2009

How You Question is What You Get: Collective Inquiry Dialogues in Online Forums

Yusun Jung
Case Western Reserve University, yusun.jung@case.edu

Richard Boland, Jr.
Case Western Reserve University, boland@case.edu

How You Question Is What You Get: Collective Inquiry Dialogues in Online Forums

Yusun Jung
Case Western Reserve University
Yusun.jung@case.edu

Richard Boland Jr.
Case Western Reserve University
Boalnd@case.edu

ABSTRACT

In today's networked environment, online forums emerge as a popular form of social structures that provides greater opportunities for learning from external resources without pre-established knowledge network. However, our inquiries in online forums do not always generate knowledge desideratum satisfactorily. A few recent studies noticed that communication practices become a means to characterize online forums and influences on effectiveness of collaborative learning. Our preliminary case study in an enduring online forum showed that how dialogue unfolds, i.e., asking questions and suggesting hypothetical solutions, shapes different dynamisms of collaborative learning; some dialogues are highly generative, drawing broad attention, surfacing multiple voices, and producing new knowledge through active reflection, refinement, and exploration; but some fail to be generative and display narrow, inadequate inquiry. Given the importance of dialogue and structures of interaction for learning, we propose to study how different dialogue practices in online forums are related to different levels of generative inquiry.

Keywords

Online forum, collaborative learning, generative inquiry, dialogue

INTRODUCTION

Advances in Information and Communication Technologies (ICT) offer unprecedented opportunities for learning unconstrained by temporal and spatial boundaries. Online forums have become the most prevalent ICT-enabled social structure for collaborative learning (DeSanctis et al. 2003). Wasko and Faraj (2005) call the self-organizing and emergent social structures that are dedicated to problems of practice *electronic networks of practice.* It is commonly believed that benevolent individuals who display good will to help others along with the culture of a gift economy that rewards helping behaviors with social capital are critical factors for successful collaborative learning in online forums (Bergquist and Ljungberg 2001; Constant et al. 1996; Wasko and Faraj 2005).

However, a recent study by Kudaravalli and Faraj (2008) shows that structures of interaction that initiate and sustain conversation are more influential on the effectiveness of collaboration than traditional variables such as community resource and participants' diversity. This reminds us of the important point that learning is essentially a demand-side issue that is independent of the abundance of knowledge in a network, and learners' initiatives and participation are of most significance (Brown and Duguid 2002; Dewey 1938; Kudaravalli and Faraj 2008). Lacking pre-established formal work structures and face-to-face interaction that delivers tacit knowledge and contextual information, people who participate in ICT-mediated collaboration rely on "dense dialogue" to overcome the constraints (DeSanctis et al. 2003; Fayard and DeSanctis 2008; Kudaravalli and Faraj 2008). Study findings imply that conversation practice is closely related to successful knowledge work. However, the understanding of what is good conversation practice and how it facilitates successful generative collective inquiry is understudied in current IS literature.

In this paper we explore the relation between different conversation practices and different levels of group learning in online forums. In the pragmatic perspective on learning, we envision group learning as collective inquiry processes through which individuals from different sub-cultures exchange knowledge by trading theories, experiences, experiments, practices, speculations, hypotheses, materials, and artifacts to make progress as a whole. Group conversation is a critical means of group learning that uncovers unforeseen issues, connects knowledge distributed among individuals, and mediates their self-reflection and action with the knowledge (Boland et al. 1994; Kolb et al. 2002). We present a preliminary case study showing that conversation in online forums is not always constructive and welcoming. Some conversations were discouraging, and people's intentions were misunderstood. Such conversation hampers group learning, but, at the same time, it offers opportunities to elaborate unclear problems and improve the search for solutions. Observing the impact of conversation on group learning, we propose a theoretical framework to study how different conversation practices influence the effectiveness of group learning in online forums.

The remainder of this paper is organized as follows. First, we review pragmatic studies of inquiry relevant to collaborative learning in online forums. Then, we present a preliminary case study in which we analyzed four discussion cases from an enduring online forum. From the case study, we propose three aspects of dialogue that influence the generativeness of collaborative learning in online forums. Finally, we close this paper by discussing its potential contributions to IS communities.

LITERATURE REVIEW

Learning is not simply understanding the true nature of things or memorizing objectified knowledge. Rather, it is a participative sport by which a learning agent transforms and constructs knowledge for his or her own purpose, that is unique to their problematic situation and need for action. Dewey (1938) denotes learning as a "coming to know," which underscores the self-motivated, knowledge-guided activity. Learning is best achievable through a learner's deliberate seeking for 'what he needs' to do 'what he wants to do' and is most properly motivated by a desire to resolve problematic situations. Here, knowledge is essentially transformative and constructed from the learner's experiences of coping with problematic situations, and knowledge value is determined by its workability in the problematic situation (Dewey 1938; Kolb 1984).

The thrust of collaborative learning, in this context, is the greater heterogeneity of experiences, which makes learning richer and more dynamic than individual monolithic learning. The way inquirers interact is not homogenization but local coordination by which they exchange own domain knowledge and practices selectively (Galison 1997). Emphasizing the participative and transformative nature of collaborative learning, we propose a concept of collective inquiry as a process through which individuals share their experiences of breakdown, construct a shared image of problem, analyze and synthesize prior knowledge to generate hypotheses, test them against problematic situations of breakdown, and construct new working knowledge. In doing so, inquirers not only generate knowledge desideratum but also find opportunities to uncover "big" problems that extant knowledge systemically incubate and identify ill-defined, emergent problems in different cognitive dimensions.

Collective inquiry is held within learning network, i.e., community of practice, where learning agents share problematic situations and access knowledge resources to create working knowledge (Brown and Duguid 1991; Cook and Brown 1999). The organizational practice of exchanging experience to construct shared understandings of problematic situation and deriving solutions becomes a critical activity of learning organizations. The practice shapes and is shaped by how people communicate one another and learn through it (Orlikowski 2002; Orlikowski and Yates 1994). In this context, conversation is a "meaning-making process" through which inquirers externalize the interpretive nature of self-reflection on problematic situations and exchange experiences and ideas — the two ways of knowing (Baker et al. 2005). Inquirers construct mutual understandings and generate new ideas through conversation. Good conversation enables each individual to promote fully own voice and to preserve the differences and the diversities, rather than evaporate them (Barker and Kolb 1993; Kolb et al. 2002). In doing so, people relate themselves to others with different perspective, to influence each other, to incorporate external values, and to modify each other. Through the recursive interaction, a group can incorporate low and unspoken voices into the creation of its values and practices. Therefore, it is reasonable to presume that the quality of dialogue, one form of organizational communicative practices, is a critical means of successful collective inquiry in terms of generativeness of producing knowledge desideratum and expanding repertoire (Singh and Jayanti 2008).

With advanced information and communication technologies possibilities for collective inquiry are not limited to co-located community of practice. Inquirers can interact with others remotely through technologies and participate or build learning networks without prior social relationship and formal work structure. Online forums are recognized as a representative ICT-enabled space to accommodate emergent self-organizing learning organizations that are constructed by inquirers' initiatives and sustained by enduring efforts of collective inquiry (DeSanctis et al. 2003). Boland and colleagues (1995; 1994) state that collective inquiry is essentially hermeneutic processes where dialogue plays a critical role. Information technologies can support ICT-mediated hermeneutic processes effectively by enhancing communicative practice. However, it is only recently that researchers recognize the importance of the communicative practice for collective inquiry in such ICT-mediated collective inquiry, i.e., online forums.

Kudaravalli and Faraj (2008) use dialogues that appeared in discussion threads as a unit of analysis. They found that how a person initiates a dialogue and how others respond to the dialogue and sustain it, influences the effectiveness of collaboration in online forums. Adopting Wittgenstein's language game, DeSanctis and colleagues (2003; 2008) show that dialogic patterns are related to diverse structural and functional characteristics of online forums, such as kiosk, club, and neighborhood, that are unique in their learning styles. For instance, language games in kiosk-type online forums can be simple and cogent, and as in clubs, can require some rituals and personal gestures to build relationships. Similarly, as in neighborhoods, they can be rich with diverse professional and personal components that are constructed by shared

experiences, practices and language. Singh and Jayanti's (2008) case descriptions indicate that generative learning cycles are filled with encouraging, positive, and engaging dialogue but inquirers in non-generative learning cycles are hesitant, discouraging, and indifferent of others' problems and suggestions.

Although dialogue is the only means to initiate and sustain collective inquiry in online forums, current literature lacks both descriptive and prescriptive implications; what constitutes good dialogue that make collective inquiry generative and how people improve their communicative practice in online forums. Our preliminary case study presented below reveals how different ways of unfolding dialogue shape different dynamism and outcomes of collective inquiry.

CASE STUDY

Using discussion threads that are publically available in an online forum, we conducted a preliminary case study to investigate the relation between dialogue and collective inquiry in online forums and to explore potentially relevant constructs and variables (Eisenhardt 1989; Kozinets 2002; Yin 2003).

We sampled a user forum of an open source community, Linux Hardware (http://www.linuxquestions.org/questions/linux-hardware-18/). We chose it purposively in two regards. First, successful open source communities such as Linux and Apache are considered to be an exemplar of collaborative learning (Awazu and Desouza 2004; Faldetta 2002; Lee and Cole 2003; O'Reilly 1999). Their practice of collaborative learning are shaped by continuous interactions among individuals guided by criticism and error correction through peer-monitoring, bottom-up community structure (Awazu and Desouza 2004; Lee and Cole 2003; Markus et al. 2000). Participants of open source communities benefit from prompt feedback, global testing pool, independent peer review, highly qualified contributors, and self-selected and motivated developers (Feller and Fitzgerald 2002, Lerner and Tirole 2000). Second, the Linux Hardware community demonstrates sufficient member heterogeneity. The EBB of Linux Hardware displays member information including geographical distribution, level of expertise (i.e., guru, senior member, member, and Newbie), tenure, and core contributions, and level of activity (number of posting). Hardware is usually used in broader and more diverse contexts than software, and, thus, hardware problems are more diverse that software.

We used an initial posting and following discussion threads as a unit of analysis. In electronic networks of practice, members' interactions are limited to textual, asynchronous, nonlinear communication via e-mail or EBB. Initial postings and discussion threads record all interactions and also indicate complex and elaborated ways to coordinate work (Kudaravalli and Faraj 2008; Wasko and Faraj 2005; Yates et al. 2003). We selected four cases from the EBB among those with longer discussion threads, as they offer opportunities to explore rich dynamics of collective inquiry (Table 1). The topics of interest and their objectives are unique and they have enough time spans ensuring sufficient developments of discussion threads.

Table 1. Description of Three EBB Communication Threads

Case	Thread title	# of views	# of threads	Duration	# of participants	Initial poster's profile	Focal member's profile
1	Cleaning a memory using an eraser will fry the RAM chips?	314	18	3D:4HR:17M	9	Member Tenure: Sep 2008 Posts: 31	Senior Member Tenure: Oct 2005 Posts: 3,955
2	USB Pen Drive / Flash Drive Unmounted but the power is there	4590	11	1YR:8D:12HR:16M	7	Member Tenure: Oct 2005 Posts: 84	Member Tenure: Jun 2006 Posts: 336
3	Asus M3N-HT Deluxe AMD Nvidia 780a Motherboard	7441	53	4M:22D:5HR:12M	13	Member Tenure: Jan 2003 Posts: 199	Senior Member Tenure: Jan 2005 Posts: 3,155
4	Reboots at 60 minutes	1224	49	6M:3D:16HR:33M	6	Member Tenure: Aug 2004 Posts: 246	Guru Tenure: Mar 2006 Posts: 5,570

We read the initial postings and classified each case according to DeSanctis et al.' taxonomy of learning style (2003); declarative learning aims to obtain relatively objective and factual knowledge; procedural learning is similar to declarative learning but interested in objective knowledge about how-to in particular; transactive learning is to search for knowledge resources, i.e., who know what; and sense-making attempts to develop shared meaning. Then, we spotted significant turning points during discussion threads where an initial positing got an initial response, discussion threads digressed and regressed,

and discussion concluded. These moments built up different dynamics of how collective inquiry in each discussion thread evolves (Figure 1). We also describe outstanding characteristics of dialogue of the punctuated moments below.

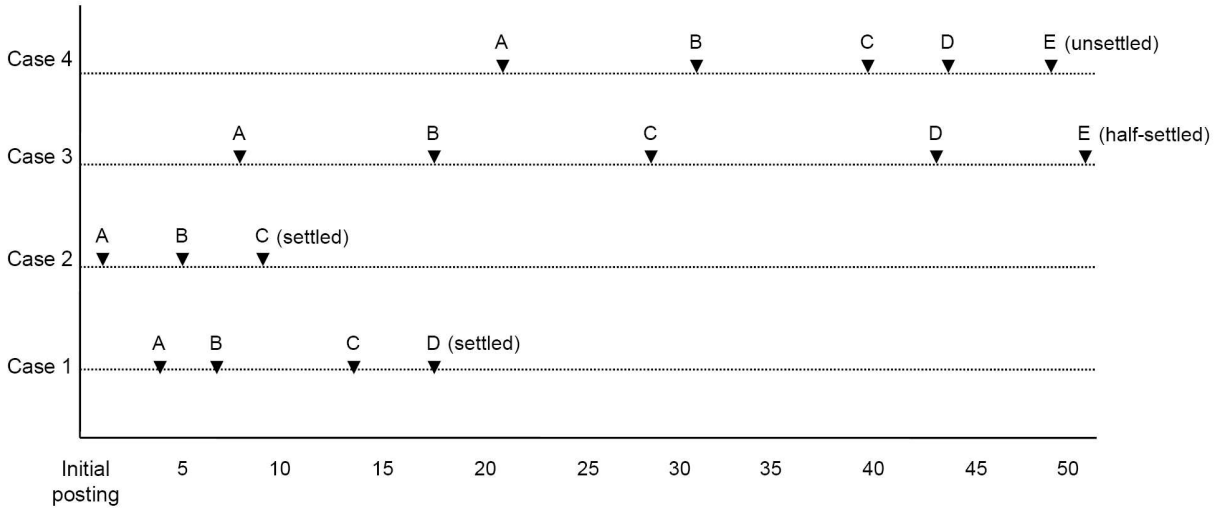

Figure 1. Turning points of dialogue in four cases

Case 1: Declarative question

Case 1 began with a straightforward declarative question asking whether cleaning a memory using an eraser would fry the RAM chips or not. Initial three threads responded to it with similar logic presuming that the friction would have marginal heating effect. Thread 4 offered a different approach from the previous three, introducing a recommended way of cleaning contact marks on RAM — using alcohol and soft cloth **(A)**. Thread 5 prompted the response pointing out that only 99.9% pure alcohol could be used for cleaning that is rarely available in regular market, since non-pure alcohol containing water and other ingredients would be harmful to electronic modules. Thread 5 criticized Thread 4 not putting a caveat on that and devaluated the effectiveness of Thread 4's suggestion. Using direct quote, Thread 4 repudiated Thread 5's criticism in Thread 6 saying that people with commonsense would know the difference and he was talking to them, which insinuates that Thread 5 had no commonsense. This infuriated moment of arguing without logic and proof was settled by a senior who had year-long experience in cleaning RAM with an eraser and confirmed that chemical cleaning would be more harmful than an eraser **(B)**. With a few appreciating messages, cleaning with an eraser seemed to be accepted as legitimate working knowledge.

Later in Thread 14 another senior member with greater track-record warned that erasers have a long-term deleterious effect due to abrasion and oil remnant after rubbing **(C)**. He also introduced "good" electronics people's knowhow with specific directions for cleaning using a paper strip with non-corrosive solvents. Thread 15 and 16 concurred with Thread 14 with more detailed description and labeled cleaning with erasers as an "old trick." Thread 18 by the same person in Thread 7 contested Thread 14 to 16 for over-apprehending a simple problem **(D)**. However, his authority failed to be forceful to those who have equivalent or greater track-records, as they did not accept an old practice simply because it was a time-honored routine. Then, the chemical cleaning replaces the old trick and is accepted as a legitimate way of cleaning modules.

Case 2: Procedural question

Case 2 attempted to make sense of a breakdown during unmounting a pen drive and solicited a safe way to do it. When an initial poster removed his pen drive, its light remained flashing and the pen drive corrupted permanently. He suspected a relation between the flashing light and pen drive corruption. However, early threads misunderstood that the light remained flashing *was* the problem being asked about and disregarded it as a non-problem **(A)**. This frustrated the initial poster. Defending his position, he further deviated from his point. It was Thread 5 that read what was asked initially correctly **(B)**. This put the discussion on the right track toward searching for a safeguard. In Thread 7 and 8, a guru and a senior member derived a solution, which was tested by someone else in Thread 9. The person further tested the suggested codeset on different operating systems and revised it for broader applicability **(C)**.

Case 3: Sense-making/Procedural question

Case 3's problem was ill-defined by an initial poster but was encountered while installing an operation system and drivers. Early threads showed typical moves asking for further information about the problem and suggesting short hypotheses to test with. In Thread 10, a guru provided a set of "right" directions and system requirements such as a better choice of motherboards, O/S, and processor **(A)**. However, this directive solution seemed offensive to a newbie who questioned the validity of the guru's suggestions line by line using heavy direct quotes with an abbreviation QFT. This incited the guru eventually. He mocked, "QFT, huh, Quantum Field Theory" in Thread 17. The newbie corrected it saying "Quoted for Truth." Then the guru left the discussion, and only newbies and members led the remaining discussion.

Thread 18 reminded others of the unsolved problem **(B)**. Again, many members and newbies exchanged hypothetical solutions and testing results, attempting to identify potential causes of the breakdowns. Some issues settled, and new issues emerged. Most of the suggested solutions came from external direct references instead of personal synthesized knowledge. This left confusing footprints to others with similar problems. Thread 28 and 29 solicited a working step-by-step solution **(C)**, and Thread 44 wished to buy a booting CD from a member who reported some success **(D)**. However, other members encouraged them to continue to participate in collective inquiry instead of offering one. Finally, two members reported successful installation (E). However, the discussion threads remained open, as others still solicited solutions for the same problems.

Case 4: Sense-making question

The initial positing of Case 4 attempted to know what caused his machine to reboot at 60 minutes. The initial poster was impressive in presenting his problem and responding to others' suggestions. He always acknowledged every suggestion, promptly tested it and reported the results with own reflections, and thanked regardless of their effectiveness. One guru and a senior member were committed to his problem and continued to provide suggestions over six months. He reported his problem solved in Thread 20, although not knowing its cause. However, the same problem recurred in one month and in another one month **(A)**. The same guru got back. In Thread 31, another member with the same issue joined the discussion **(B)**. This time, the initial poster promptly responded to it and provided what he had found so far. Then, the senior member came back to the discussion thread, too. In Thread 39, another guru joined proposing a different approach. Thread 40 was totally out of context, posting an axiomatic phrase of encouragement that added nothing technically **(C).** Others ignored it, but the person came back in Thread 43. He criticized the operating system that others had been struggling with and suggested better systems **(D)**. This was irritating, because his remark depreciated the past four-month collective effort. Then, the discussion deviated from the original problem-solving effort, and people argued over the reliability of operating systems that each advocated. The original poster reminded others of the unsolved issue, but the discussion thread remained unresolved

In all cases, we observed discursive ruptures where dialogues spin around, become suspended, and derail permanently. People misunderstood others' intentions and hurt others' feeling due to their ways of exchanging their thoughts and experiences. The discursive ruptures sometimes impede discussion progression and sometimes become a turning point of uncovering new issues. We noticed that each marked turning point was associated with certain rhetorical issues. For example, the use of value-laden words such as "good electronics" and "old trick" often irritate others (Case 1). An unconstructive attitude that asks for justifications instead of showing willingness to accept ideas discourages others and makes one lose important knowledge sources (Case 3). Abrupt intervention with an unrelated new issue is unwelcomed, although it has important points (Case 4). It suggests that technical aspects of dialogue affect ICT-mediated group learning.

PROPOSITIONS FOR FUTURE RESEARCH

We view dialogue in online forums as a strategic argumentation rather than a free and relaxed "flow of thought"(Bohm 1996), because it involves qualitative values such as persuasiveness and convincingness; An initial posting should be persuasive enough to deliver its validity and worthy of her problem to be solved through collective inquiry, and suggestions should be convincing enough for others to believe its probability and workability. In other words, the question is how does a poster make their dialogue sound interesting and worthy and how do they propose answers and new issues that are probable and convincing, so that they can influence the outcome of learning (Brown and Walter 2005). In this rhetorical approach to dialogue, we propose three aspects of dialogue — structure, patterns, and styles — are critical to improve collective inquiry in online forum.[1]

[1] We derive the three aspects of dialogue from Aristotle's three matters of rhetoric — Pisteis, Lexis, and Taxis that denote invention, expression, and arrangement respectively.

Structures of dialogue

Toulmin's argumentation theory (1958) is useful to understand the structure of dialogue in online forums, because its flexible and open representation scheme offers board applications to everyday discourse of ordinary people in particular context. Toulmin proposes claim, data, and warrant as three essential functional components of argument as well as backing, rebuttal, and qualifier as auxiliary components. How to deploy structural elements influences the level of persuasiveness and convincingness of argumentation. Toulmin leaves definitions of each element flexible and determined by particular argumentation contexts. Good argumentation is associated with coherent organization of structural elements that embraces essential elements, distributes them properly, completes connection among every sort of argument, and deploys reasonably and logically (Liakopoulos 2000; Mann and Thompson 1987). In coherent argumentation, whether an individual's argument or an argumentation dialogue, every sentence finds an intended role and is functionally meaningful. Liakopoulos (2000) states that argumentation analysis is also applicable to analyzing dialogue to examine how each statement is connected consistently and coherently. For example, when a person intends to respond to an initial posting, his or her statement should be related to one or more of the structural elements of the initial posting and consistent with the topics of the interest.

> **Proposition 1:** Discussion threads that are built upon components of previous dialogue coherently and consistently enhance generative and effective collective inquiry.

Patterns of dialogue

Particularly in a dialogueal context, identifying the relevant procedural variables by which structural elements unfold is critical. Turn-taking and monitoring are commonly found procedural patterns that are critical to the effectiveness of group learning (Luck 2007). Such patterns in online forum should be different from such patterns in synchronous collocated dialogue, because the number of participants is not fixed and their participation is sequential and asynchronous. Although extant literature lacks such discussion, we believe that proper patterns to respond others discussion threads would improve collective inquiry more generative and effective. Also, finding dialogical patterns in online forum will be a valuable qualitative research area.

> **Proposition 2:** Qualitative issues of dialogue patterns are associated with the generativeness and the effectiveness of collective inquiry.

Styles of dialogue

The level of formality and the specialized vocabulary of networks of practice is an important element of group dialogue, because it represents unique symbol system of the community (Orlikowski and Yates 1994). The use of well-liked, easily understandable expression demonstrating a community's identity, such as the choice of words, metaphor, and similes, facilitates quick learning and expands shared languages. Styles also represent emotion and motivation such as hope, suspicion, and respect and reveal opportunistic behavior showing preemptive defense against potential assaults to own statements (Dillon 1990). Although Singh and Jayanti (2008) do not analyze styles of discussion threads, it is observable from their illustrative quotes that language and styles differ between degenerative learning cycles and generative ones. Fayard and DeSanctis (2008) found that linguistic style (greetings, use of emoticon, etc.) is one way to characterize learning types of online forums. Thus, we believe that styles are influential to different patterns and outcomes of collective inquiry. For instance, different greetings in initial postings seem related to the collective inquiry process. Case 1, "Hi, LQ experts, good day," clearly indicates from whom he wants to get answer. Indeed, among 18 discussion threads, 10 threads were given by five senior members, compared with Case 3, "Hello," where only six out of 53 threads were given by three seniors.

> **Proposition 3:** The style of dialogue such as linguistic style and elements are associated with the generativeness and the effectiveness of collective inquiry.

CONCLUSION

In this paper we attempted to open a discussion about how to improve our collective inquiry in mediated environments through the art of dialogue. This study will have four contributions. First, the idea of collective inquiry envisioned in this paper explains organizational learning from the perspective of the duality of knowledge that is constituted by interactions between tacit and explicit dimensions. The duality of tacit dimensions and explicit dimensions is deeply internalized within individual local boundaries and hardly captured (Schultze and Stabell 2004; Tsoukas 1994). Focusing on inquirers' action in collective inquiry, we identify structure and procedural patterns of organizational learning.

Second, we identify characteristics of dialogue for successful and generative collective inquiry in a systematic manner. This will derive a sort of thematic inquiry guide of how to make collective inquiry successful and generative by improving group

dialogue practice. This will have practical implication, because many online forums create a set of group norms for productive communication (i.e., Raymond and Moen 2006).

Third, the study findings are useful to designing ICT artifacts such as online forum spaces and knowledge acquisition systems. Earlier, Boland et al. (1994) propose six principles of designing ICT-mediated space that supports group dialogue among distributed individuals. The proposed study will suggest more specific, empirically proven, design principles for improving group dialogue. Knowledge acquisition systems are often limited to factual query-type questions (i.e., Google, Answer.com), because it is insensitive to expressive descriptions of problems. A thematic inquiry guide that this study will deliver would be helpful to design knowledge acquisition systems that can answer more diverse types of problems.

Fourth, the study finding will be a useful tutorial for system designers, since dialogue is an important technique of designers (Luck 2007). Ackerman (2000) points out that there is significant social-technical gap in current CSCW design because of inadequate considerations of flexible, nuanced, and contextualized human activity. Design problems are often wicked, ill-defined, and unforeseeable outside user context, and the domain of design and that of use is divided. Thus, it is very important to communicate with users groups in distributed contexts to identify ill-defined problems, to intercalate the two domains of design and use, and to evaluate the relationship of problems and design artifacts for pragmatic values.

REFERENCES

Ackerman, M. 2000. "The Intellectual Challenge of Cscw: The Gap between Social Requirements and Technical Feasibility," *Human-Computer Interaction*).

Awazu, Y., and Desouza, K.C. 2004. "Open Knowledge Management: Lessons from the Open Source Revolution," *Journal of the American Society for Information Science and Technology* (55:11), Sep, pp 1016-1019.

Baker, A.C., Jensen, P.J., and Kolb, D.A. 2005. "Conversation as Experiential Learning," *Management Learning* (36:4), pp 411-427.

Barker, A., and Kolb, D. 1993. "Diversity, Learning, and Good Conversation," in: *Diversity and Differences in Organizations,* R. Sims and R. Dennehy (eds.). Westport, CN: Quorum Books.

Bergquist, M., and Ljungberg, J. 2001. "The Power of Gifts: Organizing Social Relationships in Open Source Communities," *Information Systems Journal* (11:4), Oct, pp 305-320.

Bohm, D. 1996. *On Dialogue*. New York, NY: Routledge.

Boland, R.J., Jr., and Tenkasi, R.V. 1995. "Perspective Making and Perspective Taking in Communities of Knowing," *Organization Science* (6:4), pp 350-372.

Boland, R.J.J., Tenkasi, R.V., and Te'eni, D. 1994. "Designing Information Technology to Support Distributed Cognition," *Organization Science* (5:3), pp 456-475.

Brown, J.S., and Duguid, P. 1991. "Organizational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* (2:1), pp 40-57.

Brown, J.S., and Duguid, P. 2002. *The Social Life of Informatioin*. Harvard Business School Publishing.

Brown, S.I., and Walter, M.I. 2005. *The Art of Problem Posing*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Constant, D., Sproull, L., and Kiesler, S. 1996. "The Kindness of Strangers: The Usefulness of Electronic Weak Ties for Technical Advice," *Organization Science* (7:2), pp 119-135.

Cook, S.D., and Brown, J.S. 1999. "Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing," *Organization Science* (10:4), July-August, pp 381-400.

DeSanctis, G., Fayard, A.-L., Roach, M., and Jiang, L. 2003. "Learning in Online Forums," *European Management Journal* (21:5), pp 565-577.

Dewey, J. 1938. *Logic: The Theory of Inquiry*. New York, NY: Henry Holt & Co.

Eisenhardt, K.M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), October, pp 532-550.

Faldetta, G. 2002. "The Content of Freedom in Resources: The Open Source Model," *Journal of Business Ethics* (39:1-2), Aug, pp 179-188.

Fayard, A.-L., and DeSanctis, G. 2008. "Kiosks, Clubs and Neighborhoods: The Language Games of Online Forums," *Journal of the Association for Information Systems* (9:10), pp 677-705.

Galison, P. 1997. *Image & Logic: A Material Culture of Microphysics*. Chicago, IL: The University of Chicago Press.

Kolb, D.A. 1984. *Experiential Learning: Experience as the Source of Learning and Development*. New Jersey: Prentice-Hall.

Kolb, D.A., Baker, A.C., and Jensen, P.J. 2002. "Conversation as Experiential Learning," in: *Conversational Learning: An Experiential Approach to Knowledge Creation,* A.C. Baker, P.J. Jensen and D.A. Kolb (eds.). Wesrport: Quorum Books.

Kozinets, R. 2002. "The Field Behind the Screen: Using Netnography for Marketing Research in Online Communities," *Journal of Marketing Research* (39:February), pp 61-72.

Kudaravalli, S., and Faraj, S. 2008. "The Structure of Collaboration in Electronic Networks," *Journal of the Association for Information Systems* (9:10).

Lee, G.K., and Cole, R.E. 2003. "From a Firm-Based to a Community-Based Model of Knowledge Creation: The Case of the Linux Kernel Development," *Organization Science* (14:6), Nov-Dec, pp 633-649.

Liakopoulos, M. (ed.) 2000. *Argumentation Analysis*. London: Sage Publications.

Luck, R. 2007. "Learning to Talk to Users in Participatory Design Situations," *Design Studies* (28:3), pp 217-242.

Mann, W., and Thompson, S. 1987. "Rhetorical Structure Theory: A Framework for the Analysis of Texts ").

Markus, M.L., Manville, B., and Agres, C.E. 2000. "What Makes a Virtual Organization Work?," *Sloan Management Review* (42), pp 13-26.

O'Reilly, T. 1999. "Lessons from Open Source Software Development," *Communications of the ACM* (42:4), pp 33-37.

Orlikowski, W.J. 2002. "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing," *Organization Science* (13:3), May-June, pp 249-273.

Orlikowski, W.J., and Yates, J. 1994. "Genre Repetoire: The Structuring of Communicative Practices in Organizations," *Administrative Science Quarterly* (39), pp 541-574.

Raymond, E.S., and Moen, R. 2006. "How to Ask Questions the Smart Way." from http://www.catb.org/~esr/faqs/smart-questions.html

Schultze, U., and Stabell, C. 2004. "Knowing What You Don't Know? Discourses and Contradictions in Knowledge Management Research," *Journal of Management Studies* (41:4), pp 549-573.

Singh, J., and Jayanti, R.K. 2008. "Learning Together: An Inquiry-Action Framework for Longitudinal Analysis of Online Peer-to-Peer Consumer Communities." Case Western Reserve University.

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

Tsoukas, H. 1994. "Refining Common Sense: Types of Knowledge in Management Studies," *Journal of Management Studies* (31:6), pp 761-780.

Wasko, M.M., and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), March, pp 35-57.

Yates, J.A., Orlikowski, W.J., and Woerner, S.L. 2003. "Virtual Organizing: Using Threads to Coordinate Distributed Work," *Proceedings of the 36th Annual Hawaii International Conference on System Sciences*.

Yin, R.K. 2003. *Case Study Research: Design and Methods*. Thousand Oaks, CA: SAGE Publications, Inc.