

Facilitating Cognitive Presence in Online Learning: Interaction Is Not Enough

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This study assessed the depth of online learning, with a focus on the nature of online interaction in four distance education course designs. The Study Process Questionnaire was used to measure the shift in students' approach to learning from the beginning to the end of the courses. Design had a significant impact on the nature of the interaction and whether students approached learning in a deep and meaningful manner. Structure and leadership were found to be crucial for on-line learners to take a deep and meaningful approach to learning.

Interaction is seen as central to an educational experience and is a primary focus in the study of online learning. The focus on interaction in online learning emerges from the potential and properties of new technologies to support sustained educational communication. Communication and Internet technologies provide a high degree of communicative potential through asynchronous interaction design options (Garrison and Anderson 2003). From an access perspective, participants are able to maintain engagement in a community of learners when and where they choose.

Notwithstanding the widely recognized potential of new and emerging communications technology to connect learners, until recently much of the research of collaborative online learning focused on egalitarian possibilities. Educators were quick to seize the possibility of a more democratic ap-

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proach to education as a reaction to the traditional passive, controlling nature of much of higher education. However, concerns about the lack of physical presence focused early attention on understanding the social context or presence of online learning. Participation and belonging were to be valued first and foremost. In essence, online forums were chat rooms where participation was the primary goal.

The purpose of an educational experience, whether it is online, face-to-face, or a blending of both, is to structure the educational experience to achieve defined learning outcomes. In this context, interaction must be more structured and systematic. A qualitative dimension is introduced where interaction is seen as communication with the intent to influence thinking in a critical and reflective manner. Some have argued that in higher education, it is valuable and even necessary to create a community of inquiry where interaction and reflection are sustained; where ideas can be explored and critiqued; and where the process of critical inquiry can be scaffolded and modeled. Interaction in such an environment goes beyond social interaction and the simple exchange of information. A community of inquiry must include various combinations of interaction among content, teachers, and students (Anderson and Garrison 1997; Moore 1989).

Interaction in Distance Education

Moore (1989, 1990) was one of the first to focus on interaction issues in distance education. He identified transactional distance as consisting of dialogue (i.e., interaction) and structure (i.e., design). Moore (1989) expanded on the dialogue variable and defined three core types of interaction: learner–teacher, learner–content, and learner–learner. Dialogue or interaction was recognized as a crucial variable in a distance education environment, which was not necessarily the case with an industrial design approach. Moore’s work precipitated growing interest in issues around interaction in a distance or online learning context. Others accounted for all possible combinations of interaction based on teacher, learner, and content variables (Anderson and Garrison 1997).

To capitalize on the potential of online learning for educational purposes, a qualitative shift in the nature of the interaction must be considered. Garrison, Anderson, and Archer (2000) provided a model of a community of inquiry that maps and defines educational presence. A community of inquiry is more than a social community and more than the magnitude of interaction among participants. A community of inquiry is the integration of cognitive, social, and teaching presence. Considered together, the three presences ad-

dress the qualitative nature of interactive inquiry consistent with the ideals of higher education. To appreciate interaction and the quality of learning outcomes, one must understand how cognitive, social, and teaching presence come together to create a purposeful community of inquiry.

An interactive community of learners is generally considered the *sine qua non* of higher education. However, interaction is not a guarantee that students are cognitively engaged in an educationally meaningful manner. High levels of interaction may be reflective of group cohesion, but it does not directly create cognitive development or facilitate meaningful learning and understanding. Interaction directed to cognitive outcomes is characterized more by the qualitative nature of the interaction and less by quantitative measures. There must be a qualitative dimension characterized by interaction that takes the form of purposeful and systematic discourse.

Interaction and Presence

Picciano (2002) made a distinction between interaction and presence. Interaction carries with it few conditions with regard to the nature of the communication and influence. Interaction by itself does not presume that one is engaged in a process of inquiry and cognitive presence exists. An educational experience sets a qualitative standard perhaps best reflected by the model of a community of inquiry. A community of inquiry integrates cognitive, social, and teaching elements that go beyond social exchanges and low-level cognitive interaction (Garrison and Anderson 2003). Rovai (2002) found a “positive significant relationship between a sense of community and cognitive learning” (328).

Although the natural and appropriate inclination is to first direct interaction efforts to establishing social presence and creating interrelationships, this is only a precondition for a purposeful and worthwhile learning experience. Teaching presence is important for the creation and sustainability of a community of inquiry focused on the exploration, integration, and testing of concepts and solutions. This has been shown to be true in informal professional development forums, where there is considerable discussion but most of it is of a social nature with only a low level of cognitive exchange (Kanuka and Anderson 1998). This also holds true in more formal academic settings where there is a growing body of research showing that the quantity of interaction does not reflect the quality of discourse (i.e., cognitive presence) as measured by the progression through the phases of the practical inquiry model (Garrison, Anderson, and Archer 2001; Meyer 2003; Pawan et al. 2003).

Understanding interaction for the purposes of inquiry is complex. Moreover, students are not always prepared to engage in critical discourse, especially if this is in an online learning environment (Angeli, Valanides, and Bonk 2003). This was congruent with the finding of Garrison and Cleveland-Innes (2004) in that the greatest student adjustment to online learning was most directly associated with issues of interaction—both socially and cognitively. Interestingly, in this study, establishing social presence was more heavily shaped through peer interaction. With regard to successful higher-order learning, however, Garrison and Cleveland-Innes concluded that teaching presence in the form of facilitation is crucial in the success of online learning.

There is considerable literature pointing to the relation between teaching presence and perceived learning (Jiang and Ting 2000; Pawan et al. 2003; Picciano 2002; Shea, Pickett, and Pelz 2004; Swan 2001). Swan (2001) concluded that “interaction with instructors seemed to have a much larger effect on satisfaction and perceived learning than interaction with peers” (322–323). More specifically, Angeli, Valanides, and Bonk (2003) studied the quality of online discourse and with low-level mentoring found that only “7% of the replies were justified opinions and claims” (37). Similarly, Wu and Hiltz (2004) reported that online discussions are related to perceived learning but varied according to instructional approach. They stated that the instructor’s role is crucial to effective online discussions and “more online guidance, more structured discussion topics and considerable time devotion are required for instructors” (149). Finally, Hay et al. (2004) found in a study comparing online and traditional courses that “instructor-to-student interaction was the stronger of the two interaction measures [student–student the other] in terms of predicting effectiveness for both types of delivery” (200). The primary reason is that instructors are more concerned with fulfilling interaction needs.

Interaction and Critical Discourse

Accepting that interaction is not equivalent to critical discourse or sufficient for sustaining a community of inquiry, what then do we know about teaching and cognitive presence in terms of influencing quality learning outcomes? Synthesizing some of the literature, it would appear that critical discourse and teaching presence have some common features. The first is that if students are to reach a high level of critical thinking and knowledge construction, the interaction or discourse must be structured and cohesive (Aviv et al. 2003; Pawan et al. 2003; Thomas 2002; Wu and Hiltz 2004).

The design feature of successful online courses demonstrates structured discourse that facilitate clear discussion threads, avoid disjointed monologues, and move the discussion through the phases of inquiry (levels of thinking). Another important feature found in the literature is clearly defined roles (Aviv et al. 2003; Garrison and Cleveland-Innes 2004; Hiltz and Turoff 1993; Meyer 2003; Tagg and Dickenson 1995). Here we find the leadership role of the instructor to be powerful in triggering discussion and facilitating high levels of thinking and knowledge construction.

Deep and Surface Learning

Levels of thinking and knowledge construction are learning process goals across delivery methods in education. Higher-order learning emerges in a community of inquiry. The concept of approaches to learning (commonly referred to as deep and surface learning) and related models (Biggs 1990, 1998; Entwistle 1991, 1993) provide a framework for understanding the complex web of relations between learning context and learning processes that result in particular outcomes for individual students. The instrumentation from this model was used to evaluate the conditions under which deep learning emerges in online education. Approaches to learning are both a process that carries a student through the learning environment and an outcome resulting from a student's engagement with the learning environment. Social and academic interaction in learning environments, whether online or face-to-face, has a demonstrated impact on the approach to learning and outcomes (Cleveland-Innes and Emes 2005).

"Approaches to learning" emerge from the combination of student motivation and strategies for learning. Students employ varying degrees of three different approaches to learning: deep, surface, and achievement approaches. In a deep approach to learning, material is embraced and digested in the search for meaning. Surface learning employs the least amount of effort toward realizing the minimum required outcomes. Surface learners are motivated to complete the task rather than assimilate the learning. Achievement approaches to learning are reflected by an orientation to the external reward for demonstrating learning. Strategies for the achievement orientation focus on the activities that will result in the highest marks.

All students are capable of employing any of the three approaches and do so as required by the learning environment; they choose strategies deemed to be most effective based on the requirements in the environment. Students can move from one approach to another and do so in response to the climate and requirements of the course. Without question, a deep ap-

proach to learning is the approach to foster in higher education. The mastering of material through detailed attention to the intricacies, substance, and limits of a subject area leads to improved academic performance (see, in particular, Svensson 1977).

Much has been written about teaching practice leading to deep approaches to learning in higher education (e.g., Ramsden 1992; Trigwell, Prosser, and Waterhouse 1999). Contextual factors such as workload and time constraints, type of learning evaluation, the opportunity for metacognition, the shift of learning management to the students themselves, and instructor explanation, enthusiasm, and empathy have all been indicated in the development of deep learning.

Method

The study was conducted from January 2003 to April 2004. It administered the Study Process Questionnaire to the online course participants (seventy-five students participated) to measure changes in how graduate students choose to strategize their learning in a particular learning setting. These can be either deep, surface, or achievement approaches to learning. Students were asked to complete the questionnaire in reference to the course in which they were currently engaged. Scoring of the instrument integrates motivation and activity relating to all three approaches (i.e., a score for the amount of each approach used by the student is documented at each test). The questionnaire was administered via e-mail and provided predata and postdata on student approaches to learning. Norms for this instrument reference undergraduate students only, so they were not used as a point of comparison for this study. This instrument demonstrates internal consistency and coefficients of alpha that ranged from .51 to .81 (Biggs 1987). Questionnaires were delivered electronically via e-mail and returned to research assistants the same way.

Courses for this study were purposively chosen based on level of interaction and variation in instructor presence. In addition, core courses normally taken early in each of two programs were selected to include the greatest number of novice online learners and across programs to eliminate program bias. Four courses were chosen involving a total of seventy-five students. All courses were delivered using a combination of print and online conferencing. The online conferencing component provided the opportunity for student–instructor engagement and group interaction. Required conference participation was used for assessment in two courses, whereas it remained a voluntary activity in the others.

The four treatment groups varied from each other in the following ways (see Table 1). In Course A, students critically analyzed readings in small groups with very little instructor involvement. Course B had students respond to text “lectures” individually but with little instructor involvement. However, both Courses A and B graded for participation and as a result there was quantitatively substantial online discussion. Course C had voluntary participation with considerable instructor engagement and presence, but students moderated their own discussion in various forums. It should be noted this was a survey course of the history and foundations of distance education and, therefore, there was less need or opportunity for critique and debate. Course D was designed with deep approaches in mind. There was a high level of instructor engagement with the students in and out of the conferences. There were only four conferences and participation was not required. However, the instructor was heavily involved and questions were posed to generate ongoing and thoughtful responses. Also, the assignments required reflection and thought. There was a purposeful shift to the nature (critical reflection) of the interaction as compared to quantity of postings.

Findings

The course variable acts as a surrogate for type and level of interaction, and instructor involvement, in online conferences. Time refers to the difference in approach to learning from the start of the course to the end of the course. Based on the theory of approach to learning, the context of the learning environment should influence the way students approach their learning. In an engaging, instructive, and influential learning environment, a change in approach to learning should occur. As this sample represents graduate level study, which normally involves higher-order learning, an increase in deep learning is the change most likely to occur.

The instrument documents activity in all three approaches: deep, surface, and achieving. The possible score range is fourteen to seventy. In

Table 1. Instructional Differences Across Groups

	Course A <i>N</i> = 32	Course B <i>N</i> = 11	Course C <i>N</i> = 13	Course D <i>N</i> = 19
Instructor involvement	Low	Low	Medium	High
Level of overall interaction	High	Medium	High	Low
Reflective assignment requirements	Medium	Medium	Low	High

these data, surface approach has an actual range of sixteen to fifty-six; deep approach actual range is forty to sixty-nine; achievement approach twenty-seven to sixty-one. It is expected that scores across all approaches will vary as students become familiar with the learning environment in which they are currently engaged. In higher education, a deep approach is the desired approach. Deep scores should be the highest and increase over the length of the education experience.

A two-way repeated measures Analysis of Variance was used to determine the interaction between time and course for this sample. The between-subjects variable is course (Courses A, B, C, D). The within-subjects variable is time (Time 1 and Time 2). The results of the interaction between course and time, for each approach to learning, are presented in Table 2.

The difference between approach to learning at Time 1 and Time 2 across courses is significant in one case, that of deep approach to learning ($p = .05$). Graphic depictions of change in approach to learning over the length of the semester provide patterns of difference across courses (see Figures 1–3).

Discussion

It is clear from these results that the shift in how students approached their study is strongly influenced by the design and teaching approach. It appears that teaching presence contributes to the adoption of a deep approach to learning and that interaction by itself does not promote a deep approach to learning. Courses A and B, which had little or no instructor involvement, showed either no shift or a drop in approaching learning in a deep and meaningful manner (see Figure 1). Deep approaches to learning for Course C (considerable interaction but no critical discourse) showed scores that were relatively low and remained that way throughout the courses. Interestingly, Course C had considerable instructor engagement but showed no shift to a deep approach. From an instructional design per-

Table 2. Analysis of Variance

Approach to Learning	Source	<i>d.f.</i>	<i>F</i>	Sig.
Surface approach	Time × course	3, 72	1.421	.244
Deep approach	Time × course	3, 72	2.706	.050
Achievement approach	Time × course	3, 72	1.291	.284

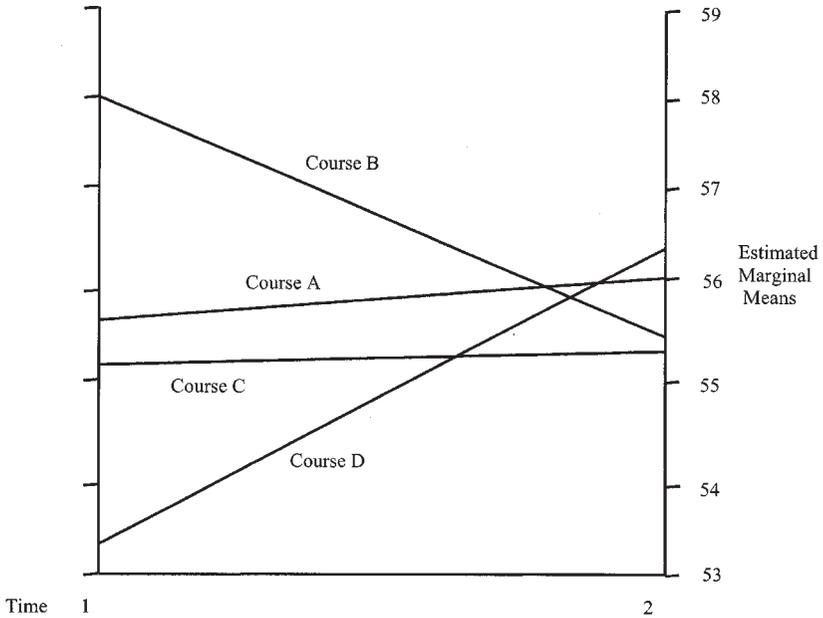


Figure 1. Deep Approaches to Learning

spective, the content and expectations (i.e., task demand) of the course simply did not require a deep approach. However, Course D was specifically designed to encourage deep approaches to learning through focused critical discourse and participants clearly showed a significant shift to a deep approach to learning.

The surface approach graphs for all the courses did not show any significant shifts (see Figure 2). Although not significant, the findings show a shift to an achievement approach for Course C (see Figure 3). Keeping in mind that an achievement approach is one that reflects the management of activities to achieve the highest grade, this approach to learning would be consistent with Course C conditions.

The findings are consistent with the literature discussed previously in that the nature of the interaction and teaching presence are crucial for deep approaches to learning. This suggests that the quality of interaction (i.e., critical discourse) must be a specific design goal and interaction facilitated and directed in a sustained manner if deep approaches to learning are to be achieved. To be clear, social interaction is necessary to establish relationships and to create a secure climate that will provide the foundation for a

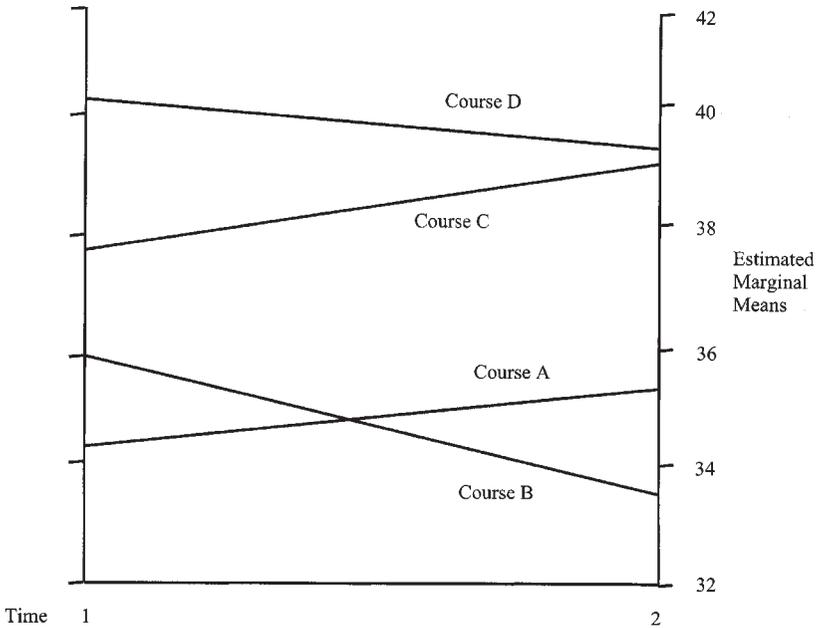


Figure 2. Surface Approach to Learning

deep and meaningful educational experience. However, social presence appears to be directly associated with the magnitude of interaction. There is evidence for this in Course D, a course in research methods, where participants demonstrated a move toward a deep approach to learning. In Course D, interaction with social content was not encouraged beyond brief introductions in the first conference. The first conference was a presentation by students of their experiences with the course topic, and the setting of objectives for content and skill mastery in the course.

Further conferences were designed to have participants “act as if” they were in the role of researcher, and respond to issues and challenges of knowledge validation and creation from that perspective. Social identity as an individual student was bypassed as the students worked with the material from a different perspective. Dialogue focused entirely on the subject matter and student perspectives on use, misuse, and application of subject-matter knowledge or expertise.

What is critical to note here is that although education is certainly a social phenomenon, there is a much larger purpose of acquiring and extending societal knowledge. Social interaction and presence may create the

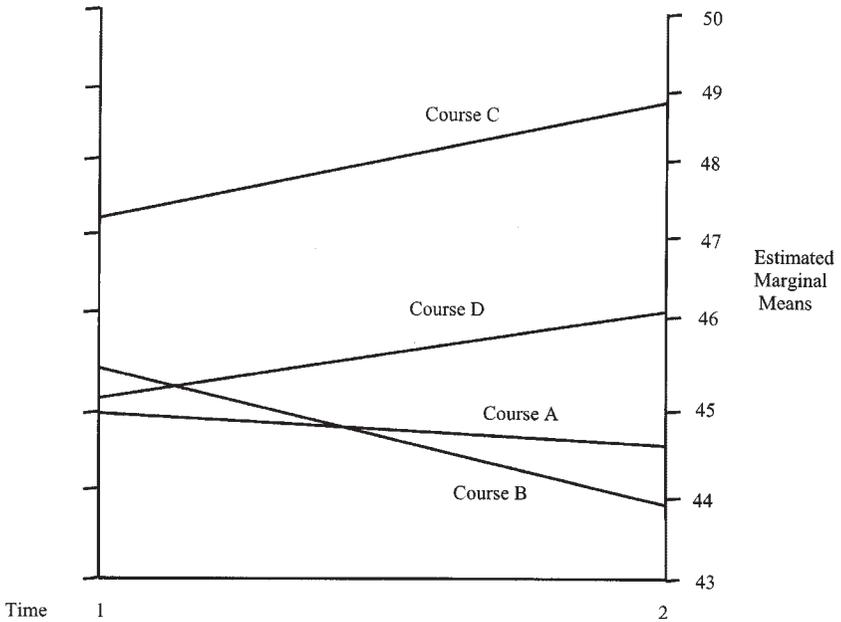


Figure 3. Achievement Approach to Learning

condition for sharing and challenging ideas through critical discourse, but it does not directly create cognitive presence or facilitate a deep learning approach. High levels of learning are dependent less on the quantity of interaction than on the quality, or substance, of interaction. That is, social presence may be a necessary but insufficient precondition for creating a community of inquiry and encouraging deep approaches to learning.

Teaching presence must be available, either from the facilitator or the other students, to transition from social to cognitive presence. Angeli, Valanides, and Bonk (2003) found that without adequate mentoring or facilitation, interaction “was mostly an exchange of personal experiences and did not support well-supported reasoning” (31). Not surprisingly, in this situation the online conference failed to sustain interest and engagement. Pawan et al. (2003) stated emphatically that “without instructor’s explicit guidance and ‘teaching presence,’ students were found to engage primarily in ‘serial monologues’” (119). That is, participants share experiences or opinions without connecting to other contributions. Similarly, Wu and Hiltz (2004) found that the quality of online discussions could be improved with more structure and guidance.

It appears that interaction does not necessarily translate into critical discourse and the integration of ideas into meaningful constructs. This was evident in Course C. Although social interaction (i.e., presence) may be a very helpful precondition, interaction for cognitive success (i.e., high levels of learning) depends on structure (i.e., design) and leadership (i.e., facilitation and direction). However, success is not automatic—there is an adjustment period (Garrison and Cleveland-Innes 2004; Ruberg, Moore, and Taylor 1996). Students must be provided structure and leadership to become engaged and responsible for approaching learning in a deep manner. Although space does not permit exploration here, we have been discussing issues of dialogue/interaction (including teacher–student) and structure that is not dissimilar to Moore (1989, 1990).

Meaningful engagement does not simply correspond to sending lots of messages. It may mean that a student is engaged vicariously by following the discussion, reflecting on the discourse, and actively constructing meaning individually. Ideally, interaction would be required to confirm understanding. However, students may be cognitively present while not interacting or engaged overtly. This reveals another challenge in understanding the qualitative nature of interaction in an online context.

Understanding a complex concept such as interaction must be viewed from a comprehensive perspective. The community of inquiry framework defines the context that can support quality interaction and deep learning. A deep approach to learning must consider all three elements of the community of inquiry: social, cognitive, and teaching presence. The findings here suggest 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. Quality interaction and discourse for deep and meaningful learning must consider the confluence of social, cognitive, and teaching presence—that is, interaction among ideas, students, and the teacher. Teaching presence provides the structure (design) and leadership (facilitation/direction) to establish social and cognitive presence (i.e., community of inquiry). The community of inquiry model has proven to be a useful framework to analyze and understand interaction in an online educational environment.

Practical Implications

From a practice perspective, we must go beyond social interaction and “serial monologues” if we are to understand the complexity of interaction consistent with deep and meaningful approaches to teaching and learning.

The challenge we face is how we design and facilitate online learning experiences to create the cognitive presence consistent with deep meaning and understanding. We focus this brief exploration of teaching interventions on issues of structure (i.e., design) and leadership (i.e., facilitation and direction). It is useful to note that design, facilitation, and direction are the three categories of teaching presence provided by Garrison and Anderson (2003). Together they provide valuable guidelines for creating and sustaining cognitive presence in an online educational environment.

From a design and organizational perspective, our findings suggest defining clear expectations and selecting manageable content, structuring appropriate activities (collaborative and individual), and conducting assessment congruent with intended goals: the fostering of a deep approach to learning. In terms of facilitating discourse, it is important to first provide clear participation requirements in terms of length, content expectations, and timeliness (Pawan et al. 2003). Next, it is important to provide engaging questions, focus discussion, challenge and test ideas, model appropriate contributions, and ensure that the discourse is progressive. The central focus must be on students creating meaning and confirming understanding. Sustained teaching presence that encourages participation, but is not teacher centered, is crucial. It is not educationally desirable or reasonable from a time-management perspective to have the teacher respond to each comment. But it is crucial that the teacher moderate and shape the direction of the discourse.

Finally, in any educational context, one can expect instances in which direct instruction is required to achieve deep and meaningful learning. That is, there will be times when specific ideas need to be offered, a student needs help, and the discussion needs to be summarized. The goal in deep learning is to move discussion from exploration to integration and then to resolution (Garrison and Anderson 2003).

Conclusion

The findings here suggest that simple interaction, absent of structure and leadership, is not enough. We need to have a qualitatively richer view of interaction. There is a strong need to study the qualitative nature of online interaction in terms of teaching and learning approaches. The position here is that the reflective and collaborative properties of asynchronous, text-based online learning is well adapted to deep approaches to learning (i.e., cognitive presence). Further study is very much needed to understand the nature of online interaction that will support high levels of learning.

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