Chapter 4
Video as Context and Conduit for Problem-Based Learning

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4.1 Introduction

An important role for video in education has been to create context-rich cases of practice for learners. It can allow learners to see the complexity of knowledge in use as they learn to bring their conceptual and theoretical ideas together with the world of practice. In particular, this research has explored the use of video triggers to help medical students learn about culturally competent communication. To help support the goal of learning to consider culture in medical communication, we connected teams from Hong Kong and Canada via video conference. In this way, we found that video technology could play a second important role, by serving as a conduit, or a means for learning and communication. This conduit role was particularly important in dealing with the emotionally laden issue of delivering bad news. In this study, medical students and faculty from Hong Kong and Canada came together to consider two cases of telling a patient that they were HIV positive. The goal of the PBL was to help the students learn about the SPIKES protocol for delivering bad news and to consider how that might be affected by patients from different cultures. The synchronous video proved important in helping students to become a community of inquiry at an accelerated pace. Moreover, using both the video and chat tools provided opportunities for just-in-time professional development. Although this was a short PBL implementation, it provided many lessons for future research and practice:

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- Problem-based learning mediated by video triggers and web conferencing provided opportunities to study medical students' social and emotional regulation.
- Video triggers created context for cross-cultural communication.
- Web-based video conferencing systems provided opportunities to learners to discuss and to facilitators to scaffold discussion.

As a proof-of-concept study, we reviewed how researchers of computer-mediated learning had used the existing community of inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000). Then, examining the role of culture in learning in general and in computer-supported collaborative learning (CSCL), we suggested an extended CoI framework with cultural overlays. An example of how the new CoI framework could be used in a culturally diverse CSCL situation (specifically when emotionally laden issues, which empower learners to unpack their cultural assumptions, are targeted for learning) is presented.

4.2 CoI Framework for Computer-Mediated Learning

First published in Garrison et al. (2000), the CoI framework is designed to examine the presence level of learners from cognitive, social, and teaching dimensions in computer-mediated learning environments. According to the authors, the framework follows John Dewey's work, in which participating in social activities should lead to an educational experience of inquiry toward meaning-making (Garrison, Anderson, & Archer, 2010; Garrison & Arbaugh, 2007). In a physical classroom, such social activities are present. The degree in which individual participants perceive its presence, therefore, should predict their engagement in learning. Meanwhile, such assumptions can be challenged in situations where social activities are largely or entirely mediated by computers. In this regard, the concept of presence becomes more important for online learning. Table 4.1 shows the categories and indicators of the CoI framework.

Garrison and colleagues' framework became popular as it provided a useful methodological tool for research in a particular context of computer-mediated teaching and learning in higher education (Garrison et al., 2010; Garrison & Arbaugh, 2007). In essence, the framework views presence from three different dimensions: cognitive, social, and teaching (Garrison et al., 2000). These three components interact with each other to constitute a meaningful learning experience of an individual (Garrison et al., 2010; Swan & Shih, 2005). The key participant actions that constitute the three presence components are: constructing meaning through sustained communication (i.e., cognitive presence); projecting learner's personal characterization (i.e., social presence); and selecting, organizing, and presenting learning content (i.e., teaching presence). Research suggests cognitive presence and social presence have gained more attention from researchers (Garrison et al., 2010), whereas teaching presence was mainly examined to identify the pre-

Table 4.1 Community of inquiry (Akyol & Garrison, 2008; Garrison et al., 2000)

	Categories	Indicator (examples)
Cognitive presence	Triggering event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Applying new ideas
Social presence	Affective response (personal/affective)	Emotions
	Interactive response (open communication)	Risk-free expression
	Cohesive responses (group cohesion)	Encouraging collaboration
Teaching presence	Instructional design and organization	Defining and initiating
	Facilitating discourse	Discussion topics
	Direct instruction	Sharing personal meaning
		Focusing discussion

requisites of fostering higher cognitive and social presence (Akyol & Garrison, 2008; Bangert, 2008; Swan & Shih, 2005).

Specifically, cognitive presence has been most targeted for investigation and has generated a consistent set of categories (triggering event, exploration, integration, and resolution) for examination (Garrison et al., 2010). Moreover, one unique aspect of cognitive presence is that these categories indicate the evolving nature of the inquiry discussion that the researchers use to examine cognitive presence. Although a group could have multiple iterations of such discussion, cognitive presence categories suggest a beginning and an end to the collaborative inquiry activity. Moreover, empirical studies using these development categories point out how online learners struggle with arriving at integration and resolution, compared with relatively easily achieved triggering event and exploration phases (see Garrison, Anderson, & Archer, 2001).

Social presence, on the other hand, reflects what creates a sense of community in online learning (Tu & McIsaac, 2010). Although its long history as a stand-alone academic concept resulted in different definitions by schools of researchers (Lowenthal, 2010), the dynamic nature of social presence within the CoI framework suggests different empirical findings (Akyol & Garrison, 2008; Annand, 2011). Lowenthal summarized that the effects of social presence have been demonstrated in relation to student satisfaction, interaction, and learning in general. For example, Swan and Shih's (2005) mixed method study revealed significant relationships between social presence and perceived learning, perceived interaction and satisfaction with instructors. Particularly, the study examined how perceived presence of peers vs. instructors differently predicted the three independent variables. Although many studies have replaced the actual measure of learning with perceived learning, the concept of knowledge community building justifies findings using such indirect measures (Lowenthal, 2010).

Finally, teaching presence is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson, Rourke, Garrison, & Archer, 2001, p. 5). Similar to other components, teaching presence is a conception of what learners perceive. However, it is more directly related to the instructor, tutor, or those who design and provide the learning experience. Unlike presence component indicators, teaching presence indicators primarily reflect instructor actions (Table 4.1). In other words, it conceptually yields more leverage to instructors to plan and adjust their actions according to learner needs. Prior studies have found evidence supporting that teaching presence is highly correlated with student satisfaction and their perceived learning using self-report measures (Garrison & Arbaugh, 2007; Garrison & Cleveland-Innes, 2005). A more recent study treated teaching presence as a grouping variable to examine instructors transferring their knowledge and skills for teaching across online and classroom settings (Wisneski, Ozogul, & Bichelmeyer, 2015). These studies exemplify the instructor-oriented characteristic unique to teaching.

As such, there are multiple ways to use the CoI framework to examine the learning that takes place in online or computer-mediated learning situations. Each component—cognitive, social, and teaching—seems to have sub-components that are either developmental over time (i.e., cognitive presence) or multidimensional (i.e., teaching presence), or both as in the case of social presence (Table 4.1). For example, an early conception of social presence includes affective, interactive, and cohesive aspects (Rourke, Anderson, Garrison, & Archer, 2001), but Tu and McIsaac (2002) later claimed that social presence is composed of dimensions such as social context, online communication, interactivity, and privacy. More recently, these dimensions were revisited to conceptualize the intimate connection between social presence and interaction (Tu & McIsaac, 2010). While the argument is not explicit, the former categories assume its loosely developmental characteristic, given Akyol and Garrison's (2008) description: "The accepted doctrine [of social presence] was to focus on affective expression *to* establish a climate for learning with open communication and cohesion *following*" (p. 5, bracket and italics added).

Moreover, the sociocultural nature of knowledge construction in a community of inquiry invites considering cultural perspectives for examining learning. Cultural practices and norms can be observed in different groups, different communities, and, most obviously, different countries (Brown, Collins, & Duguid, 1989). For example, in different communities, participants use jargon, demonstrate similar behaviors; in different countries, people speak different languages and have different ideologies and perceptions. If one believes learning is sets of activities of enculturation, adaptation, and adoption of one community's norms, values, and standards (Brown et al., 1989; Greeno, Collins, & Resnick, 1996), then, it is likely that culture has a mediating role in learners' cognitive process, while it might not directly associate with the learning outcomes (Vatrapu, 2008).

4.3 Making Culture Explicit

4.3.1 The Role of Culture in Learning

Culture is a complex concept that shapes human learning in multiple ways. In their report on institutional culture, Kuh and Whitt (1988) defined culture as:

> persistent patterns of norms, values, practices, and assumptions that shape the behavior of individuals and groups in a college or university and provide a frame of reference within which to interpret the meaning of events and actions on and off the campus (p. iv).

Kuh (1990) later summarized three levels of analyzing student culture—that is, national, institutional, and subculture levels, with the subculture being the closest in the meaning and scope of analyzing group compositions in CSCL research. A slightly different definition of culture that focuses more on its collective nature has been discussed in organizational learning research. For example, Hofstede (2011) defined culture as "the collective programming of the mind that distinguishes the members of one group or category of people from others" (p. 3). His view informed a number of computer-mediated communication research studies (Hewling, 2006; Wang, 2007). More recently, Matsumoto and Juang (2012) discussed culture as having many different meanings and usages:

> Culture can be used to describe activities or behaviors, refer to the heritage or tradition of a group, describe rules and norms, describe learning or problems solving, define the organization of a group, or refer to the origins of a group (Berry, Peoortinga, Segall, and Dasen, 1992; Kroeber & Kluckholn, 1952/1963). Culture can refer to general characteristics; food and clothing; housing and technology; economy and transportation; individual and family activities; community and government; welfare, religion, and science; and sex and the life cycle (Murdock, Ford, and Hudson, 1971; Barry, 1980; Berry et al., 1992). Thus, we use the concept of culture to describe and explain a broad range of activities, behaviors, events, and structures in our lives. It is used in many different ways because it touches on so many aspects of life. (p. 7)

Nonetheless, bringing a cultural perspective to a social phenomenon enables researchers to coherently interpret meanings of human actions or social events in their particularity by foregrounding the shared—or collective—beliefs, assumptions, norms, rituals, customs, and practices associated (Geertz, 1973; Kuh & Whitt, 1988). Moreover, Nisbett, Peng, Choi, and Norenzayan (2001) argued cultural difference not only affect people's specific worldviews, but also "(a) their naïve metaphysical systems at a deep level, (b) their tacit epistemologies, and (c) even the nature of their cognitive processes—the ways by which they know the world" (p. 291). The authors explained metaphysics as "beliefs about the nature of the world and about causality" and tacit epistemology as "beliefs about what is important to know and how knowledge can be obtained." This is to say that one's culture functions as a frame of reference when individuals use language to negotiate meanings (Kramsch, 1993). In this regard, analyzing such cultural aspects more explicitly help researchers to better interpret their online discussions.

There is more than one research perspective toward the nature of culture that shape particular research assumptions. For instance, building onto the intercultural communication research (Scollon & Wong-Scollon, 2001), Hewling discussed two alternative views on culture—that is, culture as a product of people from two or more cultural backgrounds engaging in a shared process of negotiating meaning (thus, the emergence of a "third" culture; for more information, see Raybourn, Kings, & Davies, 2003) and culture as a process that evolves over time and is understandable only within the particular context and time of observation (Gee, 2000). The current study follows more closely with the latter view on culture.

4.3.2 Examining Culture in Computer-Support Collaborative Learning

In the context of collaborative learning, culture has been studied with regard to student grouping strategies that mediate learning. In particular, issues of culturally heterogeneous and homogeneous groups have attracted many researchers' attentions (Hobman, Bordia, & Gallois, 2004; Watson, Johnson, & Merritt, 1998). However, different research studies have different results. Some researchers (e.g., Ledwith, Lee, Manfredi, & Wildish, 1998) have claimed that a homogeneous group tends to have more harmonious interactions than a heterogeneous one, thus leading to improved learning. However, other researchers have argued that heterogeneous grouping would improve learning by enhancing diverse communication styles, thus having the potential to foster cognitive elaborations (van Boxtel, van der Linden, & Kanselaar, 2000). As such, although disagreements exist as to whether heterogeneous or homogeneous groups better foster learning, both assume that student culture plays an important role in collaborative learning and it affects the manner in which students collaborate with others.

The perspective of culture as affecting human behaviors or actions remains the same in collaborative learning studies conducted in computer-supported settings (Gunawardena & LaPointe, 2007; Vatrapu, 2008). For example, Gunawardena and LaPointe's review that introduced design principles for online distance learning showed that most empirical studies reviewed compared learner perception or behaviors—under the themes of social presence, conflict resolution, meaning of silence, help-seeking behaviors—across multiple culture groups. Typically, countries or languages of participants were used as proxies for culture in these studies. In other words, the authors assumed that online distance learners who are from the same country or using the same language have a predisposition to certain behaviors or actions that affect learning.

Seeing culture as communication, Gunawardena and LaPointe (2007) pointed out the importance of language in understanding culture. Based on their synthesis, cognition takes the form of verbal and/or nonverbal cues/languages and constitutes a message, a meaningful unit of communication constructed in situ, and is delivered to others via media. In this cyclical process, language is considered to shape one's

thinking (c.f., the Sapir-Whorf hypothesis). From this perspective, research on language has generated useful bodies of knowledge that are applicable to research on culture—for instance, various ways to classify language (e.g., verbal vs. nonverbal and spoken vs. written), different branches of studying language and meaning (e.g., semantics and semiotics), and different methods of analyzing language data (e.g., content analysis and discourse analysis) can be adopted in research on culture. However, understanding and explicating particular assumptions about language should precede borrowing the tools and techniques from such research.

Use of mediating technology adds further complexity to understanding culture and communication. Such studies tend to be conceptually associated with affordances, or "opportunities for action" (Kirschner, Strijbos, Kreijns, & Beers, 2004, p. 49) that are provided by the learning technologies used. For instance, Vatrapu (2008) examined the influence of culture on participants' appropriation of socio-technical affordances and creation of technological intersubjectivity (based on perception of themselves and other participants), and on performance from individual learning outcome assessments in a CSCL environment. Vatrapu commented that culture is "an abstract antecedent that denotes the ways of thinking, acting, saying, behaving and believing that participants bring to any interaction" (p. 168). As such, examining culture in CSCL can be more challenging than in natural settings due to the additional constraints that technology introduces. At the same time, use of mediating technology can invite new opportunities for creating supportive learning environments once such additional considerations are fully understood.

4.4 An Extended CoI Framework with Cultural Overlays

In this study, participants in the existing online data came from two institutions, each from Hong Kong and Canada. While both parties were similarly past their second year in medical school, the fact that they originated from and were attending institutions from geographically distant countries, with different first languages suggests that there may be distinct patterns of norms, values, practices, and assumptions that shaped their behaviors and frames of references they used to interpret meanings during interaction (Kuh & Whitt, 1988).

Moreover, we concluded that the CoI framework is appropriate for analysis as the data was collected from an online learning community. However, the existing CoI framework did not explicitly address the cultural aspect of online communities. Therefore, we propose an extended CoI framework with a cultural overlay to make the cultural aspect of the data explicit.

In fact, several studies have empirically focused on the cultural aspect in analyzing online teaching and learning data from people from multiple cultures. For example, Williams et al. (2014) have identified challenges online facilitators face in a cross-cultural online environment and suggested strategies to address such challenges. In action research including five faculty members, who have had experience facilitating a culturally diverse online class, the results identified areas in which

challenges and strategies were discussed. They included (1) framing, asking questions, and reframing information, (2) online group participation, (3) absence of face-to-face meetings, (4) learning the interpersonal and group dynamics of online work, (5) expectations of students, (6) facilitator expectations, and (7) facilitator anxieties. Ideally, employing such strategies would increase teaching presence perceived by learners.

Nevertheless, it is difficult to discern implications that are attributable from cultural diversity specifically from the existing CoI framework, as culture cannot simply be another addition to the existing framework or an external factor that is linked to only a single presence component. As a relatively new issue for researchers who study online learning, particularly those who are using the CoI framework, only limited research is available on the role of culture is building a CoI or managing, better supporting, or enhancing learning where cultural diversity plays a role. Research suggests culture may be associated with social presence more directly than other CoI components (Gunawardena & LaPointe, 2007); yet, other possibilities may simply be under-investigated. In fact, studies that connect culture with social presence also indicated its potential connection with learners' interaction with others that are human (peers or tutors; see Swan & Shih, 2005) or nonhuman (the mediating technology; see Vatrapu, 2008). These connections may affect not only social but also cognitive or teaching presence.

To allow for exploring all possibilities, we integrated one's culture as an overlay to the existing CoI framework (Fig. 4.1). Given that three presence components are mostly measured collectively from learner-generated data in context and the assumption that with high level of all three components the learning quality will increase—hence, the learning outcomes—the presence components are visualized as three overlapping spheres that are reflective of learners' collective level of

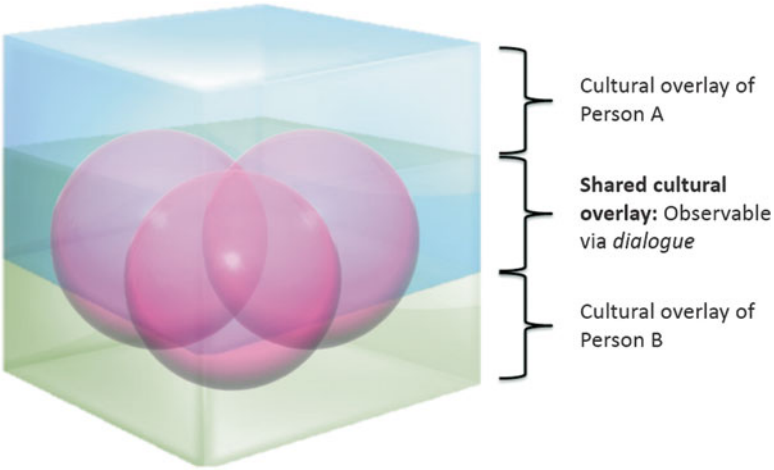

Fig. 4.1 An extended CoI framework with cultural overlays

presence in three areas. With examining collective knowledge building requiring interaction data from at least two participants (who could be playing either a learner or tutor role) and with their cultural difference made explicit in the conceptualization, the new framework has two cultural overlays from each participant.

The new framework does not require entirely new methods or methodological considerations for research, as it is based on the same assumptions as the existing framework. For instance, the goal for high quality learning remains in the cognitive domain, unless stated otherwise. Therefore, researchers will still seek evidence of cognitive change as evidence for learning. Moreover, the learning in the cognitive domain can be promoted via increased cognitive, social, and teaching presence. Nevertheless, the cultural overlays are meant to invite at least the following opportunities for understanding quality learning in a computer-mediated CoI.

First, it visually signals researchers to consider the role of culture in distance learning as mediating the link between factors that are external and internal to learners (e.g., external: interface design, peer learners, facilitator; internal: presence components). Treating culture as a thin and translucent layer that covers the existing presence spheres enables exploring all possible associations the presence framework yields. Second, the overlays of the new framework offer two ways to focus on the cultures of the CoI participants in relation to the concepts of situated meanings and cultural models (Gee, 2011). Compared to the previous use of the framework where the focus is on the measurable changes attributable to culture, the second use emphasizes the better understanding of the role of culture in shaping what is learned among participants of a CoI. This process is encouraged by the overlapping area of the two cultural overlays (hereby referred to as the "shared" cultural overlay), which symbolizes manifestation of the "third" culture (Kramsch, 1993; Raybourn et al., 2003).

Compared to the existing framework where such co-construction is largely explained through the sub-components of cognitive presence (thereby validating the assumption that target knowledge is mostly in the cognitive domain), the new framework extends the traditional boundary to learning through co-constructing new culture. Nevertheless, it should be noted that while the emergence of a third culture might be expected as one outcome of learning, the primary goal for learning in designing such space would still focus on quality learning in the cognitive domain. The following case study is the example of the second use of this cultural overlay framework.

4.5 An Example: A Case Study on Multicultural Online Medical Learning

This example case study is meant to serve two purposes. First, we would like to demonstrate how the new framework can be used to analyze computer-mediated interaction data amongst multicultural CoI participants. Second, we examine the role video played in PBL. We briefly review the use of video in PBL.

4.5.1 Problem-Based Learning and Video

Problem-based and inquiry-based learning have been argued to be effective ways to promote students' learning in complex domains as they are highly scaffolded (Hmelo-Silver, 2004, 2006; Hmelo-Silver, Duncan, & Chinn, 2007). However, studies suggest successful design and implementation of PBL is also challenging. For example, Hung, Bailey, and Jonassen (2003) identified that PBL effectiveness studies have produced conflicting findings in the following areas: depth vs. breadth of curriculum, higher-order thinking vs. factual knowledge acquisition, long-term effect vs. immediate learning outcomes, traditional roles of professors vs. the role of PBL tutors, and students' initial discomfort vs. their positive attitudes. Their finding suggests that a careful design and implementation is critical in arriving at the desired learning outcomes with PBL approaches (Jonassen, 2000, 2011).

Efforts have been made to better support implementing PBL with available technology (Choi & Hannafin, 1995; Hannafin, Land, & Oliver, 1999; Kim & Hannafin, 2011). For example, researchers have worked closely with instructors and teachers to help them more easily create effective PBL curricula and support their students in class (Derry, Hmelo-Silver, Nagarajan, Chernobilsky, & Beitzel, 2006). Moreover, a frequently discussed way to use video is to provide rich contexts for learning. For example, typical forms of studies on video include video vs. text comparison studies (e.g., Balslev, De Grave, Muijtjens, & Scherpbier, 2005), exploratory video use effectiveness studies (e.g., Schrader et al., 2003), and different kinds of video use studies (e.g., Tawfik & Jonassen, 2013). In a recent comparison of paper and video as PBL problem triggers, Lu and Chan (2015) found that video led to greater question asking and elaboration by a group of second year medical students. While these studies focus on identifying the effect of video in learning in complex domains, studies that provide detailed accounts of what the multiple roles of video looks like in such environments are seldom found. Understanding the role of video is particularly important when the learning takes place in even more technologically complex learning environments such as the web-based conferencing that serves as the platform for the current study.

4.5.2 Study Design

To describe the role of video in PBL, we used a naturalistic qualitative case study design, targeting the shared cultural overlay as the major construct to explore with Gee's (2011) discourse analysis method.

Participants. A purposeful sample of four students and two instructors from two institutions participated in the study, from either Hong Kong or Canada. All names are represented in pseudonyms. Instructor W, Student M and E are from a medical school in Canada. Instructor L, Student K and V are from a medical school in Hong Kong. All but Student M are male. All students are past their second year in medical school.

Table 4.2 Instructor-guided activities by class sequence

Sequence	Guided activity
Pre-video discussion	Discussion norm setting
	Role assignment (Leader, Scribe)
	Discussion
	–Sharing thoughts (notes taken by Facts, Ideas, Issues)
	–Reviewing the notes
	Instructor summarizing and giving comments on the discussion
During video (10 min)	Note-taking for post-video discussion
Post-video discussion	Analyzing by Facts, Ideas, Issues
	Summarizing discussion
	Sharing reflection

Research context. Two video-triggered PBL sessions were implemented over 2 days via a commercially available video conferencing tool, scaffolded with a chat feature (see Lajoie et al., 2014). The session focus was physicians delivering bad news to patients. This problem was considered ill structured and emotionally laden to solve, as it dealt with affective constructs, such as empathy, ethics, and professionalism (as a doctor). Each session consisted of instructor-guided activities that followed a similar class sequence (Table 4.2). Participants communicated in English in both sessions. Two video triggers were used, one for each day, and although the content of the video triggers was the same (i.e., a doctor delivering bad news to a patient), one was taken in English-speaking context and the other was taken in Cantonese-speaking context and delivered with English subtitles. Instructor W facilitated the first session. Student M led the discussions, and Student V scribed on the chat room in the video conference system. Instructor L facilitated the second session, where Student K led the discussion and Student E scribed. Transcripts for each session were created and referred to as Transcript 1 (Session 1) and Transcript 2 (Session 2). Figure 4.2 illustrates the overview of the research context.

4.5.3 Analysis Procedures

Initial review of transcripts. Two researchers who are also authors individually reviewed the transcripts multiple times to situate themselves in the scene. During the initial review, each researcher sectioned the transcripts by labeling class sequences (including major class events, such as starting and managing technical or logistic issues—introduction of class topic, pre-discussion, role-assignment for video watching—watching video—post-video class discussion) to better understand how each session developed. The researchers also highlighted directly on the transcript to identify areas where they thought the role of cultures were observable and took annotations about their initial thoughts about the role of cultures (Fig. 4.3).

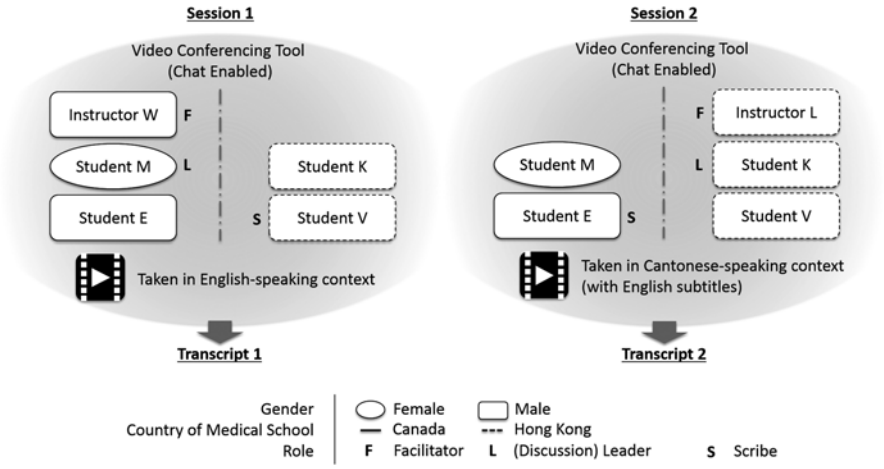

Fig 4.2 Research context overview

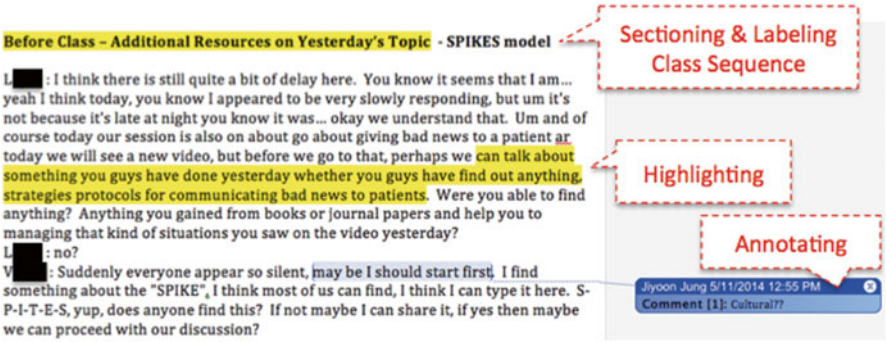

Fig. 4.3 Illustration of analysis: initial review of transcript

The researchers shared their individual findings to identify the internally agreed-upon areas in each transcript that suggest participants' cultures becoming an issue (c.f., explicit evidence of the third culture emerging). Within the identified areas of the transcripts ("the excerpts"), the discourse analysis method (Gee, 2011) was used to interpret cultural aspects of the data. It was chosen over the content analysis or thematic coding method, which are typical choices for the CoI research with qualitative data, to better capture the cultural nuances hidden beyond the sentence-level meaning of content. The researchers' iterative and collaborative effort in discussing and agreeing upon the findings is expected to serve as an external-to-data measure to improve the trustworthiness of the findings.

Discourse analysis. Languages serve as scaffolding social activities and human affiliation. Gee (2011) defined discourse analysis as "the analysis of language as it is used to enact activities, perspectives, and identities" (p. 4). This definition suggests that languages can function to create realities of significance, practice, identities, relationships,

politics, connections, or sign systems and knowledge (referred to as "seven building tasks"). Following this, Gee also suggested six tools of inquiry, including social languages, Discourses, Conversations, intertextuality, situated meanings, and figured world. According to Gee, examining all 42 combinations would be ideal, but selectively focusing on a few of inquiry paths is how a typical discourse analysis is performed.

Two types of meanings are worth mentioning here (Gee, 2011): situated meaning and cultural models. Situated meaning refers to "an image or pattern that we assemble 'on the spot' as we communicate in a given context, based on our construal of that context and on our past experience" (p. 80). Because they are communicated in a given context, the meaning is "negotiated" (p. 81). On the other hand, cultural models are "'storylines,' families of connected images (like a mental movie) or (informal) 'theories' shared by people belonging to specific social or cultural groups" (p. 81). According to the author, "cultural models 'explains,' relative to the standards of the group, why words have the various situated meanings they do and fuel their ability to grow more. … [and are] distributed across the different sorts of 'expertise' and viewpoints found in the group" (p. 81). In other words, in CSCL with culturally diverse learners, situated meaning is conceptually similar to the shared cultural overlay negotiated in situ by participants assuming different cultures, whereas a cultural model is analogous to individual cultural overlays as it assumes informal theories shared within a single cultural group.

4.5.4 Illustrative Findings

The analysis of both transcripts suggested that one's individual cultural model could be portrayed by tracking individual participant's discourse over time. At the same time, the smallest unit of the shared cultural overlay (i.e., what is learned via co-construction of the third culture) was identified by attending to a particular cultural issue that was explicitly raised during participants' discussion on the learning topic.

As an example, we present an illustrative finding for a unit of what was learned by employing the concept of the shared cultural overlay. During analysis, we focused on what was inferable and interpretable based on the transcripts and not the direct observation of the PBL sessions. We also noticed the learning situation was contextually complicated due to technical issues (e.g., delayed, overlapping, or interrupted communication due to bad Internet connection) but this was not a focus of this analysis.

Shared cultural overlay. This example was excerpted from Day 1 post-video discussion facilitated by Instructor W and led by Student M, who are both from Canada. Once the instructor asked a guiding question, "What were the things that each of you selected as important points in the video? What was good about them? And what could be improved?" Students began the discussion. Note that each participant's gender and country of medical school origin is marked as F (female) or M (male) and C (Canada) or HK (Hong Kong) alongside their pseudonyms in the excerpts. Other linguistic and notational devices are not used. Italics in brackets are the inferred meanings of the pronouns based on the larger context.

On the instructor's cue, Student M spoke first. She commented about what she liked about what the doctor in the video did in telling the bad news:

Student M (F, C)	She [*the doctor*] ar explained a lot of the test that were done and that is, was, confirmed, you know. She's kinda bringing it up that whatever she is going to say is the result that is gonna be reliable, and ar, that it was verified. So I really liked she approached and brought up the topic of the diagnosis. Um… I don't think she, I don't see any negative point in that part. And I really like the beginning

Then, Student E, who is also from Canada, commented on what he perceived as "missing" from the video:

Student E (M, C)	The only ar—I really like everything that she [*the doctor*] like, she said and she did—but I really think that there's something missing, in which she didn't really have a sense of how he [*the patient*] was feeling then and that there were any—say, new symptoms or anything—like, anything wrong. And during the video, she says that "you're really young and don't have any problems," but how can she know about—unless she asked this really. Even if there were information on the referral notes, you need to ar, I feel like you—it is necessary to ask the patient about that [*the patient not having any physical problem*] and get that. But I, I, I still think she, everything she did was great, but there is just something there [*what the doctor did in the video*] is missing, I thought

This comment led Student K from Hong Kong to question about the typical required medical procedure of getting patient consent prior to any medical examinations in Canada. Student K foregrounded the assumed different cultural practices between Canada and Hong Kong as the focus of discussion, made explicit by his using of the phrase "from a Hong Kong view." Then, the discussion on how doctors should tell bad news to patient (c.f., emotionally laden) evolved into more culturally laden conversation amongst participants. In other words, video in this case had triggered discussion on cultural similarities and differences among participants.

The next example comes after Student E's previous comment:

Student K (M, HK)	Just asking, um… ar from a Hong Kong view, I am not sure ar..
Student M (F, C)	I agree with Student E (M, C). I think it is especially because ar…
Student K (M, HK)	I am sorry. Can you finish it—finish your sentence, please?
Student M (F, C)	Yes, I… No, I cut it you, you start
Student K (M, HK)	I am just wondering, the video I guess is taken in Canada, what are the procedures like ar about testing like for HIV. Is ar…, throughout the video, my thoughts in thinking cuz in Hong Kong what happens is we have to get consents from the patient when we test for HIV viruses. And so in that sense um so, so that the patient would already given consent for HIV to be tested, that means they would have some sort of expectation already, so I am not sure ar, is this the case in Canada? Or you have asked them some consensus or HIV testing? Or you just do it immediately and take them by surprise

Student K's reference to his country (e.g., "from a Hong Kong view," "in Hong Kong what happens is…") during his speech suggests that he had attributed the cause of his perceived cognitive dissonance during the discussion to the potentially different medical practice between Canada and Hong Kong. Notice that Student K also said if the patient had given consent for the HIV test, "the patient would have some sort of expectation already." His comment implies that the action of getting tested for HIV by itself is significant in his culture. In his perspective, only if the patient had a reason to be taken the test would she/he have taken it. Therefore, being told the bad test result by the doctor is not a "missing" thing.

The instructor then tried to facilitate by providing fact-confirming feedback on the suggested cultural difference, followed by Student M.

Instructor W (M, C)	So just to interject, that's a good point, Student K (M, HK). Ar, in Canada, like in Hong Kong, you must obtain patient consent before doing an HIV test
Student K (M, HK)	Ok… I managed to put ar—
Student M (F, C)	Is there—sure, to what point the patient would expect the result to be positive though because a lot of people from um what I think are just doing the ar STD test as a routine test or you know just done as a general picture. I don't actually think that most of the patients do expect positive result although they do order the test for them. Although the patient consents…

Student M's response to Student K's previous comment is layered by her culture. Cued by "from … what I think," she commented that in her culture STD (sexually transmitted diseases) tests are "a routine test." With such clarification Student K moves on to responding to the instructor's second guiding question, on improvement suggestions to the doctor in the video.

Student K (M, HK)	So maybe perhaps an improvement I could suggest to the doctor in the video is to start actually what Student V (M, HK) had mentioned about ICE, so just to get a a a a confirmed idea of what the patient really expects which I think um has been left out in the video, so just jump onto the report without actually clarifying what the patient expects to hear. So maybe an improvement would be just to do the ICE, the process of ICE

Here, ICE (idea, concern, expectation) is a concept that the participants had learned prior to watching the video. Student V introduced the concept during the pre-video discussion. He had described idea as "whether we [*doctors*] would ensure whether we have sufficient idea of what's going on," concern as "what is the major concern of the patient," and expectation as "how can we [*doctors*] help the patient or what is the patient expecting from us." In this regard, video has played the role of a conduit in conveying what was learned throughout the current discussion. Student V's subsequent comment illustrates another role video played during the session:

Student V (M, HK)	Um…, maybe I could talk a bit about—
Student M (F, C)	So, are there other important event that a you guys know?

Student V (M, HK)	Maybe I can try to talk about, um…, how to try to um talk about the um investigation procedure in the beginning. Because I have been noting down at the 40 second. Zero four zero, um there is um a moment that I can see the change in body language of the patient. When he was told that he has HIV, he puts his hand on his mouth, and I think it's a sign of strain that he is worried. But what I can note is that the doctor just go on and talked about whether it is confirmed test or whether it is a test repeatedly, I don't think the doctor has take care of the emotional change of the patient

Student V said that he could "see the change in body language of the patient." In other words, the video trigger provided a rich context that enabled the learners to attend to both the verbal and nonverbal information of the problem. This information was about the physical movements ("the body language") and made the temporal dynamics more salient (40 s). Without the video, such understanding of the context would have been more challenging—for instance, taking more time with a text trigger or unless the text were annotated, might never be noticed. Student K, who had previously questioned why getting a bad HIV test result was unexpected, agreed with Student V as he described the specifics of the video, again noting the gestural and temporal dynamics from the video.

Student K (M, HK)	I agreed with Student V (M, HK), I also noted at um 0.41, that his eyes actually looked away, so his hand shifted like that (puts hand on mouth), and his eye deviated from the doctor and um, that is the sign that is actually um yeah the doctor should address that immediately

4.6 Discussion

4.6.1 Adding a Cultural Overlay

In this research, we expanded the CoI framework to overlay a cultural dimension. We employed the new framework in order to better understand how the participants of the CoI had engaged with sensitive issues of culture in addition to the target knowledge (i.e., SPIKES model) of the PBL sessions. In the analyses presented here, it is clear that the learning environment supported discussions of cultural issues. Elsewhere, we have demonstrated how this also supported creating a shared culture of medicine (Lajoie et al., 2014). As seen above, one salient learning outcome attributable to the participant culture created during the session was the awareness that the socio-cultural significance is attributed to the action of taking an STD test in Hong Kong, whereas in the Canadian context, the result of the test was more significant. Full exploration of the data is expected to identify multiple units of co-constructed knowledge associated with culture. The finding can be further elaborated through connecting it to the larger body of knowledge on difference between the two countries.

4.6.2 Role of Video

Video triggers, or cases, can support learning by creating a rich common problem context to discuss (Derry, 2006; Derry & Hmelo-Silver, 2005; Lu & Chan, 2015). It was evident in the current case study that the video triggers effectively and efficiently created an opportunity for learners to negotiate meanings around an emotionally laden issue, despite its conceptual complexity. Furthermore, we found that the video played a second role as conduit that provided opportunities for productive discussions. Specifically, the example shared in the illustrative finding was that the information about ICE was conveyed to the post-video discussion through the video trigger. Here, the particular purpose of using the conduit metaphor for video in distance learning is to emphasize the potential for video to easily connect a series of sequenced learning activities and provide a social presence and fluent conversation that might not be possible in other online media (see Lajoie et al., 2014 for further discussion of social presence). Nonetheless, the conduit metaphor for the medium in communication theories is not entirely new.

For instance, it has been discussed in linguistics where language is considered the medium for thoughts (Reddy, 1979). When digital technology was considered as the medium, both Clark (1983) and Kozma (1991) discussed this extensively, with conflicting conclusions. Following this tradition, the conduit role of video postulates substantial affordances of video for co-construction of meaning, in addition to the role for creating context. In addition to creating a richer context that effectively becomes a source for learning, video as conduit emphasize on its function of allowing fluent interaction that needs to flow throughout the PBL learning experience.

4.7 Limitations

The current study did not report based on the entire set of data, but focused on one part of the data that illustrated the use of the new framework most effectively. Moreover, it also focused on presenting an example of the shared cultural overlay component of the new framework and did not examine the mediating role of the culture. In addition, the data are drawn from a single small study. The research presented here was used for theory development; further research will be needed to test this theory in other online contexts.

Finally, the current study did not necessarily account for the role of instructor facilitation during interpretation. In fact, there were a number of discussion facilitation strategies used during the sessions. For example, the instructors sometime cued what to focus on at the beginning of each major sequence in the session. They also guided the scribe to "write down in the chat area the following three types of information: Facts, … ideas …, issues …" during pre-video discussion and facilitated during the post-video discussion by playing the role of mediator between the two student groups from different cultures.

4.8 Concluding Remarks

In this paper, we framed cultural practices as collectively built and distributed in the learning environment. The nature of data of this study helps us to align cultural building activities with cognitive building activities as students were building their knowledge while comparing medical practices in two countries. However, even though under this backdrop, we did find some incidences from the data that showed students' exploring different cultures, integrating them, and building their common cultural values. Kramsch (1993) commented that in this process of creating a third culture "people become aware of the various frames of reference one can use to describe events … [and indeed realize] … the paramount importance of context and how manipulating contextual frames and perspectives through language can give people power and control" (p. 235).

Interpreting the data via the shared cultural overlay framework suggests that video plays the role of providing context as it promoted faster building of CoI by triggering the discussion on cultural differences amongst participants that made nonverbal information salient (e.g., time, gestures). Moreover, video functioned as a conduit for learning in that it supported discussing emotionally laden learning content, such as doctor's telling of bad news to a patient. Future studies must expand interpretation on larger data sets. Studies can also employ other components of the new framework, the individual cultural overlay, to describe the cultural model of a particular member of the CoI.

This is a proof-of-concept study, in which we examined the impact of different cultural practices on cognitive presence. Elsewhere we have described other elements of the CoI (Lajoie et al., 2014). Building on that work, we show how we can use video to present culturally meaningful and contrasting modes of communication as well as using it as a conduit for discussion that has cultural overlays.

References

Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks, 12*(3), 3–22.

Anderson, T., Rourke, L., Garrison, D., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1–17.

Annand, D. (2011). Social presence within the community of inquiry framework. *The International Review of Research in Open and Distance Learning, 12*(5), 40–56.

Balslev, T., De Grave, W. S., Muijtjens, A. M., & Scherpbier, A. J. J. A. (2005). Comparison of text and video cases in a postgraduate problem-based learning format. *Medical Education, 39*(11), 1086–1092.

Bangert, A. W. (2008). The effects of social presence and teaching presence on the quality of critical inquiry for a web-based statistics course. *Journal of Computing in Higher Education, 20*(1), 34–61.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42.

Choi, J. I., & Hannafin, M. (1995). Situated cognition and learning environments: Roles, structures, and implications for design. *Educational Technology Research and Development, 43*(2), 53–69.

Clark, R. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*, 445–459.

Derry, S. J. (2006). eSTEP as a case of theory-based web course design. In A. O'Donnell, C. E. Hmelo-Silver, & G. Erkens (Eds.), *Collaborative learning, reasoning and technology* (pp. 171–196). Mahwah, NJ: Erlbaum.

Derry, S. J., & Hmelo-Silver, C. E. (2005). Reconceptualizing teacher education: Supporting case-based instructional problem solving on the World Wide Web. In L. PytlikZillig, M. Bodvarsson, & R. Bruning (Eds.), *Technology-based education: Bringing researchers and practitioners together* (pp. 21–38). Greenwich, CT: Information Age Publishing.

Derry, S. J., Hmelo-Silver, C. E., Nagarajan, A., Chernobilsky, E., & Beitzel, B. D. (2006). Cognitive transfer revisited: Can we exploit new media to solve old problems on a large scale? *Journal of Educational Computing Research, 35*(2), 145–162.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education, 2*(2–3), 87–105.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education, 15*(1), 7–23.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *Internet and Higher Education, 13*, 5–9.

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *Internet and Higher Education, 10*(3), 157–172.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education, 19*(3), 1433–1438.

Gee, J. (2000). The new literacy studies and the social turn. In D. Barton, M. Hamilton, & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 180–196). London, UK: Routledge.

Gee, J. P. (2011). *An introduction to discourse analysis: Theory and method* (3rd ed.). New York, NY: Routledge.

Geertz, C. (1973). *The interpretation of cultures: Selected essays* (Vol. 5019). New York, NY: Basic Books.

Greeno, J., Collins, A., & Resnick, L. B. (1996). Cognition and learning. In B. Berliner & R. Calfee (Eds.), *Handbook of educational psychology*. New York, NY: Simon & Shuster MacMillan.

Gunawardena, C. N., & La Point, D. (2007). Cultural dynamics of online learning. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 593–607). Mahwah NJ: Erlbaum.

Hannafin, M., Land, S., & Oliver, K. (1999). Open learning environments: Foundations, methods, and models. *Instructional-Design Theories and Models: A New Paradigm of Instructional Theory, 2*, 115–140.

Hewling, A. (2006). Culture in the online class: Using message analysis to look beyond nationality-based frames of reference. *Journal of Computer-Mediated Communication, 11*, 337–356.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*(3), 235–266.

Hmelo-Silver, C. E. (2006). Design principles for scaffolding technology-based inquiry. In A. M. O'Donnell, C. E. Hmelo-Silver & G. Erkens (Eds.), *Collaborative reasoning, learning and technology* (pp. 147–170). Mahwah NJ: Erlbaum.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*(2), 99–107.

Hobman, E. V., Bordia, P., & Gallois, C. (2004). Perceived dissimilarity and work group involvement the moderating effects of group openness to diversity. *Group & Organization Management, 29*(5), 560–587.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online Readings in Psychology and Culture, 2*(1), 8.

Hung, W., Bailey, J. H., & Jonassen, D. H. (2003). Exploring the tensions of problem-based learning: Insights from research. *New Directions for Teaching and Learning, 2003*(95), 13–23.

Jonassen, D. H. (2011). *Learning to solve problems: A handbook for designing problem-solving learning environments*. New York, NY: Routledge.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology, Research and Developments, 48*(4), 63–85.

Kim, M. C., & Hannafin, M. J. (2011). Scaffolding problem solving in technology-enhanced learning environments (TELEs): Bridging research and theory with practice. *Computers & Education, 56*(2), 403–417.

Kirschner, P., Strijbos, J., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative learning environments. *Educational Technology Research and Development, 52*(3), 47–66.

Kozma, R. B. (1991). Learning with media. *Journal of Educational Research, 61*, 179–211.

Kramsch, C. (1993). *Context and culture in language teaching*. Oxford, UK: Oxford University Press.

Kuh, G. D. (1990). Assessing student culture. *New Directions for Institutional Research, 68*, 47–60.

Kuh, G. D., & Whitt, E. J. (1988). *The invisible tapestry. Culture in American colleges and universities. ASHE-ERIC Higher Education, report no. 1, 1988*. Washington, DC: Association for the Study of Higher Education.

Lajoie, S. P., Hmelo-Silver, C. E., Wiseman, J. G., Chan, L. K., Lu, J., Khurana, C., …, Kazemitabar, M. (2014). Using online digital tools and video to support international problem-based learning. *Interdisciplinary Journal of Problem-Based Learning, 8*(2), 6.

Ledwith, S., Lee, A., Manfredi, S., & Wildish, C. (1998). Multiculturalism, student group work and assessment. Oxford: Oxford Brookes University.

Lowenthal, P. (2010). Social presence. In S. Dasgupta (Ed.), *Social computing: Concepts, methodologies, tools and applications* (pp. 129–136). Hershey, PA: IGI Global.

Lu, J., & Chan, L. K. (2015). Differ in socio-cognitive processes? Some comparisons between paper and video triggered PBL. *Interdisciplinary Journal of Problem-Based Learning, 9*(2). doi:10.7771/1541-5015.1495.

Matsumoto, D., & Juang, L. (2012). *Culture and psychology*. Boston, MA: Cengage Learning.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108*(2), 291.

Raybourn, E. M., Kings, N., & Davies, J. (2003). Adding cultural signposts in adaptive community-based virtual environments. *Interacting with Computers, 15*(1), 91–107.

Reddy, M. J. (1979). The conduit metaphor: A case of frame conflict in our language about language. In A. Ortony (Ed.), *Metaphor and thought* (pp. 284–310). Cambridge, MA: Cambridge University Press.

Rourke, L., Anderson, T., Garrison, R., & Archer, W. (2001). Methodological issues in the content analysis of computer conference transcripts. *International Journal of Artificial Intelligence in Education, 12*(1), 8–22.

Scollon, R., & Wong-Scollon, S. (2001). *Intercultural communication* (2nd ed.). Oxford, UK: Blackwell.

Schrader, P. G., Leu Jr, D. J., Kinzer, C. K., Ataya, R., Teale, W. H., Labbo, L. D., & Cammack, D. (2003). Using Internet delivered video cases, to support pre-service teachers' understanding of effective early literacy instruction: An exploratory study. *Instructional Science, 31*(4–5), 317–340.

Swan, K., & Shih, L. F. (2005, June). The development of perceptions of social presence in online course discussions. In *World Conference on Educational Multimedia, Hypermedia and Telecommunications* (Vol. 2005, No. 1, pp. 836–843).

Tawfik, A., & Jonassen, D. (2013). The effects of successful versus failure-based cases on argumentation while solving decision-making problems. *Educational Technology Research and Development, 61*(3), 385–406.

Tu, C. H., & McIsaac, M. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning, 1*(2), 34–45.

Tu, C., & McIsaac, M. (2010). The relationship of social presence and interaction in online classes. *American Journal of Distance Education, 16*(3), 131–150.

van Boxtel, C., van der Linden, J., & Kanselaar, G. (2000). Collaborative learning tasks and the elaboration of conceptual knowledge. *Learning and Instruction, 10*(4), 311–330.

Vatrapu, R. K. (2008). Cultural considerations in computer supported collaborative learning. *Research & Practice in Technology Enhanced Learning, 3*(2), 159–201.

Wang, M. (2007). Designing online courses that effectively engage learners from diverse cultural backgrounds. *British Journal of Educational Technology, 38*(2), 294–311.

Watson, W. E., Johnson, L., & Merritt, D. (1998). Team orientation, self-orientation, and diversity in task groups their connection to team performance over time. *Group & Organization Management, 23*(2), 161–188.

Williams, S. W., Watkins, K., Daley, B., Courtenay, B., Davis, M., & Dymock, D. (2014). Facilitating cross-cultural online discussion groups: Implications for practice. *Distance Education, 22*(1), 151–167.

Wisneski, J. E., Ozogul, G., & Bichelmeyer, B. A. (2015). Does teaching presence transfer between MBA teaching environments? A comparative investigation of instructional design practices associated with teaching presence. *The Internet and Higher Education, 25*, 18–27.