

Towards understanding threads as social and cognitive artifacts for knowledge building in online learning



murat oztok

Lancaster University

Department of Educational Research

oztokm@gmail.com

ABSTRACT

Learning scientists have indicated that one way to support knowledge construction in asynchronous threaded discussions is to provide means by which critical discourse can be supported. However, studies that seek to understand critical discourse in online learning tend to focus on the outcomes of threads or examine threads in aggregate. In order to understand the pedagogical processes by which knowledge construction can be initiated and sustained, I examined patterns of social, cognitive, and teaching presences influencing the development of pivotal notes (notes that trigger knowledge construction). Evidence suggests that exhibiting high levels of cognitive presence tends to lead quickly to knowledge construction, whereas the other presences do not. Research directions are suggested to better understand these processes.

KEYWORDS

Online learning, Social presence, Teaching presence, Cognitive presence.

Purpose and perspective

The Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 1999) is a prominent theoretical framework in online learning literature that focuses on the pedagogical processes by which deep and meaningful discourse can be supported at the intersection of three elements: social presence, cognitive presence, and teaching presence. The CoI model has roots in socio-cognitive theory and argues that “[i]n an environment that is supportive intellectually and socially, and with the guidance of a knowledgeable instructor, students will engage in meaningful discourse and develop personal and lasting understandings of course topics” (Rourke & Kanuka, 2009, p. 21). Critical discourse is at the core of this model and it is based on Toulmin’s (1958) model of argumentation and Ausubel’s (1961) model of meaningful learning. According to the CoI model, social presence refers to the ability of participants to project their personal characteristics into the community through three types of communicative actions: affective, cohesive, and interactive responses. Teaching presence refers to the responsibilities of the instructor with respect to instructional design, discourse facilitation, and

direct instruction (Garrison et al., 1999). Cognitive presence is “the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication” (ibid. p.12), and it is identified through four cognitive events: triggering, exploration, integration, and resolution. In tandem, the three presences are believed to support and sustain critical discourse that leads to knowledge construction. However, the literature suggests that discussions in online learning environments typically lack support for critical discourse (Hewitt, 2005), preventing critical thinking and knowledge construction (Oztok, Zingaro, Brett, & Hewitt, 2013; Rourke & Kanuka, 2007).

The majority of contemporary online courses employ asynchronous threaded discussions, providing individuals an opportunity to reflect on their insights while reacting to and engaging with each other (Hewitt, 2005). Threads provide individuals an opportunity to reflect, exchange ideas, and negotiate perspectives, and have been found useful in supporting students in collaboration and exploration (Oztok, 2012). Nevertheless, due to lack of scaffolding and cognitive guidance inherent in threads (Suthers, Vatrapu, Medina, Joseph, & Dwyer, 2008), along with the impersonal nature of

online environments (Oztok & Brett, 2011), individuals may feel disconnected or disoriented (Hewitt, 2005) preventing them from synthesizing the group discussion. Thus, lack of social, cognitive, and instructional guidance for supporting collaborative learning in asynchronous threaded discussions creates further obstacles for collaboration, meaning-making, and knowledge construction.

Critical discourse is of recurring concern in the online learning literature (Hewitt, 2005; Zingaro, 2012; Zingaro & Oztok, 2012). That said, much of the research examines aggregate patterns of critical discourse at the class level (e.g., Zingaro, 2012; Zingaro & Oztok, 2012). Since knowledge construction is not a compiled outcome but rather a collaborative process, this prior work fails to explore the precursors for engendering critical thinking in the first place. I argue that understanding the relationship of teaching presence, social presence, and cognitive presence to the process of knowledge construction can inform our understanding of the ways that knowledge construction can be supported and sustained. This research therefore explores the role of the three presences (social, cognitive, and teaching) in the CoI model in the process of knowledge construction.

Methods and data sources

In order to understand the pedagogical processes by which knowledge construction can be initiated and

sustained, I examined the patterns of social, cognitive, and teaching presences that may create or support the necessary conditions and qualities for “pivotal notes”, explained in detail below. To this end, I (along with my research team) analyzed threads in which individuals collaboratively constructed knowledge, identified pivotal notes in those particular threads, and coded the categories of social, cognitive, and teaching presences that exist in precursor notes (Cronbach’s alpha for our presence coding schemes was 0.83). Data is gathered from a fully online graduate education course from Fall 2012 (N=13) offered at a large North-American research university. The course comprised twelve modules, each corresponding to one week, in which students discussed weekly readings. Each week, one or two students acted as moderators. They facilitated discussion throughout the week, kept discussions on track, offered a summary of the week’s issues, and overall provided opportunities for sustained discourse, increased interaction, and rich discussions.

The Interaction analysis model (Gunawardena, Lowe, & Anderson, 1997) is employed for examining the process of knowledge construction. It is based on socio-cultural learning theories and is specifically developed for analyzing asynchronous threaded discussions. The model conceptualizes knowledge construction as a process of negotiation in which meanings, perspectives, and perceptions play important roles. While not strictly sequential, the interaction analysis model suggests five phases through

which knowledge construction occurs: 1) sharing and comparing of information, 2) discovery and exploration of dissonance or inconsistency among participants, 3) negotiation of meaning of knowledge co-construction, 4) testing and modification, and 5) phrasing of agreement and applications of newly constructed meaning (Table 1).

Recently, Wise and Chiu (2011) have built on the interaction analysis model and defined pivotal notes as those notes in which knowledge construction processes are triggered. A pivotal note is a note within a threaded discussion that initiates new segments of discussion, possibly leading to higher-level discussion and knowledge construction.

Phases	Description	Example
1 Sharing Information	Statements of observation, opinion, agreement, clarification, example or problem definition etc.	"I agree that students' pre-existing ideas are important to consider. There is empirical support for this in the misconceptions literature."
2 Exploring Dissonance	Identification of areas of disagreement; clarification of source and extent of disagreement; providing support for one's ideas in the face of counterarguments.	"I think what we are disagreeing about here is not whether we should assess learning but how to design assessments to drive positive learning experiences."
3 Negotiating Meaning	Identification of areas of agreement across conflicting ideas; clarification of meanings of terms; proposal and negotiation of integrating metaphors and compromise statements.	"I think that if we take an 'expert' as someone who sees the deep structure of a discipline, then we can all agree that more than rote memorization is needed."
4 Testing and Modifying	Testing the proposed synthesis against "received facts," cognitive schema, personal experience, collected data, and expert testimonies.	"We agreed that peer-interaction is important for learning, but what about all the research on self-study and individual tutoring systems?"
5 Agreeing and Applying	Summarization of agreement(s); application of new knowledge; metacognitive statements of changes in knowledge or ways of thinking.	"I think our discussion has shown that it is not just the learning materials that matter, but how they are used. I guess the next question is how to help students use materials well..."

Table 1: Summary of Interaction Analysis Model. Based on (Gunawardena et al., 1997), adapted from (Wise & Chiu, 2011)

The Col model has been employed by numerous researchers in a substantial number of studies for more than a decade (Rourke & Kanuka, 2007) in order to study knowledge construction in relation to the dynamics of a community of learners. The model identifies “the key

elements of an educational transaction that could be studied in concert such that their interdependencies could be understood” (Akyol & Garrison, 2008, p. 4). Each of the presences is multi-layered and defined based on constituent categories (See Table 2).

Elements	Categories	Indicators
Social Presence	Interactive / Open Communication	Learning Climate/Risk-Free Expression
	Cohesive	Group Identity/Collaboration
	Affective / Emotional Expression	Self Projection/Expressing Emotions
Cognitive Presence	Triggering Event	Sense of Puzzlement
	Exploration	Information Exchange
	Integration	Connecting Ideas
	Resolution	Applying New Ideas
Teaching Presence	Course Design & Organization	Setting Curriculum & Methods
	Facilitating Discourse	Shaping Constructive Exchange
	Direct Instruction	Focusing and Resolving Issues

Table 2: Social, Cognitive, and Teaching Presence. Adapted from Garrison et al. (1999).

Results

I analyzed the threads from the middle four weeks of the course, as these weeks exclude intro/exit weeks and were the most active overall. Of the 153 notes in 22 threads that I analyzed, I found only 7 threads in total in which

students collaboratively constructed knowledge. Then, I analyzed those 7 threads and investigated the notes prior to the pivotal note in relation to the categories of the three presences (Table 3). By doing so, I explored the conditions leading to and qualities necessary for the pivotal note.

	1	2	3	4	5	6	7
Social Presence	I-A-A-I-I-C	C-A-A-I-I	A-A-I-I-A	I-C-A-I-A-I	I-A-C-C-I	C-C-A-A	A-A-I-C-I-I
Cognitive Presence	T-T-T-E-I-I	E-T-T-E-I	E-E-I-E-I	T-E-E-E-I-I	T-E-I-I-I	E-E-I-I	T-E-I-E-I-I
Teaching Presence	C-D-F-F-D-D	C-F-F-D-F	F-D-D-F-F	C-D-D-F-F-D	F-F-F-D-F	C-D-F-F	F-D-F-F-D-F

Table 3: Categories of the three presences in notes prior to the pivotal note (The letters represent the first letter of each category)

The results indicate that when social presence and its categories are considered in conjunction with knowledge construction, there is no dominant category or pattern of categories that is suggestive of promising discussions. That is, according to the results, there is no certain aspect of social presence that is needed or required for the pivotal notes. The findings are in line with the current literature in suggesting no effect of social presence on knowledge construction (Arbaugh, 2007; Rtheke & Kanuka, 2009).

However, it is important at this point to note that I am not suggesting that social aspects have no value for learning or knowledge construction. Indeed, social presence throughout the these may support threaded discussions since it provides contextual understandings for individuals (Kehrwald, 2008). However, I see no clear pattern between social presence and pivotal notes.

Similarly, there is no strong or clear pattern of teaching presence and its categories that appear to support

pivotal notes. However, studies have repeatedly shown that teaching presence affects learning and knowledge construction (Akyol & Garrison, 2008). I believe that the result is contradictory because studies examining teaching presence investigated its role using outcomes or aggregates. Thus, when teaching presence is considered in conjunction with the process of knowledge construction, the current conceptualization of teaching presence might fall short since it does not conceptualize knowledge construction as a collaborative process.

When cognitive presence and its categories are considered, it can be suggested that *exploration* followed by *integration* may provide the cognitive supports required for discussions to evolve and lead to triggering notes. In particular, when individuals integrate each others' ideas and connect those ideas to other ideas, they can create situated meanings (Lave & Wenger, 1991), understand each others' subjectivity (Suthers, 2006), and distribute the cognitive responsibility (Stahl, 2010).

Significance and Discussion

Threaded discussions support divergence and plurality of ideas. However, such discussions lack supports for synthesizing multiple perspectives or engaging in meta-level analysis, activities necessary for collaboration and knowledge creation. As a first step in understanding the role of the Col presences for knowledge construction, I

analyzed both presences and knowledge construction for relationships suggestive of particular prerequisites for knowledge construction. I find evidence that exhibiting high levels of cognitive presence tends to lead to knowledge construction, though the other presences do not.

This work agrees with the perspective of Rourke and Kanuka (2009), who argue that cognitive presence can be seen as an outcome of the Col model. As cognitive presence indicators were prerequisite to knowledge construction in this work, I similarly see cognitive presence as a valued end in itself. What remains to be addressed is the role of social and teaching presence in fostering cognitive presence and hence knowledge construction.

Conclusion

I have merged theory from the learning sciences and online learning literatures to investigate precursors of knowledge construction using the Community of Inquiry framework. Cognitive presence seems largely related to knowledge construction, though the relationships with other presences remain unclear. I intend to continue this research through an examination of multiple courses to determine the extent to which the findings can be generalized. I encourage the online learning research community to continue to problematize the divergent nature of threads and discover prompts and supports that encourage those processes known to lead to knowledge construction.

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.
- Arbaugh, J. B. (2007). An Empirical Verification of the Community of Inquiry Framework. **Journal of Asynchronous Learning Networks**, 11(1), 73–85.
- Ausubel, D. P. (1961). In defense of verbal learning. **Educational Theory**, 11(1), 15–25. doi:10.1111/j.1741-5446.1961.tb00038.x
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. **The Internet and Higher Education**, 2(2–3), 87–105. doi:10.1016/S1096-7516(00)00016-6
- Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis Of A Global Online Debate And The Development Of An Interaction Analysis Model For Examining Social Construction Of Knowledge In Computer Conferencing. **Journal of Educational Computing Research**, 17(4), 397–431.
- Hewitt, J. (2005). Toward an Understanding of How Threads Die in Asynchronous Computer Conferences. **Journal of the Learning Sciences**, 14(4), 567–589. doi:10.1207/s15327809jls1404_4
- Ke, F., Chávez, A. F., Causarano, P.-N. L., & Causarano, A. (2011). Identity presence and knowledge building: Joint emergence in online learning environments? **International Journal of Computer-Supported Collaborative Learning**, 6(3), 349–370. doi:10.1007/s11412-011-9114-z
- Kehrwald, B. (2008). Understanding Social Presence in Text-Based Online Learning Environments. **Distance Education**, 29(1), 89–106.
- Lave, J., & Wenger, E. (1991). **Situated Learning: Legitimate Peripheral Participation**. New York, NY: Cambridge University Press.
- Oztok, M. (2012). Tacit knowledge in online learning: community, identity, and social capital. **Technology, Pedagogy and Education**, 1–16. doi:10.1080/1475939X.2012.720414
- Oztok, M., & Brett, C. (2011). Social Presence and Online Learning: A Review of Research. **The Journal of Distance Education**, 25(3). Retrieved from <http://www.jofde.ca/index.php/jde/article/view/758>. Accessed on 2015/02/10.
- Oztok, M., Zingaro, D., Brett, C., & Hewitt, J. (2013). Exploring asynchronous and synchronous tool use in online courses. **Computers & Education**, 60(1), 87–94.
- Rourke, L., & Kanuka, H. (2007). Barriers to online critical discourse. **International Journal of Computer-Supported Collaborative Learning**, 2(1), 105–126. doi:10.1007/s11412-007-9007-3
- Rourke, L., & Kanuka, H. (2009). Learning in communities of inquiry: A review of the literature. **Journal of Distance Education**, 23(1), 19–48.
- Stahl, G. (2010). Guiding group cognition in CSCL. **International Journal of Computer-Supported Collaborative Learning**, 5(3), 255–258. doi:10.1007/s11412-010-9091-7
- Suthers, D. D. (2006). Technology affordances for intersubjective meaning making: A research agenda for CSCL. **International Journal of Computer-Supported Collaborative Learning**, 1(3), 315–337. doi:10.1007/s11412-006-9660-y

Suthers, D. D., Vatrappu, R., Medina, R., Joseph, S., & Dwyer, N. (2008). Beyond threaded discussion: Representational guidance in asynchronous collaborative learning environments. **Computers & Education**, 50(4), 1103–1127. doi:10.1016/j.compedu.2006.10.007

Toulmin, S. E. (1958). **The Uses of Argument**. Cambridge, UK: Cambridge University Press.

Wise, A., & Chiu, M. (2011). Analyzing temporal patterns of knowledge construction in a role-based online discussion. **International Journal of Computer-Supported Collaborative Learning**, 6(3), 445–470. doi:10.1007/s11412-011-9120-1

Zingaro, D. (2012). Student Moderators in Asynchronous Online Discussion: a Question of Questions. **Journal of Online Learning and Teaching (JOLT)**, 8(3), 159–173.

Zingaro, D., & Oztok, M. (2012). Interaction in an Asynchronous Online Course: a Synthesis of Quantitative Predictors. **Journal of Asynchronous Learning Networks**, 16(4), 71–82.