et al., 1999). Establishing social presence online, particularly when written rather than spoken communication is relied on, can be challenging; yet, facilitators must create and sustain social presence to achieve a CoI (Garrison, 2017). They must, however, reflect the pedagogy of online learning, rather than attempting to replicate the face-to-face classroom experience (Garrison, 2017). Students typically interact first socially, and then cognitively as they collaborate and construct meaning (Vaughan et al., 2013).

CP, the focus of this study, is considered the most basic and most connected to the achievement of learning outcomes (Garrison, et al., 2000). CP, closely aligned with critical thinking, has been defined "as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (Garrison, et al., 2001, p. 11). Garrison (2017) argues that CP, a collaborative process of inquiry, includes critical thinking and listening. Learners are expected to develop greater CP as they become more competent and confident (Garrison, 2017).

CP "is operationalized by the Practical Inquiry (PI) model that consists of four phases of inquiry – triggering event, exploration, integration, and resolution" (Garrison, 2017, p. 26). The first phase, triggering event, is described as an event or experience that triggers curiosity (Garrison et al., 2000). A guiding question may sufficiently stimulate deep discussion at this stage (Vaughan, 2010). This curiosity leads to the exploration phase when learners try to resolve or make sense of what was triggered. Exploration may be characterized by participants exchanging information, or experiencing, living, or immersing themselves in a learning situation (Garrison et al., 2000; Vaughan, 2010). The third phase, integration, is described as reflective wherein the learner visibly connects and integrates what is learned and experienced. Garrison et al. (2000) explain that new discoveries and knowledge are conceptualized at this phase. The inquiry model culminates with the resolution phase whereby problems are critically assessed and solved, and new questions may again prompt the triggering phase.

CP is also supported by social presence (Kanuka & Garrison, 2004). Higher levels of social presence facilitate the collaboration and construction of meaning in learner communities. However, strategies that facilitate interaction in online learning environments are insufficient to create CP (Garrison & Cleveland-Innes, 2005). While the quantity of student interaction may be indicative of social presence, it is the quality of student interaction (collaboration) that will determine CP and, subsequently, facilitate deep and meaningful learning experiences (Garrison & Cleveland-Innes, 2005).

Participants manifest all three mutually reinforcing presences of the CoI (Garrison, 2017). For instance, Akyol and Garrison (2008) found that social presence is dominant at the beginning of the course as students develop relationships and negotiate roles; whereas cognitive and teaching presences dominate as the term progresses and students focus more on academics. Furthermore, the presences are mutually reinforcing. Choo et al. (2020) cite Noteboom and Claywell (2010) who found that high levels of CP were reported by students who also had high levels of social and teaching presences. It is at the intersection of the three presences that deep and meaningful learning experiences occur.

Method

The current study sought to identify whether the design of weekly lesson plans (synchronous and asynchronous) aligned with the four phases of CP, directly addressing the research question. The survey results were analyzed alongside the lesson plans of two teacher-researchers in order to investigate more closely the relationship between task design and perceived CP. This approach sought to map out the teacher-researchers' practice in relation to the CoI framework, focusing on CP.

Context

As with most post-secondary instruction, courses for the current study were taught entirely online in the fall 2020 semester as a response to the global pandemic. Teacher-researchers taught three sections of an intermediate level English for Academic Purpose (EAP) course hosted on a learning management system platform (Moodle). Teachers employed available tools to mediate synchronous and asynchronous interactions, such as forums, lessons, quizzes, and interactive content. Synchronous class times, which were approximately two thirds of the regularly scheduled class time, were hosted in a web conferencing platform that facilitated text-based chats, audio and camera functionality, and a collaborative writing surface, as well as

desktop sharing capabilities. Asynchronous class times were dedicated primarily to independent work.

Fully online EAP courses presented some unique challenges for teachers as students were not only online, but often distanced geographically. Thus, students logging into a synchronous class from different time zones often resulted in a lack of participation from sleepy learners. Others lacked the confidence to participate in virtual, synchronous lessons with cameras on. Additionally, certain websites that may have been a favoured resource by teachers in face-to-face learning environments were blocked by some countries. Thus, teachers relied more heavily on personally created material. The aforementioned challenges led the teachers to continuously question how to best facilitate their classes in a fully online environment.

To deal with this novel challenge, the teacher-researchers in this case met regularly to discuss task design and facilitation of lesson plans in response to student needs. The teacher of the first iteration of the lesson each week (Wednesday morning, Section D) shared her observations with the other teacher on what worked and what did not. Collaboratively they problem solved, through regular meetings and/ or email exchanges, on how to best (and quickly) improve the task design and facilitation of subsequent iterations (Wednesday afternoons, Section C, and Thursday mornings, Section A). This included small adaptations in task design (e.g., timing, clarifications, instructions, etc.).

Participants

Participants for this study included the two teacher-researchers (n=2) and student volunteers from their three sections of intermediate level EAP (n =27). Participation was voluntary and anonymous. Intermediate level EAP courses require a minimum IELTS score of 5.5 to enter and, in this case, classes were capped at 20 students. EAP courses in this context aim to improve students' academic language, research, and learning strategies, thereby preparing them for success in a North American university.

Data Collection Methods / Tools

At the end of term, teacher-researchers completed an online version of the CoI survey (Arbaugh et al., 2008), extended to include questions related to professional development, course design, and use of digital tools (Appendix A). Similarly, all students in the teacher-researchers' classes were invited to complete a survey as well (Appendix B). The students' version included the original CoI survey questions and was adapted to include additional questions related to demographics, level of comfort and expertise with technology, and the use of digital tools. Surveys were hosted in Qualtrics, an online survey software, to ensure anonymity in the case of student participant volunteers.

Additionally, the teacher-researchers independently completed an itemized table at the end of the term which outlined their lesson plans for seven classes. Each teacher revisited their own teaching materials for these seven classes and first reviewed the overall approach and general components to their lesson before noting the details and specific activities for each. Thus, their tables, moving from general plans to specific, outlined the type of activity, task instructions, the learning context (synchronous or asynchronous), and the community of learners. Note that the CoI was used post-term as an analytical tool for research purposes rather than as a model for designing lesson plans.

Data Analysis

In order to compare perceived teaching, social, and cognitive presences, both overall and with respect to the individual phases of presences, teacher and student participant responses to the CoI survey were assigned numerical values from *strongly disagree* = 0 to *strongly agree* = 4. As per Arbaugh et al. (2008), the responses were then averaged, both for the three presences in general as well as for the individual phases of each presence. Next, focusing only on CP questions from the CoI survey (Arbaugh et al., 2008), teacher-researchers compared student and teacher responses and the student responses across the three sections.

As part of the analysis, teacher-researchers worked with the itemized tables and compared them for general similarities in approach, task, and instruction from week to week. For example, researchers looked at the two itemized tables for parallels in general task design in terms of timing and sequencing of activities, class discussion, review, breakout room tasks, and main room debrief. Each teacher-researcher reflected on how the main components of the lesson plans aligned with the four phases of CP. Next, the specific activities for one lesson plan, Week 5, were mapped out onto the four phases of CP, triggering event, exploration, integration, and resolution, by each teacher-researcher. Researchers agreed on Week 5 as it was a midpoint in term and so students were, by then, familiar with the format of the weekly lesson plans. These two data sets are discussed separately.

Results and Discussion from CoI Survey

The following results are derived from the 29 participants (27 students and 2 teachers) who volunteered to complete the extended versions of the CoI survey (Appendix A and B). The surveys included 13 questions related to teaching presence, 9 related to social presence, and 12 related to CP (Arbaugh et al., 2008). All results reported below represent averages of all student participants (n = 27) and averages of all teacher participants (n = 2). This small-scale study helped respond to our research question: How do weekly task design and the facilitation of lesson plans, either synchronously or asynchronously, impact student and teacher perception of CP based on the four phases: triggering event, exploration, integration, and resolution?

Survey Results, Overall

This section reports on averages of all three sections of students and teachers for teaching, social and cognitive presences (Table 1). Student participants in all three sections (A, C, and D, combined averages) consistently rated their perceived level of teaching presence as *higher* than teacher participants (3.31 vs. 2.85, respectively).

Also, student participants in all three sections and teacher participants (combined averages) rated their perceived level of social presence *similarly* (2.57 vs. 2.61, respectively). Whereas student participants in two sections (A and D) rated their perceived level of CP (2.76 combined average) significantly *lower* than the teacher participant (3.42), the student participants in the third section (C) reported their perceived level of CP as slightly *higher* than the teacher (2.71 vs. 2.67, respectively).

Table 1

Averages of Teaching, Social, and Cognitive Presence as Reported by Student and Teacher Participants

	Students Section A	Students Section D	Students Sections A & D	Teacher Sections A & D	Students Section C	Teacher Section C
Teaching presence	3.36	3.45	3.41	3.31	3.11	2.38
Social presence	2.62	2.4	2.51	2.78	2.69	2.44
Cognitive presence	2.94	2.57	2.76	3.42	2.71	2.67

Survey Results and Discussion of Student Perception of CP across Three Sections

Of note, while the teachers met regularly between teaching their own sections, the Wednesday morning (Section D) and Thursday morning (Section A) courses were taught by the same teacher.

Students in sections of the course who participated in lesson plans during the second (Wednesday afternoon, Section C) and third iterations (Thursday morning, Section A) reported *higher* levels of CP (2.71 and 2.94, respectively) than students who participated in the first iteration on Wednesday morning, Section D (2.57) (Table 1).

Students in sections of the course who participated in lesson plans during the second (Wednesday afternoon, Section C) and third iterations (Thursday morning, Section A) reported *higher* levels of the triggering event, integration, and resolution phases than students who participated in the first iteration on Wednesday morning, Section D (Table 2).

While exploration did not increase across the three iterations, it did increase from Wednesday morning, Section D (2.73) to Thursday morning, Section A (2.98). These sections were taught by the same teacher (Table 2).

Table 2

Averages of Student and Teacher Participant Responses to the Four Phases of Cognitive Presence (CP)

CP phase	Features of each phase	Students Section A	Students Section D	Students Sections A & D	Teacher Sections A & D	Students Section C	Teacher Section C
Triggering Event	Peak curiosity	2.77	2.33	2.55	3.67	2.48	3.0
Exploration	Seek answers or resolution	2.98	2.73	2.86	3.67	2.6	2.67
Integration	Reflect and integrate knowledge	2.95	2.60	2.78	3.33	2.78	2.67
Resolution	Critically apply and solve problems	3.05	2.60	2.83	3.0	3.0	2.33

Teacher-researchers attribute the increased student perception of CP across the three sections from 2.57 (Section D) to 2.71 (Section C) to 2.94 (Section A) (Table 1) to frequent teacher meetings and discussions. To explain, teacher-researchers met regularly to discuss task design and the facilitation of lesson plans throughout the week. The teacher-researcher of the first iteration shared observations on what worked well after her first class (Section D) and provided suggestions for improvements which were incorporated by the teacher-researcher of the next iteration (Section C). Small adaptations in task design (e.g., timing, clarifications, etc.) may explain improvements in self-reported cognitive presence. This observation seems to be supported by the literature. Garrison (2017), citing several studies, argues that "the design and nature of the task [is] the greatest factor in reaching resolution" (p. 57). Indeed, Garrison and Arbaugh (2007) explain that the design of the task must provide clear directions and all relevant information to learners, and the timing must be designed to move students through the phases of CP. Student participants in the current study reported a combined average of 3.46 with respect to the design and organization phase of teaching presence, suggesting that the students' educational experience is improved as teacher-researchers redesign activities, improve facilitation and course delivery, etc.

Moreover, Bangert (2008) found that teaching presence, particularly the facilitation and direction phase, and social presence were associated with the resolution phase of CP. Similarly, Vaughan et al. (2013) asserts that "of all aspects of the Community of Inquiry framework, the activities of facilitation are the most critical; facilitation manages the overlaps between all three presences and is at the core of the dynamics of a community of inquiry" (p. 46). Thus, teaching presence unifies cognitive and social presences, while social presence facilitates trust and open communication in the learning environment (Vaughan et al., 2013). Students in the current study reported a combined average of 3.24 with respect to the facilitation and direction phase of teaching presence, but only 2.57 for social presence, suggesting that teacher-researchers must pay more attention to activities which develop social presence early in the semester. If students in the current study were not provided sufficient opportunities to develop relationships and trust, and subsequently a sense of belonging, they may not have fully experienced the other presences and meaningful inquiry may not occur. Thus, a lower level of social presence may impact the development of other presences, and, ultimately, the achievement of deep and meaningful learning experiences (Garrison, 2017).

However, research has also revealed that while social presence is dominant in the beginning of a course as learners develop relationships and connections, as the course progresses social presence declines and cognitive and teaching presences increase (Akyol & Garrison, 2008; Vaughan et al., 2013). Students in the current study were surveyed only at the end of the course, which may explain why the overall average across three sections (D, C, and A) of social presence was lower than cognitive and teaching presence (2.57 vs. 2.74 and 3.31, respectively).

Survey Results and Discussion of Student vs. Teacher Perceptions of the Four Phases of Cognitive Presence
As noted, CP is operationalized by four phases: triggering event, exploration, integration, and resolution. Table 2, above, shows the calculated averages for teachers and students in all sections. Here we discuss the results of the triggering event and exploration phases.

Triggering event phase. Student participants in all three sections consistently reported their perceived level of CP in the triggering event phase as *lower* than teacher participants.
Sections A & D (2.55 vs. 3.67, respectively)
Section C (2.48 vs. 3.0, respectively)

Exploration phase. Student participants in all three sections consistently reported their perceived level of CP in the exploration phase as *lower* than teacher participants.
Sections A & D (2.86 vs. 3.67, respectively)
Section C (2.60 vs. 2.67, respectively)

Teacher participants reported higher levels of CP in the triggering event and exploration phases, suggesting that teachers seemed to overestimate the extent to which students' curiosity was piqued as well as how motivated they were to further explore course topics. The lower reported levels of the triggering event is alarming as this first phase is "crucial to participants taking responsibility and engaging in a true inquiry process" (Vaughan & Garrison, 2005, p. 8). In their comparison of discussions held online vs. face-to-face, Vaughan and Garrison (2005) found that the latter context elicited more triggering events in learners. Participants in Vaughan and Garrison's study explained that they felt more comfortable engaging in discussions in the face-to-face context as "the physical presence provided additional communication cues such as facial expressions and body language" (p. 6). This may be particularly true of second language learners who lack the competence and/or confidence to voice opinions in English, politely interrupt a speaker, express agreement/disagreement, etc. by relying solely on verbal communication without the help of gestures, facial expressions, and so on. Indeed, teacher-researchers of the current study remarked several times over the course of the semester the frustration they felt at some students refusing to turn on cameras and microphones to participate in synchronous, breakout room activities. Additionally, several students expressed their own frustration in post-class reflection activities about their experiences participating in breakout room activities with classmates who refused to turn on microphones and cameras. While teacher-researchers at the time felt they shouldn't push students who may feel uncomfortable in online contexts to do so, in hindsight, this may have contributed to lower experiences of CP. Certainly, these students would have been disadvantaged trying to keep pace with the oral discussions of their classmates by typing responses.

Survey Result and Discussion of Student vs. Teacher Perceptions of the Integration and Resolution Phases
Table 2, above, shows the calculated averages of perceived CP for teachers and students in all sections. Here we discuss the results of the integration and resolution phases.

Integration Phase. Students in Sections A and D (combined averages) reported their perceived level of CP in the integration and phase to be *lower* than the teacher (2.78 vs. 3.33, respectively); whereas, students in Section C reported their perceived levels of integration to be *higher* than the teacher participants (2.78 vs. 2.67, respectively).

Resolution Phase. Students in Sections A and D (combined averages) reported their perceived level of CP in the resolution phase to be lower than the teacher (2.83 vs. 3.0, respectively); whereas, students in Section C reported their perceived levels of resolution to be higher than the teacher (3.0 vs. 2.33, respectively).

Resolution Phase, Final Question. Student responses (combined averages) were consistently higher than teachers (3.22 vs. 2.5, respectively) in response to "I can apply the knowledge created in this course to my work or other non-class related activities." This was the highest reported average among student participants in all 12 CP questions.

Teacher-researchers attribute this first finding (integration) to the synchronous nature of the tasks. As previously explained, lesson plans required students to participate in synchronous, breakout room discussions to first explore and then integrate information related to the assigned task. Thus, communication in these synchronous discussions was spontaneous and immediate, as compared to the slower, more reflective nature of asynchronous, written discourse where participants are given time to consider and/or edit responses. As Weigel (2002) notes, integration is encouraged by emphasizing written rather than oral responses within online inquiry. Indeed, Vaughan and Garrison (2005) found a greater number of student comments related to the integration phase in asynchronous, online contexts as compared to face-to-face environments. This can be explained by Newman et al.'s (1997) finding that asynchronous, written communication helps students to make connections between ideas as well as Meyer's (2003) investigation into asynchronous discussion response, wherein students were able to better recognize connections and understand other's ideas.

Teacher-researchers attribute the second finding (resolution) to higher levels of social presence reported by students of Section C (2.69) compared to Sections A and D combined (2.51) (Table 1), suggesting that the established learning environment in Section C helped students feel more at ease. Researchers also speculate that the teacher of Section C may have prompted more frequently.

In comparing teaching presence (3.41 average in Sections A and D vs. 3.11 in Section C) and social presence (2.51 average in Sections A and D vs. 2.69 in Section C) (Table 1) to the resolution phase, we are unable to account for these differences. The only possible explanation, and as explained above, is that resolution in our EAP context does not occur after integration in the weekly lesson plans, but rather later in isolated graded assignments. Anecdotally, this is where we see students beginning to incorporate the underlying skills practiced in the weekly lesson plans as they move from the triggering event to the exploration to the integration phases.

Teacher-researchers attribute the finding from the resolution phase, final survey question to the deliberate design of lesson plan tasks which scaffolded skills necessary in future graded assignments. As previously noted, the researchers argue that the resolution phase of the lesson plans in their EAP class was not the resolution of the problem students were tasked with (triggering event), but rather the knowledge, practice, and application of academic English skills that EAP students are required to demonstrate in graded assignments as measures of learning outcomes.

Results and Discussion from Lesson Plan Analysis

To interpret the results from the itemized tables, researchers looked at the weekly synchronous and asynchronous practice, called lesson plans. Recall that lesson plans were not designed with the CoI / CP in mind. Rather, lesson plans were initially modified from typical face-to-face classroom activities using the perceived affordances of digital tools as understood at that time.

Lesson Plans, General

Over the course of the semester, learners completed and participated in lesson plans over seven classes, each lesson consisted of the same general five components: *pre-class reading activities, class discussion, breakout room activities, main room debrief,* and *post-class reflection* (Table 3).

Table 3
Analysis of Lesson Plans

Activity	Description	Duration / Frequency
1. Pre-class reading activities	Students completed the following activities in order: 1. Apply academic reading strategies 2. Answer 'Guided Reading Questions' quiz 3. Listen to a 'Chapter Summary video' 4. Complete a 'Practice Quiz	7 weeks
2. Class discussion	Anonymous polls and/or informal questions to review main concepts of the assigned reading and encourage critical thinking	Weeks 1 - 3: approximately five minutes Weeks 4 - 7: 15 to 20 minutes
3. Breakout room activities	Students were given a new content source (e.g., listening - TedTalks/YouTube and/or reading - CBC News) and a problem to solve as a team. Skills practiced: listening, note taking, reading, working in groups (expressing ideas, agreeing/disagreeing politely, turn taking in conversation, various group roles, etc.), as well as academic skills (e.g., citing, referencing, providing support for arguments).	Varied, depending on activity.

	A volunteer representative from each breakout room group presented their findings while members of other groups took notes.	Varied, increased in length over the course of the term.
4. Main room debrief		
	As students' competence and confidence increased, debates and/or follow-up questions became the norm, both teacher- and student-initiated.	
		7 weeks
5. Post-class reflection	Learners completed a post-class reflection activity individually and asynchronously. Following the Rolfe et al. (2001) model of reflection, learners were asked to reflect on and describe their personal synchronous learning experience (i.e., their participation in, and the group dynamics of, synchronous, breakout room activities) and to consider how that experience may inform their future behaviour in synchronous and/or group work.	

Lesson Plans, Results and Discussion

The Practical Inquiry model, which includes four phases, is the means through which CP is operationalized and assessed (Garrison, 2017). Thus, to assess whether the synchronous and asynchronous lesson plans (Table 3) achieved CP, teacher-researchers chose to map Week 5 of the aforementioned five components described above onto the four phases of CP. This section reports on the specifics from Week 5 lesson plan (Table 4) and helps respond to the research question, *How does weekly task design and the facilitation of lesson plans, either synchronously or asynchronously, impact student and teacher perception of CP based on the four phases: triggering event, exploration, integration, and resolution*?

Table 4
Specific Lesson Plan Activities from Week Five of Seven as Related to the Four Phases of Cognitive Presence (CP)

CP phase	Lesson plan activity
Triggering Event	● Class discussion to review the main concepts of the assigned readings (Corrigan, 2019; Zhang & Pickwell-MacPherson, 2019) ● Watch and take notes on a YouTube video presenting a first-person account of the need for telesurgery (Demystifying Medicine, 2020)
Exploration	● Teacher designates groups as either proponents or opponents of 5G in healthcare. ● In breakout rooms, groups must develop a supporting argument, cited in APA style, with a minimum of three pieces of evidence from assigned readings (Corrigan, 2019; Zhang & Pickwell-MacPherson,

		2019) and/or the telesurgery video (Demystifying Medicine, 2020).
Integration		• After brainstorming ideas in phase two, students collaborate in breakout rooms to finalize their argument for/against 5G in healthcare.
• Back in the main room, a representative from each group presents ideas. As he/she is presenting, members from the same group voluntarily elaborate on or clarify ideas by turning on microphones and/or typing in the chat.
• Members from other, similarly designated groups (i.e., proponent or opponent) also offer and compare ideas.
• Members from dissimilarly designated groups offer ideas as a debate.
Resolution		• Students complete a post-class reflection activity where they reflect on their experience participating in lesson plans. One prompt asks them how they can improve in subsequent weeks, thereby encouraging reflection on any existing issues and the offering of potential solutions.
• Students are tested on the underlying skills associated with lesson plan activities through formative assessments (e.g., writing assignments, presentations, etc.).

The first phase, the triggering event, typically presents learners with "a dilemma or problem that students could relate to, based on their experience or previous studies" (Garrison, 2017, p. 56). In this phase, the problem is conceptualized. Thus, "the educational processes would include presenting information that generates curiosity and questions" (Garrison, 2017, p. 65). In this case, the assigned readings and asynchronous activities preceding the Week 5 lesson plan discussed the pros and cons of the use of 5G telecommunications in the health sector (Corrigan, 2019; Zhang & Pickwell-MacPherson, 2019). After participating in the class discussion which reviewed the main concepts of the assigned reading, students watched a YouTube video which presented a case study on the need for telesurgery (Demystifying Medicine, 2020). This video built on students' knowledge from the assigned readings and class discussion, and it piqued interest as it was presented in first-person format.

In the second phase, exploration, students search for relevant information and possible solutions to the problem presented in phase one. If working in groups, students are encouraged to explore ideas collaboratively to make sense of new information (Garrison, 2017). As they do so, they must "brainstorm ideas; offer supportive or contradictory ideas and concepts; solicit narratives of relevant perspectives or experiences; and elicit comments or responses as to the value of the information for ideas" (Garrison, 2017, p. 66). In Week 5, students were divided into breakout rooms and were designated the position of proponent or opponent of 5G in healthcare. Student groups were tasked with developing an argument, cited in APA style, which consisted of a minimum of three supporting points from the assigned readings (Corrigan, 2019; Zhang & Pickwell-MacPherson, 2019) and/or the telesurgery video (Demystifying Medicine, 2020).

The third phase, integration, moves the ideas generated in phase two to a more integrated and developed argument. As students collaborate to develop tentative solutions to the problem presented in phase one, they "integrate information; offer messages of agreement; build on other ideas; provide a rationale or justification; and explicitly offer a solution" (Garrison, 2017, p. 66). Teacher-researchers see this integration phase as overlapping with both the exploration phase (i.e., students collaborate in breakout rooms to first gather and then integrate information to reach a potential solution) and the third and fourth lesson plan steps discussed above. That is, during the weekly lesson plan, students seemed to complete the integration phase in breakout rooms, but later when a group representative was presenting findings to the class back in the main room, members of the same group would often turn on their microphone to elaborate or clarify the ideas presented by the representative or type such messages in the chat. In the specific case of the Week 5, where two groups were designated proponents and two opponents, members of different groups with the same designation chimed in while the representative presented findings, thus collaboratively integrating ideas both within a breakout room group as well as between groups. Additionally, members from groups with different designations offered ideas to contradict their classmates and trigger a debate.

The final phase, resolution, is characterized by offering and testing a potential solution to the problem presented in phase one (Garrison, 2017). However, the teacher-researchers argue that, in EAP, the resolution phase is less about finding a solution to the actual problem presented in the triggering event phase and more about the development of underlying academic and language skills associated with the task, such as collaboration. That is, though the focus of Week 5 was the use of 5G in healthcare, as EAP teachers, we are not concerned with whether our students actually learn about 5G or healthcare; this topic is simply chosen as a means through which to teach English through academic content. Thus, we see this phase as a resolution of issues in terms of required language and skills.

In this modified representation of phase four, the solutions offered are through the post-class reflection activity, where students are provided the opportunity to self-reflect on the inquiry process and collaborative experience (e.g., issues related to group dynamics, their own participation in the group work, etc.). Students are also prompted to reflect on how they can improve in subsequent weeks, thereby improving the conditions necessary for deep and meaningful learning to occur. Indeed, many students wrote that they were dissatisfied with their role and/or performance in group work and vowed to be more active, supportive, etc. in subsequent weeks. The testing of the issue (i.e., underlying skills) occurs through formative assessments in the class (e.g., writing assignments, presentations), where skills, such as citing and referencing, speaking, reading, etc. are formally assessed with feedback provided for future improvement.

Limitations

We recognize the limitations of this small study, namely the small number of participants and the fact that this was a convenience sample. However, we believe that the analysis of lesson plans, a novel approach, provides a meaningful way to investigate the impact of perceived CP and is a move away from text-based analysis used in earlier studies (Garrison et al., 2000; Oriogun et al., 2005; Vaughan & Garrison, 2005). In addition to convenience sampling, we chose to shift our focus from achievement outcomes in relation to all three presences and instead focus primarily on CP. Another limitation of this small study is that not all results from the

survey were analyzed. For example, questions 39 and 40 of the teacher survey asked about hours spent attending professional development workshops and the perceived impact these had on teacher preparation. While not explicitly motivated by the CoI framework, each of the teacher-researchers reported attending more than 10 hours of training and reported that this positively impacted their course design in preparation for fall 2020 teaching. Nevertheless, this was a drastic shift from familiar face-to-face contexts to fully online.

Implications

When a global pandemic forces teachers not versed in online pedagogy to teach fully online, and with very little time, what strategies work best? And what can we learn from these experiences moving forward to improve the design and facilitation of online and blended courses? As Garrison (2017) explains, "the challenge [with e-learning] is to understand how we can create and sustain communities of inquiry that will facilitate developing deep and meaningful approaches to learning" (p. 21).

We argue that the teacher or designer's facilitation of the three presences are what lead to successful CP in our study. This aligns with Vaughan et al.'s (2013) assertion that "of all aspects of the Community of Inquiry framework, the activities of facilitation are the most critical; facilitation manages the overlaps between all three presences and is at the core of the dynamics of a community of inquiry" (p. 46). Similarly, Bonk et al. (2005), in reference to blended learning contexts, suggest that teachers should "know when to shift gears or add new tasks or resources" (p. 564), which Vaughan, et al. (2013) suggest is how CP can be achieved. This is what our study sought to understand, and Garrison et al.'s (2000) practical inquiry model helps researchers identify indicators of CP within each of the four phases.

With respect to "shifting gears" (Bonk et al., 2005), teacher-researchers of the current study make the following suggestions for task design, lesson facilitation, and future research:
At the triggering event phase, teachers can use polls embedded in web conferencing tools, or external polling software, such as Poll Everywhere, as well as external media, such as a first-person account of a topic, to pique curiosity.

At the exploration stage, teachers could prompt or scaffold the activity so that students are more likely to succeed when seeking answers. Additionally, teachers could encourage students to turn cameras and microphones on, particularly in breakout room activities where the teacher is not always present to prompt participation. Inasmuch as possible, this may help to simulate face-to-face interaction. In this way, nonverbal cues can aid in the group discussion.

At the integration stage, synchronous lesson plans could include an additional asynchronous component (e.g., a discussion forum). Potentially, students would participate more in the integration phase if they were afforded more time to respond to classmates and in less risky scenarios (asynchronously) where they can edit their responses before publishing them.

In terms of the resolution stage, teachers could take a step back, particularly in blended and online contexts, and take a macro-level view of the overall plan (i.e., how the skill relates to the overall learning outcomes of the course). When the resolution phase carries over into subsequent, graded activities, the teacher should articulate and make explicit connections for the students of

the value of practice in lower stakes assignments (e.g., post-class reflections) in relation to performance on higher stakes assignments (e.g., an end-of-term writing assignment).

Generally, teachers are encouraged to devote time early in the semester to activities designed to build student relationships and cohesion (social presence), for example, by carefully matching students according to skill level or interests and facilitating team-building activities and friendly competitions. Additionally, reflection and other academic skills need to be more explicitly taught and modeled.

Future research might consider surveying students closer to the beginning as well as the end of term and comparing perceived reports of the three presences. Also, future research might look for a correlation between perceived CP and achievement of learning outcomes.

Conclusion

This small-scale study surveyed students from three sections of a post-secondary EAP course delivered entirely online in the fall 2020 semester. As well, it analyzed weekly lesson plans through the lens of the four phases of CP. While student participants consistently reported lower levels of CP than teacher participants in the triggering event and exploration phases, results were mixed for the integration and resolution phases. Importantly, student-reported experiences of the triggering event, integration, and resolution phases, increased with each iteration of the lesson plan (i.e., course section), suggesting that task design and facilitation play a major role in students' perceived experience of CP.

Online learning requires new approaches to pedagogy. Yet, with skills, training, and informed design principles, teachers can create rich online learning contexts that stimulate curiosity and the process of inquiry, thereby facilitating cognitive presence. In retrospect, we found the CoI framework a useful model in guiding and fine-tuning our online practice. The CoI framework helps to illuminate the student's perspective of the teaching, social, and cognitive presences, which, in turn, helps teachers and designers to improve learning communities and, ultimately, learning outcomes.

Declarations

This project received ethics clearance (Project #113192) from the Office of Research Ethics, Carleton University, Ottawa, Canada.

The researchers mitigated any risk or conflict of interest. Student participation was voluntary and anonymous. Data analysis was conducted after final grades were submitted and approved.

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Appendix A
Teacher Survey

1-3 demographic information

Teaching Presence
Design & Organization
4. As the instructor, I clearly communicated important course topics.
5. As the instructor, I clearly communicated important course goals.
6. As the instructor, I provided clear instructions on how to participate in course learning activities.
7. As the instructor, I clearly communicated important due dates/time frames for learning activities.

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

Direct Instruction
14. As the instructor, I helped to focus discussion on relevant issues in a way that helped me to learn.
15. As the instructor, I provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.
16. As the instructor, I provided feedback in a timely fashion.

Social Presence
Affective expression
17. As students got to know other course participants, it gave them a sense of belonging in the course.
18. Students were able to form distinct impressions of some course participants.
19. Online or web-based communication is an excellent medium for social interaction.
Open Communication
20. Students felt comfortable conversing through the online medium.
21. Students felt comfortable participating in the course discussions.
22. Students felt comfortable interacting with other course participants.

Group Cohesion
23. Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
24. Students felt that their point of view was acknowledged by other course participants.
25. Online discussions helped students to develop a sense of collaboration.

Cognitive presence
Triggering event
26. Problems posed increased student interest in course issues.
27. Course activities piqued student curiosity.
28. Students felt motivated to explore content related questions.

Exploration
29. Students utilized a variety of information sources to explore problems posed in this course.
30. Brainstorming and finding relevant information helped students resolve content related questions.
31. Online discussions were valuable in helping students appreciate different perspectives.

Integration
32. Combining new information helped students answer questions raised in course activities.
33. Learning activities helped students construct explanations/solutions.
34. Reflection on course content and discussions helped students understand fundamental concepts in this class.

Resolution
35. Students can describe ways to test and apply the knowledge created in this course.
36. Students have developed solutions to course problems that can be applied in practice.
37. Students can apply the knowledge created in this course to their work or other non-class related activities.

Additional questions
38. For the purposes of this research, synchronous learning is defined as a learning activity that is designed for students to engage in together and at the same time via text, voice, or chat and in the same online environment. Whereas, asynchronous learning is defined as a learning activity that is designed for students to complete independently and on their own schedule. These activities may occur in the online environment used for synchronous activities, but students are not expected to be engaged together and at the same time.

39. In preparation to move to a fully online teaching practice for the Fall 2020 term, please indicate how many professional development workshops you attended as offered by the university, the unit, or outside webinars, such as those offered by Contact North.

40. What impact did these workshops have in preparing you to teach this fall, especially in terms of the choice of tools and decision as to how much time to teach synchronously or asynchronously?

41. For each "normally" scheduled 3 hour class, students and teachers were online synchronously for approximately:

42. On average, how many hours / week (outside of class time) did you expect students to be online participating in assigned ESLA activities?

43.Which types of activities did you assign to students to complete online? (check all that apply)

44. Of the activities indicated above, which three did you assign most often? (1 = most often)

45. Which of the following web conferencing tools did you use? (check all that apply)

46. What did you use web conferencing tools for in your ESLA class? (check all that apply)

Appendix B
Student Survey

Teaching Presence
1. Consent
2. Yes/ no to proceed with online survey
3. I am a student of (section)
4. I am (age)
5. My first language is
6. I am comfortable trying new technology
7. I would rate my level of computer expertise as
8. My experience learning with technology, such as chat forums is
9. I use social networking sites, like WeChat, Facebook, Instragram, TikTok, ___hours per day
10. For my classes I mostly use (desktop, laptop, tablet)
11. When I am participating with other students and/or my teacher on a video conference call, I have my camera on.

Design & Organization

12. The instructor clearly communicated important course topics.
13. The instructor clearly communicated important course goals.
14. The instructor provided clear instructions on how to participate in course learning activities.
15. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation
16. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
17. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
18. The instructor helped to keep course participants engaged and participating in productive dialogue.
19. The instructor helped keep the course participants on task in a way that helped me to learn.

20. The instructor encouraged course participants to explore new concepts in this course.
21. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction
22. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
23. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.
24. The instructor provided feedback in a timely fashion.

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

Open communication
28. I felt comfortable conversing through the online medium.
29. I felt comfortable participating in the course discussions.
30. I felt comfortable interacting with other course participants.

Group cohesion
31. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
32. I felt that my point of view was acknowledged by other course participants.
33. Online discussions help me to develop a sense of collaboration.

Cognitive Presence
Triggering event
34 Problems posed increased my interest in course issues.
35. Course activities piqued my curiosity.
36. I felt motivated to explore content related questions.

Exploration
37. I utilized a variety of information sources to explore problems posed in this course.
38. Brainstorming and finding relevant information helped me resolve content related questions.
39. Online discussions were valuable in helping me appreciate different perspectives.

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

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