

Thank you for your awesome thoughts about the article:

Social interaction and critical thinking in student-facilitated online discussions

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Introduction

In the university-level English for Academic Purposes (EAP) program in which I teach, asynchronous online discussions (AOD) form a core component of the online reading classes. Discussion board forums are the primary venue for students to work collaboratively and scaffold each other's ability to think critically about the ideas set forth in a variety of authentic texts. However, my sense has been that for many students the process of critical thinking never gains much momentum. While this is not unique to the online environment, it does seem as if, much more so than in face-to-face classroom, the absence of critical thinking is related to a lack of social engagement. The main impetus of this research is to move beyond this impressionistic view and establish a more precise characterization of the quality of critical thinking that is present in online discussion forums and the factors that may be supporting or inhibiting its development. In particular, this study examines critical thinking and social interaction in the context of a peer-facilitated reading discussion task which was conducted over five weeks of an online advanced ESL reading class.

Literature Review

Asynchronous Computer-Mediated Communication

A number of researchers have recognized the potential of text-based asynchronous computer-mediated communication (CMC) to support higher level thinking. In particular, they have noted (a) how the decontextualized nature of writing forces online participants to be more precise and explicit (Lapadat, 2002); (b) how the relative lack of time constraints allows for greater reflection (Meyer, 2003) and the crafting of more coherent and substantive responses (Lapadat, 2002; Rourke & Anderson, 2002) than would be possible in face-to-face

communication; (c) how the ability to review archived posts enables the sustained development of ideas (Abrams, 2005; Lapadat, 2002); and (d) how the greater equalization of participation allows for the inclusion of a wider array of perspectives (Abrams, 2005; Lapadat, 2002).

Garrison, Anderson, and Archer (2000) assert that "it is the reflective and explicit nature of the written word that encourages discipline and rigor in our thinking and communicating" (p. 90), while Warschauer (1997) claims that text-based CMC has the potential to merge the reflection that has been characteristic of writing with the interactivity that has been characteristic of speech.

Because of these seeming affinities between text-based asynchronous CMC and higher levels of thinking, researchers have developed a number of models to empirically investigate the ability of this medium to support the co-construction of knowledge and/or critical thinking (Gunawardena, Lowe, & Anderson, 1997; Henri, 1992; Newman, Webb, & Cochrane, 1995).

One particularly prominent model is the Community of Inquiry (CoI) framework developed by Garrison et al. (2000). This framework recognizes critical thinking is a collaborative process embedded in a social context in which the absence of adequate leadership or communal feeling can foreclose the possibility of critical thinking, regardless of the potential affordances of the medium. Thus the CoI framework posits that deep and meaningful learning can occur in an online community of inquiry as the result of interaction of cognitive, teaching, and social presences, each of which is described in greater detail in the next section.

Community of Inquiry

Theoretical framework. In the CoI framework Garrison et al. (2000) broadly define cognitive presence as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (p. 89). More specifically, Garrison et al. (2000) operationalize cognitive presence through the "practical

inquiry” (PI) model. Like Garrison’s earlier work on critical thinking (Garrison, 1991), the PI model is heavily influenced by Dewey’s ideas of reflective thinking; it conceptualizes critical inquiry as a process grounded in experience and contingent on collaborative discourse. The PI model consists of four phases—trigger, exploration, integration, and resolution; Table 1 presents example indicators that characterize each of these phases (for a full list of indicators, see Appendix A). Foregrounding the importance of cognitive presence, Garrison et al. (2000) claim that “cognitive presence is a vital element in critical thinking, a process and outcome that is frequently presented as the ostensible goal of all higher education” (p. 89).

Table 1

Four Phases of the Practical Inquiry (PI) Model (Garrison, Anderson, & Archer, 2001)

Phase	Sample indicators
Triggering Events	Recognizing the problem Sense of puzzlement
Exploration	Brainstorming Information exchange
Integration	Convergence—among group members or within a single message Connecting ideas, synthesis
Resolution	Vicarious application to real world Testing and defending solutions

Garrison et al. (2001) define teaching presence, the second crucial element in a CoI, as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (p. 5). Teaching presence, however, need not be restricted to the instructor; many of the functions of teaching presence can also be assumed by other course participants. Anderson, Rourke, Garrison, and Archer (2001) divide teaching presence into three categories. The first of these, instructional design and organization, includes the

broad set of activities involved in determining the structure of and developing materials for an online course; orchestrating individual and group activities; and modeling effective and appropriate use of the medium. Many of the activities associated with instructional design and organization may be in place long before an online discussion even begins and thus somewhat hidden; other activities, such as the logistical decisions related to the time parameters or groupings, are more apparent in online discussions. The second category, facilitating discourse, includes communication that supports critical inquiry, such as discussion board comments reinforcing group member contributions or questions promoting discourse. In the final category of teaching presence, direct instruction, subject matter experts scaffold other participants' learning by sharing their disciplinary knowledge in various ways.

The third component in the CoI framework is social presence, communication focused on building and maintaining interpersonal relationships. Social presence is related to the concept of immediacy, "those communication behaviors that enhance closeness and nonverbal interaction with another" (Mehrabian, 1969, as cited in Rourke, Anderson, Garrison, & Archer, 1999). Early research into CMC characterized it as a lean medium unsuited to sustaining social relationships, but Rourke et al. (1999) claim that more recent research has challenged this notion and propose three different categories of responses—*affective*, *interactive*, and *cohesive*—through which both students and teachers can create a sense of social presence in an online environment. *Affective* responses allow participants to express emotions and create feeling of warmth through the means available in a text-based medium, such as self-disclosure, humor, and the use of emoticons or non-conventional spelling and punctuation. *Interactive* responses include quoting from other participants' messages and expressing appreciation or agreement in order to convey awareness of or interest in the contributions of others. Finally, *cohesive* responses "build and sustain a sense of group commitment" through such devices as the use of phatics, vocatives, and group references to "we" and "us" (Rourke et al., 1999, p. 8).

Empirical findings. The CoI framework has generated a substantial body of empirical research into cognitive presence in asynchronous CMC and its relationship to teaching presence and social presence. What follows is a review of selected findings relevant to the current study.

In terms of cognitive presence, research has shown mixed results. Some studies have reported that the greatest proportion of messages were coded at the level of integration (Akyol & Garrison, 2008, 2011; Meyer, 2004; Richardson & Ice, 2010; Schrire, 2004, 2006), while others have reported that the majority of messages were coded at the level of exploration (Arnold & Ducate, 2006; de Leng, Dolmans, Jöbssis, Muijtjens, & van der Vleuten, 2009; Pawan, Paulus, Yalcin, & Chang, 2003) In some instances, the large number of messages in the exploration phase are indicative of stalled inquiry; Pawan et al. (2003), for example, did not find any examples of resolution and concluded that the in-service teachers in their study “were mostly engaged in the presentation of positions rather than in inquiry” and primarily contributed “one-way serial monologues” (p. 137). However, in discussion board forums in which there is evidence of resolution, the much larger number of messages at the exploration and integration phase may simply be a natural artifact of the inquiry process: participants begin by generating a large number of relatively superficial ideas which are then consolidated into more substantial but less frequent messages.

In seeking to understand what enhances or inhibits the development of cognitive presence, a number of researchers have concluded that teaching presence is the decisive factor (Bangert, 2008; Garrison & Cleveland-Innes, 2005; Pawan et al., 2003). Garrison and Cleveland-Innes (2005) found that only in the course in which the instructor provided reflective tasks and sustained discussion board involvement designed to promote critical inquiry did students shift to

deep approaches to learning. They concluded that "neither social presence alone nor the surface exchange of information can create the environment and climate for deep approaches to learning and meaningful educational exchanges" (p. 144). Instead, teaching presence is required to "moderate and shape the direction of the discourse," though in a way that ensures the discussions are still student-centered (p. 145). It is possible, however, for individuals other than the instructor to contribute to a strong sense of teaching presence. Rourke and Anderson (2002) found that teams of graduate students acting as peer facilitators were able to adopt all three teaching presence roles and that students judged these peer-facilitated discussions to be "more responsive, more interesting, and more structured" than those led by the instructor (p. 13). However, they do qualify their finding by acknowledging that the instructor was able to assume "the teaching presence responsibilities that peer teams might have overlooked or struggled with," such as diagnosing misconceptions (p. 16).

Researchers have also noted that another aspect of teaching presence—task design, which falls within the category of instructional design and organization—also influences cognitive presence. Garrison (2007) logically argues that if the task does not "require a collaborative solution or artifact, the transcripts of online discourse will not reveal discourse that has moved to the resolution phase" (p. 66); other researchers have also observed that the structure and cognitive demands of the triggering prompt can influence the nature of the subsequent discussions (Meyer, 2004; Richardson & Ice, 2010). de Leng et al. (2009) address another aspect of task design, the value of making the expectations of critical inquiry transparent to students. de Leng et al. (2009) investigated the development of critical thinking among virtual groups of medical students working collaboratively to resolve biomedical questions triggered by personal experiences during work placements. When the virtual groups were formed students were introduced to the CoI framework and provided with a description and checklist for the

type of discourse expected during each phase. In the final week of the discussions the moderators asked students to shift into the "verification and resolution" phase by "introducing information from the literature to support or refute explanations suggested in the previous phase ...and examin[ing] whether the new insights offer useful explanations of situations and events in real practice" (de Leng et al., 2009, p. 4). The student checklist for this phase included the question "Are you applying newly gained insights to the problem and does that lead to resolutions, predictions, or conclusions?" (de Leng et al., 2009, p. 4) During this week students posted a high proportion of messages coded as integration or resolution, and so de Leng et al. (2009) conclude that "it is possible to steer the type of contribution by dedicating a certain week to a specific phase of the Practical Inquiry model" (p. 11). Taken together, these studies suggest that task design can have significant impact on the degree of cognitive presence that develops in an online discussion forum.

Cognitive presence is also related in significant ways to social presence. Garrison et al. (2000) argue that "socio-emotional interaction and support are important and sometimes essential in realizing meaningful and worthwhile educational outcomes" and so the establishment of adequate levels of social presence is necessary to facilitate cognitive presence (p. 95). Social presence also has a clearly documented relationship with perceived learning, if not with actual learning outcomes. Swan and Shih (2005) found strong correlations between students' perceptions of both instructor social presence and peer social presence with their perceptions of learning. Moreover, they reported that students with the highest levels of social presence attributed learning to opportunities for interacting with their classmates and being exposed to a wider range of perspectives on the discussion board, whereas students with the lowest levels of social presence attributed learning exclusively to the effort they put into writing messages for the discussion board. Swan and Shih (2005) concluded that there exist "meaningful differences in

student perceptions of the nature and purposes of online discussion” which can be attributed to differences in social presence (p. 131). Thus to understand students level of cognitive engagement in asynchronous discussion boards it is also fruitful to investigate the degree of social presence.

Alternative Perspectives on Critical Thinking

The CoI framework is attractive because it was specifically designed to address critical thinking in text-based, asynchronous discussion forums and encompasses a broad and active line of research. Moreover, the CoI framework is comprehensive, allowing for a consideration of teaching and social presences, potentially crucial elements in understanding how and why critical thinking does or does not develop. However, the PI model is just one of many critical thinking models. In fact, critical thinking is a widely used but inconsistently defined term which can be narrowly conceived as a specific set of argumentation skills or broadly conceptualized as disposition toward “reflective skepticism” (Brookfield, 1987). Researchers who have analyzed the same transcripts using multiple critical thinking frameworks have reported that findings are not consistent, implying that any one framework will illuminate—and neglect—different aspects of this construct (Meyer, 2004; Schrire, 2004, 2006). In response to this limitation, some researchers have built new models, while others have used more than one model.

In this case, there are several reasons to believe that the PI model alone may not adequately capture the critical thinking in the particular teaching context which is the focus of this study and that using a second model would be informative. To begin with, the empirical evidence for the cognitive presence construct in the CoI framework was grounded in an analysis of the discussion board transcripts produced by graduate students enrolled in content courses, whereas the course in question is a skills class composed of both undergraduate and graduate

students. Secondly, Garrison et al. (2001) note that their critical thinking model is a pragmatic one whose aim is the application of school learning to real-life situations and so might not be appropriate for contexts in which critical thinking is “based on abstract logical-thinking processes, such as deductive thinking and analysis of arguments” (p. 21). This raises two questions: whether the PI model is appropriate for the population of students enrolled in this course and whether it is congruent with the definition of critical thinking employed in this course. The first question is difficult to answer without actually applying the PI model and assessing the results; in this case, it would be useful to see how well the PI model performs in comparison with a different critical thinking model.

As for the second question, the exact nature of critical thinking in the current context is not fully articulated, but it seems to contain elements which align with the PI model and a more specific set of narrowly defined reading skills. The critical-thinking student learning outcomes state that students will be able to “evaluate authors’ messages, techniques, and arguments” and, as embodied in the course textbook, these include such skills as identifying the author’s assumptions and assessing the credibility, relevance, and sufficiency of the evidence the author uses to support his/her claims; these the PI model is not especially suited to capturing. At the same time, the emphasis is not just on parsing arguments but on engaging with texts through active reflection on lived experience. In this case, using two models may provide a more inclusive picture of these different dimensions of critical thinking.

Therefore I have chosen to supplement the CoI framework with the content analysis model developed by Yang, Richardson, French, and Lehman (2011) in order to explain cognitive activity not accounted for by existing models. Their model is new and as yet untested, but it is loosely based on the revised Bloom’s taxonomy. It consists of indicators of both knowledge

acquisition and cognitive skills, which Yang et al. (2011) define as “intellectual or mental activities that process information and stimuli” (p. 47). Table 2 summarizes the main levels of this model; more detailed descriptions can be found in Appendix B. Although this model was also created to describe cognitive activity in AODs and a number of descriptors reference the interactive nature of this context, it does not explicitly conceptualize critical thinking as chiefly collaborative venture. This is an advantage because, due to the nature of the task, parts of the OADs to be analyzed in this study reflect individual rather than collective efforts.

Table XX

Categories for Assessing Students’ Cognitive Learning (Yang et al., 2011)

Knowledge	Factual
	Conceptual
	Procedural
Cognitive Skills	Sharing, describing, seeking information
	Explaining, comparing, interpreting, clarifying
	Analyzing, concluding
	Applying
	Creating

Research Questions

The literature review above suggest that a number of factors are implicated in understanding critical thinking, and so this study attempts to answer the following research questions in relation to a peer-facilitated online discussion activity carried out as part of an advanced academic reading class:

1. In what ways and to what extent is cognitive presence/skills evident?
2. In what ways and to what extent is social presence evident?
3. In what ways and to what extent is teaching presence evident?

4. In what ways is social presence related to cognitive engagement?
5. What task design features could be changed in order to increase the probability of students engaging in critical thinking ?

Methods

This research project was initially conducted using discussion forum transcripts generated over five weeks of an online, advanced ESL Reading course offered through a large American public university. During these five weeks, students were divided into three small groups consisting of four or five students; for all five weeks, students engaged in the same task, “reading circle,” (RC) an activity in which one student chooses an article from a set of 25 potential articles¹, develops a set of comprehension and discussion questions, and then facilitates an online asynchronous discussion. Group membership remained constant throughout this activity, and so I treated the complete set of messages for each group as a case and adopted a comparative case study approach. I chose to focus on the two groups that were most clearly different from each other: when I originally graded this assignment, I felt that the students in group one were able to achieve much higher levels of interaction and group cohesion than the students in group two. It should be noted that because both of these groups consisted of four students, I chose the article, developed the questions, and led the discussion during the first week of the RC activity.

After initially coding the reading circle transcripts for social and teaching presence, I decided to also analyze transcripts from the first online discussion in which participants had worked together as a group in order to try to trace the ways in which social presence developed. This discussion was conducted two weeks earlier in the semester and included responses to an

¹ In the face-to-face version of this class, and indeed in previous online sections, students were asked to search for suitable article on their own. However, in this class I was concerned about the ability of some students to meet deadlines, and so I asked them to choose from a pool of articles other students had chosen for their reading circles.

instructor-generated prompt. In the end, I analyzed 68 messages totaling approximately 17,000 words from group 1 and 42 messages totaling approximately 8,000 words from group 2.

Content Analysis

In looking for evidence of critical thinking I used the cognitive presence protocol developed by Garrison et al. (2001) (see Appendix A) and the content analysis scheme developed by Yang et al. (2011) (see Appendix B). To gauge teaching presence I used the protocol developed by Anderson et al. (2001) (see Appendix C) and to assess social presence I used the protocol developed by Swan and Shih (2005) (see Appendix D) on the basis of the original protocol by Rourke et al. (1999).

The CoI protocols specify a number of categories for each presence and a number of concrete indicators for each category, while the Yang et al. (2011) content analysis scheme includes both categories and sub-categories. In some cases, such as identifying the use of vocatives or paralinguistic features such as emoticons, these indicators are unambiguous and easy to apply. However, in other cases the indicators or sub-categories are more problematic. Although they are useful for inferring the presence of latent projective variables such as features of individual and social cognition (Rourke, Anderson, Garrison, & Archer, 2001), coding at the indicator level can become difficult (Garrison, Cleveland-Innes, Koole, & Kappelman, 2006). For example, it might not be clear whether a message that contains a series of undeveloped ideas is an example of “brainstorming” or “information exchange”; however, it would be clear that it belonged to the “exploration” category of cognitive presence. Consequently for critical thinking I have used the indicators and sub-category as guides but coded at the category level.

A persistent issue when using content analysis is the decision regarding what unit of analysis to adopt. Because individual messages are objectively and easily identifiable by multiple

raters, they are more efficient to use and allow for the calculation of inter-rater reliability statistics; however, this can prioritize reliability at the expense of construct validity (De Wever, Schellens, Valcke, & Van Keer, 2006), as messages are not always fine-grained enough to capture the complexity of the construct being investigated (Rourke et al., 2001). Conversely, thematic units—defined by Henri and Rigault (1996) as “the smallest unit of delivery, linked to a single theme, directed at the same interlocutor (singular, plural, or indefinite), identified by a single type (linguistic), having a single function” (p. 62)—are not set *a priori* but decided by individual raters, introduce more subjectivity into the coding process but are potentially more meaningful (Rourke et al., 2001). Because the individual messages I analyzed contained responses to multiple questions, I used thematic unit as the unit of analysis for all three presences. In order to maximize intra-rater reliability I re-read the coded transcripts several times to make sure that thematic units which could be reasonably construed as belonging to different presences or categories were coded consistently across transcripts.

In order to help identify patterns, I tallied how many times each indicator of social or teaching presence occurred in the messages of each student in each reading circle; however, I have opted for a primarily qualitative approach to data interpretation. To begin with, as Rourke et al. (1999) notes, the social presence protocol gives all indicators equal weight, when in fact some may “represent a more labor-intensive, and thus a more conscious and willful, effort on the part of the student to interact with others” (p. 14). Moreover, there are qualitative differences in the ways in which a single indicator is deployed by various participants; an expression of appreciation, for example, can sound conventional and routine or be imbued with the participant’s personality, a distinction affects the degree of social presence it conveys. Most importantly, though, a table of numbers offers neither adequate description nor explanation of

the group dynamics. Similarly, although I tallied how many times an indicator of cognitive presence/skill occurred in response to each question in each reading circle, I have also analyzed these results in a more qualitative fashion.

Results

Quality of Thinking

Cognitive presence. In terms of cognitive presence as defined by the Garrison et al. (2001) model, neither group was able to move past the exploration phase: only one portion of one message was coded at the integration level. However, within the exploration phase, real differences did exist between the two groups; these are summarized in Tables 3 and 4. The first column labeled *Trigger* indicates the number of triggering events present in the follow-up posts, and the remaining columns indicate the number of responses coded as *Exploration* or *Integration*. For example, in RC 1, there were two triggering questions; the first elicited four thematic units coded as exploratory and the second elicited one.

These tables show that participants in group one engaged in substantially more joint exploration than participants in group two, differences which seem attributable to two factors. The first is the nature of the triggering questions. For example, during RC 2, the leader in group one posted one triggering question addressed to the entire group; as a consequence, group members responded in a collective fashion, acknowledging other members' contributions and then adding their own ideas. In contrast, the leader in group two posted three questions, one for each group member, and so individual group members simply responded to "their" question. The second, perhaps glaringly obvious, factor is that students in group one frequently posted follow-up messages, whereas students in group two frequently did not. The reasons for this will be explored in relation to social presence, but for now it is enough to note that there is no possibility

for the development of any level of cognitive presence when there is scant evidence of presence, period.

Table 3
Cognitive Presence in Follow-Up Posts, Group One

	Trigger	Exploration	Integration
Pre-RC	T1 → T2 → T3 → T4 → T5 → T6	E1 E2 E3→ E4→ E4 E5	I3
RC 1	T1→ T2→	E1→ E1→ E1→ E1 E2	
RC 2	T1→ T2→	E1 E2→ E2 →E2 → E2	
RC 3	T1→ T2→	E1 E2→ E2	
RC 4	T1→ T2→	E1→ E1→ E1 E2→ E2	
RC 5	T1→	E1→ E1→ E1→ E1	

Table 4
Cognitive Presence in Follow-up Posts, Group Two

	Trigger	Exploration
Pre-RC	T1 → T2	E1→ E1
RC 1	T1	
RC 2	T1 → T2 → T3	E1 E2
RC 3	T1 → T2	E1
RC 4	T1 →	E1
RC 5	T1 →	E1

Tables 3 and 4 only report cognitive presence from the follow-up messages in the RC, not from the initial posts in which group members responded to the four comprehension and four discussion questions posed by the group leader. The reason for ignoring these initial messages is simple: they read as if they were composed individually, out of sight of the discussion board and without reference to what other group members might have already written. Although in their follow-up comments participants occasionally referred back to the content of these initial messages (generally to express simple agreement), on the whole they seemed disconnected from the actual discussion activity. Thus it did not feel appropriate to examine them with an instrument meant to describe a collaborative process. This disconnection does, however, suggest ways in which the task might be revised, a possibility taken up in the discussion section.

Cognitive skills. As it accommodates individual as well as collaborative efforts, the Yang et al. (2011) model was applied to the initial messages as well as the follow up posts. In terms of the level of cognitive skills students were able to deploy, the findings confirm those of the cognitive presence model: only one part of one message was coded at the analysis/conclusion level. Otherwise, participants' responses were characterized as belonging to the *sharing, describing, and seeking information level* or *explaining, comparing, interpreting, and clarifying level*. Thus it does not appear that students were able to achieve higher levels of thinking.

However, this model was not particularly sensitive and so did not contribute much to understanding possible differences between groups or individual members. For example, all messages in which ideas are supported by “underlying reasoning, rationale, or personal explanation and examples” belong to one level of cognitive skills, regardless of how well-elaborated, relevant, or logical the support is. Thus analysis of transcripts with both the Garrison et al. (2001) and Yang et al. (2011) models leads to two broad conclusions; (a) as suspected,

students are not achieving high levels of critical thinking, but (b) a model developed specifically for this context would yield more precise results.

Social Presence

Analysis of both groups' transcripts revealed two trends common to both groups. First, across all five reading circles the initial messages in which students posted their responses to the comprehension and discussion questions contained almost no indicators of social presence except personal examples; these were often answers to questions that explicitly obliged students to draw on their personal experiences. This lack of social presence indicators, and in particular the complete dearth of any interactive indicators, reinforces the impression, discussed in the previous section, that the initial messages were not well integrated into the discussion. Second, when it was their turn to be the reading circle leader, participants generally posted messages which contained more social presence indicators, suggesting that they recognized a social dimension to their responsibilities as group leaders.

Otherwise, though, the evidence of social presence in the two groups was quite different, with the transcripts of group one yield many more types and instances of social presence. More importantly, in group one, these indicators seemed to contribute to a sense of group cohesion lacking in group two. Although a number of social presence indicators potentially contribute to the sense of group cohesion, here I will focus on two in particular: expressions of appreciation and expressions of shared responsibility.

Table 5 includes examples of many, though certainly not all, of the expressions of appreciation produced during the first group discussion (pre-RC) and the five RCs. This rather extensive catalogue of examples is meant to illustrate several features of these expressions of appreciation: they were produced more frequently but not exclusively by group leaders, each of

whom interjected their thanks throughout the RC and then in a summary statement at the end; while some participants were more effusive than others, each participant offered their appreciation multiple times; these expressions frequently incorporated other social presence indicators, such as vocatives; and some of these expressions were highly personalized. In contrast, the transcripts of Group 2 included two expressions of thanks: in the pre-RC, one participant thanked another for defining a word, and in RC 2 the group leader wrote “Thank you everyone for all the responses.” Although repeated expressions of appreciation are in no way obligatory for a group to have a successful discussion, in this case they serve as a proxy for the other interactive indicators and highlight the sense of congeniality present in group one and largely absent in group two.

Table 5

Expressions of Appreciation, Group One

	Example
Group members thanking each other or the group leader	<ul style="list-style-type: none"> • <i>Thanks for interpreting and trying to make me understand from your own perspective, I appreciate it a lot!</i> (Mali, pre-RC) • <i>Thank you for the encouragement.</i> (Victoria, pre-RC) • <i>Thank you for bringing it up. It is really interesting.</i> (Sue, RC2) • <i>Thanks for your leading for this reading circle.</i> (Wei, RC3)
Group leaders thanking group members during the RC	<ul style="list-style-type: none"> • <i>Thank you Victoria for your awesome thoughts about the article.</i> (Mali, RC 2) • <i>Thank you Wei! Remember when you told me you wanted to be like me in posting my assignments early? Well now you are the first one to post your answers and good job! I really like all your answers, i see that you payed close attention while reading the article and all your responses are really good.</i> (Victoria, RC 3) • <i>Thank Victoria and Mali for the answers to those questions.</i> (Sue, RC 4) • <i>Thanks Mali and Victoria to join in this discussion.</i> (Wei, RC 5)
Group leaders thanking group	<ul style="list-style-type: none"> • <i>Thanks ladies for all the great AWE-MAZING (awesome & amazing) thoughts. I'm am glad all of you three get to enjoy the reading and</i>

- members at the end of the discussion
- *contributed to my comprehension and discussion questions. Appreciate all the great works, well done!* (Mali, RC2)
 - *Thank you Sue, Wei, and Mali. this weeks reading circle was definitely successful and I'm happy I got the chance to be your reading circle leader this week.* (Victoria, RC3)
 - *Anyways, thank you guys for the excellent discussion for week 10.* (Sue, RC4)
 - *Thanks again to join this discussion. I feel so happy that we can discuss such an interesting topic together.* (Wei, RC5)
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Table 6

Expressions of Shared Responsibility, Group One

Responsibility to...	Examples
complete assignment	my apology, i will get back to question 3 because have not really quite completed my answer for it. (Mali, RC 1)
post on time	Please excuse my late arrival. (Wei, RC 2)
help each other	I have prepared a couple of comprehension and discussion questions for all of us so that we can discuss and help each other better understand the article. (Victoria, RC 3)
work as a group	After Wei posting his answers, we can have more discussions later. (Sue, RC4)

Expressions of shared responsibility are not listed on either the Rourke et al. (1999) or Swan and Shih (2005) protocols for social presence, but I created this category after noticing that participants in group one were apologizing to each other nearly as frequently as they were thanking each other. Primarily, participants offered their apologies for posting late; occasionally, they regretted not knowing an answer. These expressions indicated that group members understood the RC as a collaborative endeavor whose success was partially dependent on their participation; this idea also seemed present in comments in which group leaders framed discussion as a mutually supportive process. Thus I grouped these types of statements together

into one category, shared responsibility. This sense of responsibility in group one seemed to translate into a commitment to participate consistently; only twice did group members neglect to follow up on their initial post with additional comments. In contrast, members of group never expressed a sense of obligation and frequently did not participate: in every RC, one or two group members posted their initial responses to the comprehension and discussion questions and then never returned to the discussion board.

Teaching Presence

During their turn as group leader, each of the participants produced at least one thematic unit which was coded as *promoting discussion* under the *facilitating discourse* category of teaching presence; some group leaders' messages also contained evidence of *identifying areas of agreement* or *acknowledging group member contributions*. However, these labels do not adequately capture the varying effectiveness of the group leaders' attempts to facilitate discourse. Table 7 includes the triggering events mentioned in relation to cognitive presence: the first elicited a relatively vigorous group response, while the second elicited individual answers from two group members and no collaborative discourse. In both instances the participants attempt to acknowledge their group members' contributions and prompt further discussion, but the fragmented nature of the second set of questions makes it difficult for a cohesive discussion to ensure. These examples are representative of their respective groups; overall, the leaders in group one were more effective in facilitating discourse than the leaders in group two.

Table 7
Examples of Facilitating Discourse, Group Leaders

Group One	<i>I find that all of you understood about Dr. Dunbar's purpose and settings of his experiments and that the type of laughing he was focused on was relaxed and contagious "social laughing." Thus, all of us may agree that laughing contributes to social bonding.</i>
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One more question I have for the three of you, Have you ever thought that laughing has negative effects; for example, instead of bringing groups of people together it may break-up strong bonds? Try to relate your answer to your experience. (Sali, RC 2)

Group Two *Thank you everyone for all of the responses.*

Mariah: Do you think that the parents are the only languages that babies hear from and get accents from? If there are other resources, what do you think they would be?

Sharon: What do you think is the best way to avoid language interference to a new language?

Li: Are there other good ways to improve your accent other than talking to your English speaking friends? (Yuki, RC2)

Discussion

Social Presence & Cognitive Engagement

It is beyond the scope of this study to suggest that social presence is necessary for critical thinking. Social presence may not facilitate movement from exploration phase to integration and resolution, or from “sharing and comparing” to analysis and conclusion. However, it is quite clear that group one exhibited relatively high levels of social presence and participation, whereas group two exhibited low levels of social presence and participation. Consequently, students in group one engaged in collaborative exploration, while students in group two did not; without this initial exploratory phase, higher levels of thinking are unlikely to materialize. Thus social presence seems to serve a critical role, and though the present findings do not pinpoint the factors that enable social presence to flourish, they do suggest that this is an aspect of OADs both teachers and researchers should attend to.

Task Redesign

The findings of this study suggest a number of ways in which the RC task could be

redesigned. The present practice of asking students to concurrently answer multiple comprehension and discussion questions at the outset of the assignment seems to be producing long, static messages that are not ideal for promoting interaction and collaboration. Moreover, if the goal of this assignment is to prompt students to engage deeply with a text and pursue critical inquiry, dispersing their efforts among six or eight initial questions is less productive than focusing their attention on one. One recommendation, then, is that student leaders ask just one substantial question that resists easy answers and whose resolution depends on a understanding of the text(s) and the application of personal values or experience, thus integrating comprehension and discussion.

The fact that group one was able to establish a relatively high level of interaction but still did not progress beyond the exploration phase or the *explaining/comparing/interpreting* level suggests the need for stronger teaching presence if students are to reach higher levels of critical thought. This could include aspects of instructional design, such as making explicit the desired critical thinking model, providing students with descriptions and checklists, and then articulating different phases of the discussion to the model as was done by de Leng et al. (2009). The differential success of student leaders' attempts to stimulate discussion also points to the need for specifying the characteristics of successful bids at facilitating discourse and communicating these to group leaders. Finally, because group leaders may not be able or socially inclined to do anything other than praise and encourage their group members, this task also likely calls for stronger teaching presence in the form of sustained instructor feedback. This could be directed to groups or individuals or both, but it seems clear that the instructor should be more active in pointing out to students opportunities to move beyond the sharing of personal experiences, e.g. places where textual support, analysis, the testing of evidence against established criteria, etc. are

called for.

In order not to impinge on the cognitive and affective benefits associated with peer-facilitated discussion (Rourke & Anderson, 2002), these interventions should not be intrusive and should, perhaps, be reserved for a post-task, reflective phase. This suggests the need to restructure the time parameters of this activity. In its current implementation, each RC followed directly on another, so that the day students finished posting follow-up comments for one RC they were assigned the comprehension and discussion questions for the next. Without time for students to receive and respond to feedback there is little chance that simply engaging in more discussion will lead to improved outcomes.

Limitations

Some limitations are specific to this study. To begin with, although I read the transcripts repeatedly to try to ensure self-consistency, this reliability of the coding decisions could have been improved if an additional researcher had also coded the transcripts. A second limitation is that the two models used to code for critical thinking and cognitive learning (Garrison et al., 2001; Yang et al., 2011) were imported from research contexts in which the priority was efficiently and reliably coding a large number of messages in order to generate quantitative results; moreover, these models addressed critical thinking in content courses. Consequently, while each model offers a starting point, neither is satisfactory. For a more precise and nuanced description of the discourse generated by the two groups of students it would have been useful to develop a critical thinking protocol specifically for this context. A third limitation has to do with the rather narrow treatment of teaching presence; it would have been useful to carefully examine the quality of the group leaders' original comprehension and discussion questions.

Other limitations are typical of many studies which rely only on content analysis of

discussion board transcripts in order to reach conclusions about critical thinking. Multiple researchers have noted the incomplete nature of discussion board transcripts, which do not capture the critical thinking students might be engaged when reflecting individually or engaging in other off-line activities, particularly other course projects (Arnold & Ducate, 2006; Garrison et al., 2001; Shea et al., 2010). For example, Akyol and Garrison (2011) note that although the final resolution phase accounted for less than 10% of all postings in the two classes they studied, the majority of students felt that they were able to reach the resolution phase by completing their final project; the instructor also felt that this project was the "true measure of cognitive presence" (p. 243). Thus it is legitimate to question whether it reasonable to expect online discussions need to demonstrate the full cycle of critical inquiry, or the highest levels of cognitive skills, when in fact they may represent just one step in a larger process. It would have been illuminating to look at the other course work produced by the participants in this study. Additionally, a number of researchers have used (Akyol & Garrison, 2011; Schrire, 2004, 2006; Swan & Shih, 2005) or advocated (Pawan et al., 2003) a mixed methods approach. This study too would have benefited from additional data sources, including interviews, questionnaires, or self-reflection assignments designed to elicit students' perceptions of the extent to which the peer-facilitated online discussions helped them to develop their critical thinking skills and the factors which they perceived to help or hinder this development.

Future Directions

In the previous section I have suggested some ways in which this study could be further refined: using the existing data set, I could enlist a second person to code the transcripts, develop a critical thinking protocol using a grounded theory approach, and examine the participants' other course assignments for evidence of critical thinking. However, given the flaws I have

identified with the current task design, I believe it would be more profitable to look at the level of discourse students engage in when the task is optimized to promote critical thinking. Ideally, I would re-design and implement the reading circle task based on the current findings and then analyze the resulting transcripts.

Unfortunately, as I will be teaching a hybrid /online version of an advanced EAP writing class for graduate students instead, this will not be possible. Instead, what will be possible is to transfer the insights gained from this project to the design of online discussion board assignments in the writing curriculum. As promoting critical thinking is a cross-curricular objective within this program, modifying an existing activity or creating space for a new one should not be a problem. As part of the course requirements I would also include written self-reflection tasks that would serve (a) a real pedagogical purpose, in line with other assignments that ask students to reflect on their learning, and (b) as potential sources of information (pending their consent) regarding students' evaluation of the effectiveness of the discussion board assignments. Thus with some advanced planning I would be able to create a research design that also taps students perspectives on their learning.

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Appendix A

Protocol for Analysis of Cognitive Presence (adapted from Garrison et al., 2001)²

Phase	Indicators	Sociocognitive processes
Triggering Events (evocative)	Recognizing the problem	Presenting background information that culminates in a question
	Sense of puzzlement	Asking questions; messages that take discussion in new direction
Exploration (inquisitive)	Divergence—within the online community	Unsubstantiated contradiction of previous ideas
	Divergence—within a single message	Many different ideas/themes presented in one message
	Information exchange	Personal narratives/descriptions/facts (not used as evidence to support a conclusion)
	Suggestions for consideration	Author explicitly characterizes message as exploration—e.g. “Does that seem about right?”
	Brainstorming	Adds to established points but does not systematically defend/justify/develop additions
Integration (tentative)	Leaps to conclusion	Offers unsupported opinion
	Convergence—among group members	Reference to previous message followed by substantiated agreement, e.g. “I agree because...” Building on, adding to others’ ideas
	Convergence—within a single message	Justified, developed, defensible, yet tentative hypothesis
	Connecting ideas, synthesis	Integrating information from various sources—textbook, article, personal experience
	Creating solutions	Explicit characterization of message as a solution by participant
Resolution (committed)	Vicarious application to real world	None coded
	Testing solutions	
	Defending solutions	

² As noted by Pawan, Paulus, Yalcin, and Chang (2003), two of the indicators—divergence within a single message and convergence within a single message—will not be relevant if a thematic unit is used as the unit of analysis.

Appendix B

Protocol for Analysis of Cognitive Skills (adapted from Yang et al., 2011)

Category	Subcategory
Sharing, describing, seeking information	Referring to or describing personal experiences and examples related to discussion topic; agreeing or disagreeing with others or assigned reading materials without much new information
	Describing or communicating one's own or others' hypothesis, position, perspective or opinions without explanation or reasoning; summarizing discussions or assigned reading materials without much interpretation
	Observing, asking questions related to discussions or reading materials
Explaining, comparing, interpreting, clarifying	Providing info/answering questions when asked
	Suggesting or providing personal solutions or answers
	Providing/describing opinions/perspectives with explanations/examples
	Reorganizing knowledge elements in the learning process
Analyzing, concluding	Clarifying misconceptions or misunderstandings of a concept or principle
	Defining or redefining terms and terminologies
	Identifying the linkages or relationships between problems and ideas
	Comparing, contrasting, or distinguishing two or more ideas, opinions, or perspectives
	Breaking down a complex whole into its elements or parts
	Appraising
	Evaluating or assessing ideas, points, or perspectives
	Reaching or forming a decision or consensus

Applying	Demonstrating or illustrating the use of a theory, principle, or tool, etc. Integrating the theories, principles, tools, or research findings into practice Solving problems or suggesting solutions according to a learned theory or principle
Creating	Raising new ideas for discussion, study, research, etc. Creating, constructing, or assembling a new object, concept, perspective, etc. not previously illustrated Designing or developing an object or project

Appendix C

Protocol for Analysis of Teaching Presence (adapted from Anderson et al., 2001)

Category	Indicators
Instructional design and organization	Setting curriculum
	Designing methods
	Establishing time parameters
	Utilizing medium effectively
Facilitating Discourse	Establishing netiquette
	Identifying areas of agreement/disagreement
	Seeking to reach consensus/understanding
	Encouraging, acknowledging, or reinforcing student contributions
	Setting climate for learning
	Drawing in participants, prompting discussion
Direct Instruction	Assessing the efficacy of the process
	Presenting content/questions
	Focusing the discussion on specific issues
	Summarizing the discussion
	Confirming understanding through assessment and explanatory feedback
	Diagnosing misconceptions
	Injecting knowledge from diverse sources, e.g. textbook, articles, Internet, personal experiences (includes pointers to resources)
	Responding to technical concerns

Appendix D

Protocol for Analysis of Social Presence (adapted from Swan & Shih, 2005, Rourke et al., 1999)

Category	Indicators	Definition
Affective	Paralanguage	Features of text used to convey emotion (i.e. emoticons, exaggerated punctuation and spelling)
	Emotion	Use of descriptive words that indicate feelings
	Value	Expressing personal values, beliefs, & attitudes
	Humor	Use of humor—teasing, cajoling, irony, sarcasm, understatement
	Self-disclosure	Sharing personal information, expressing vulnerability
Interactive	Acknowledgement	Referring directly to the contents of others' messages; quoting from others' messages
	Agreement/disagreement	Expressing agreement or disagreement with others' messages
	Approval	Expressing approval, offering praise, encouragement, expressing appreciation
	Invitation	Asking questions or otherwise inviting response
	Personal advice	Offering specific advice to classmates
Cohesive	Greetings & salutations	Greetings, closures
	Phatics	
	Vocatives	Addressing or referring to participants by name
	Group reference	Referring to the group as “we,” “ us,” “our”
	Social sharing	Sharing information unrelated to the course
	Course reflection	Reflection on the course itself