

Collective Brokering Practices in a Virtual Learning Community

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Abstract: The purpose of this paper is to illustrate the concept of the boundary object, based upon experiences in a six-week scientific virtual summer camp. Log data as well as interview protocols reveal the dynamics that existed among 384 participants in 56 within-group forums (WGF) and one cross-group forum (CGF). By re-conceptualizing the boundary object as a space or an area, we shed a new light on the notion of brokers. We also propose a new construct -- "collective brokering practice" -- to show brokering practices in a virtual social world.

Keywords: boundary object, broker, brokering practice, forums

1. Introduction

Conventional online learning research has focused on analyzing single discussion forums. Greater attention should be given to multiple communities of practice and the dynamics that exist among them. No forum can be entirely isolated from the rest of the broader community; they are all connected with one another. The average person does not stick to a single forum, but tends to shift around, responds appropriately to inter-forum links and references, and behaves freely and arbitrarily. Observing the online behavior patterns of learners based merely on the activity in a single forum does not capture the integral interactions of learners in multiple forums. Based on real data collected from Taiwan, this study examines how learners work within and among multiple forums.

2. The use of "boundary objects" as a way to understand forums

This concept originated with Susan Leigh Star and Griesemer [1], and has been applied to computer supported collaborative work [2]. Boundary objects, serve to translate various perspectives, have been conceptualized as artifacts, documents, diagrams, forms, and problems [3]. Researchers in social organization and business administration have taken it seriously. For example, Gal's [4] study of organizational change showed the evolution of boundary objects. Recent literature demonstrates that there is more than one single type of boundary object [5, 6, 7, 8]. Academic works tend either to classify the types of boundary objects or to discuss their characteristics [9, 10, 11, 12]. Numerous efforts have been made to identify boundary objects among people from communities in the real world such as schools, corporations, and non-profit organizations [13, 14, 15, 16]. Recently, Lee [9] stressed the importance of boundary objects for coordinating activities across multiple social worlds. This present study employs the boundary object in the study of online forums. Boundary objects may be employed as a magnifying lens for dealing with issues such as how learners negotiate their perspectives, and how to develop jointed learning activities across multiple forums.

A very closely related concept is that of brokers. As Wenger [17] mentions, "brokers" are those who use multi-membership to transfer some element of one practice into another. They serve as mediators among groups and a good broker is able to open up new possibilities for meaning [17]. Prior literature claimed that brokers are more likely to remain at the boundaries of many practices rather than moving to the core of any one

practice. Brokers may indeed remain upon the margins of "real" community practices, but is this also true of brokers in virtual communities? Records of discussion forums analyzed with the aid of discourse analysis may answer questions such as what are they brokering, and how participants are engaged in different forums.

This study illustrates cross-forum activities. By using the concepts of boundary objects as well as brokers, we show how incomplete the traditional approach of viewing forums in isolation may be. This paper develops a new route for illuminating the brokering process, based mainly upon the observation of phenomena found in online forums.

3. Case study: CGF vs WGFs

Ethnographic methods (i.e. participant-observation, interviewing, and documentary analysis) were chosen to probe the interaction that occurred during collaborative learning activities. How did virtual community members engage in discussion forums? All of the fieldwork took place in the virtual site built for a six-week summer camp in 2002. Most participants were high school students. All of them (N=384) were studying local (Taiwan) weather related issues.

Our fieldwork site, Lain (Learning Atmospheric science via InterNet), was designed by a group of Taiwanese scientists. Two types of forums are observed in Lain. All participating students were assigned to 56 groups with 5-7 members each. These were defined as within-group forums (WGFs). Another forum was designed for cross-group discussion, the cross-group forum (CGF). All participants were permitted to contribute only to the single WGF with which they were affiliated, though they had the read-access to articles posted in any WGF. Members of each WGF had to work together to finish part of a portfolio weekly by end of each week. All members are expected to contribute to their WGFs. Simply put, their homes were in their respective WGFs, and the CGF served as public square.

Two types of connections can be identified here. Firstly, the CGF served as a boundary object. The function of the CGF was to organize different ideas contributed from members of each WGF. Secondly, certain people served as brokers by shifting between their WGFs and the CGF. We concerned ourselves with these two major practices, an insight presented in Wenger's community of practice theory [17].

We now examine why the function of the CGF in Lain is meaningful and the significance of a Lain member's participation in the CGF. These members contribute the boundary objects in Lain. This is true, but a new question then arises: Can all of them or all contributors to the CGF be considered brokers? It is reasonable to assume that those who contribute at least one posting in the CGF should be regarded as brokers. Identifying brokers in virtual learning communities and recognizing brokering behavior in Lain becomes of primary importance.

An examination of figures shows that the entire body of participants posted over 23,660 articles in the 56 WGFs -- an average of 422.5 in each as compared to 1911 articles posted in the CGF by 126 participants. This evidence, at first glance, can be interpreted to mean that two-thirds of learners in Lain did not join the CGF at all. This contrasts sharply with WGF participation as almost all participants made contributions to the forums with which they were affiliated. Another fact came from interview data. A number of participants reported their experience in the CGF to our interviewers, and provided 72 protocols. These data reflected various learning experiences. Clearly, the CGF served as a place of comfort for story-telling or as a refuge for frustrated collaborators.

4. Reconsidering boundary objects and brokers

Based on CGF and WGF data analysis, we draw three conclusions all of which expand our understanding of boundary practice.

4.1. Brokers are not necessarily marginal

Having identified the five most active members in the CGF, we find that they posted nearly half of total postings in the CGF. It is obvious that certain individuals thrive on being brokers. Each of the five members, namely, rainer, liiu loves, ihil, ash, and ldiiffee, contributed over one hundred postings, while the average number of postings in the CGF by 126 contributors was only 15. The most prolific contributor, rainer, who posted 336 articles, contributed 17.6% of the 1911 total postings. The second most prolific, liiu_loves, posted 186 articles, 9.7% of the total. Ihil, ash, and ldiiffee contributed 157, 134, and 108 articles respectively, ranking them 3rd, 4th, and 5th in CGF postings. These were clearly very proactive in the CGF, and are thus candidates for being regarded as brokers.

Table 1. Rank order of top five postings in CGF

Rank order	Name	Postings in CGF	Total postings in CGF	Percent
1	rainer	336		17.6
2	liiu_loves	186		9.7
3	ihil	157	1911	8.2
4	ash	134		7.0
5	ldiiffee	108		5.6
	total	921	1911	48.0

Source of data: collected from Lain.

Those top five CGF contributors, were also active in their respective WGFs. The same figures based on individual WGF contributions show that the number Rainer contributed, 154, made up one fifth of total postings (769) in his WCF group, a_11. In group d_01, liiu_loves ranked number one, with a contribution of 156 -- over one third of a total 586 postings. Similarly, the postings contributed by ihil (194), ash (586), and ldiiffee (751) were each ranked number one in their respective WGFs. The ranking of their postings was determined based on comparison of their posting count with those of their teammates. Had all contributed equally, each individual's postings would have made up 14% to 20% of total posts. The contributions of these specific participants, however, were far above average. Obviously, all of these five were core members, and were hardly ever marginal in their respective WGFs.

Table 2. Top five members's postings in their affiliated WGFs

Group label	Name of top five contributors in CGF postings	Rank order in CGF	Rank order of affiliated WGFs	Frequencies of postings in WGF	Total postings within WGF group	As percent of within WGF group
a_11	rainer	1	3	154	769	20.0
d_01	liiu_loves	2	1	156	435	35.9
a_07	ihil	3	1	194	495	39.2
d_10	ash	4	1	586	962	60.9
b_08	ldiiffee	5	1	751	1392	54.0

Source of data: collected from Lain.

These brokers were certainly core participants. Their sustained postings made them popular in WGFs as well as in the CGF.

Brokering practice is too complex to be analyzed purely based upon a calculation of postings. Active participants serving as brokers make up just a part of the picture.

4.2. Brokering practices must occur as a collaborative endeavor

Brokering practice is the interplay of all community members, and is accomplished by at least three types of people -- proactive members, those who posted more than 100 articles; ordinary members, who posted fewer than 100; and lurking members, who posted nothing. Of a total 384 participants, the proactive group was composed of the 5 persons mentioned previously. The second group contained 121 members, and the third, 258 members.

The second group plays an important role. Ordinary members (N=121) made indispensable contributions by presenting problems and anecdotes from their individual WGFs. Much like an old-fashioned fireplace, the second type of brokers provided the wood, the fuel for the fire. Without them, there would have been no fire. The CGF would have been devoid of spirit and inspiration if multiple practices and instances from various WGFs had not been introduced. Combined together with the frequent responses of the proactive brokers, the periodic postings by ordinary brokers caused the CGF to become a nexus of perspectives which attracted a wide audience.

The third type, the silent participants or lurkers, forwarded useful articles back to their own WGFs. For example, Pismire, said: "Sometimes when you read something important or juicy, you will go back to your WGF to announce to your teammates for attention." We have found that lurkers can play an important role through a give-and-take process in that they deliver information from the CGF to their respective WGFs.

Each of the groups provided useful contributions. Collaborative communal enterprises are not able to function by relying solely upon one particular type of participant. On the contrary, they engage in a collective brokering practice.

4.3. Boundary objects could exist as a living space such as the CGF

A necessary precondition for boundary objects is the participation of people. In this study, boundary objects are regarded as a place or an area, but not as "natural areas" in the sense that term is used by classic human ecologists [18, 19, 20]. Any community must occupy a space. The CGF in Lain provides an area, a good place for the exchange of ideas. In virtual communities, all we ever actually observe are individual actions. Taking a holistic perspective, we attempt to transcend the details of this social world and to do so, we need to make special efforts conceptually rather than simply observing closely the individual social phenomena. Re-conceptualizing the CGF space is a step in this direction.

We see boundary objects as a space. Skillful people come together in a specific place to express their emotions, complaints, and of course to exchange ideas. Much as in a traditional market, we can also come and simply walk around. In Lain, those we call lurkers have also made their contributions to the atmosphere of the market. Similarly, the CGF is a place, whenever people feel that they have something to get from the CGF or just want to share something with members outside their own group, they logged in and situated themselves in the broader community. They did gain something there -- much like window shopping. By living within as well as outside this community center, they align with the broader social system. Through this process of alignment, participants become part of something big and become connected through the coordination of their energies, actions, and practices [17].

5. Conclusion

Rather than focus on individuals and their postings in a single forum, this study looked at an inter-dependent living space. In Lain, the CGF functioned as an area for sharing, caring, and aligning. Members of all WGFs participated in the joint CGF in their own ways, regardless of how many articles they posted. Three kinds of participants were identified and all of them may be regarded as brokers. We call what they did collective brokering practice, which is a conceptual breakthrough and extends the previous definition of

brokers from an individual to a communal style.

The CGF is very like a fireplace. Using the metaphor of a fireplace makes it possible to consider the categories of proactive, ordinary, and lurking brokers that characterize multiple online discussion forums and their boundary practices. Better than the complementary connections of broker vs boundary objects [17], the fireplace gives us a sense of how different participants situated themselves as part of the whole activity, how the trajectories of brokering developed in boundaries across forums, and how the process of brokering can not be accomplished by single type of broker. It is our suggestion that the ecological approach should be incorporated into online learning across multiple forums for future study.

References

- [1] Star, S.L., & Griesemer, J.R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology. *In Social Studies of Science*, 19, 387-420.
- [2] Brown, J.S. & Duguid, P. (2001). Knowledge and Organization: A Social-Practice Perspective. *Organization Science: A Journal of the Institute of Management Sciences*, 12(2), 198-213.
- [3] Kim, J.Y., & King, J.L. (2000). Boundary instances in heterogeneous engineering teams: Trouble management in the DRAM manufacturing process. In T.L. Griffith & E.A. Mannix (eds.), *Research on Managing Groups and Teams*, 3. JAI Press, 79-98.
- [4] Gal, U., Yoo, Y., & Boland, R.J. (2004). The dynamics of boundary objects, social infrastructures and social identities. *Sprouts: Working Papers on Information Environments Systems and Organizations*, 4(4), 193-206.
- [5] Bechky, B.A. (2003). Sharing Meaning across Occupational Communities: The transformation of knowledge on a production floor. *Organization Science*, 14, 312-330.
- [6] Berg, M. & Bowker, G. (1997). The Multiple Bodies of the Medical Record. *Sociological Quarterly*, 38 (3), 513-537.
- [7] Bossen, C. (2002). The Parameters of Common Information Spaces: The heterogeneity of cooperative work at a hospital ward. In E.F. Churchill, J. McCarthy, C.M. Neuwirth, & T. Rodden (eds.), (2002). *Proceedings of the ACM Conference on Computer-Supported Cooperative Work*, New Orleans, LA, USA, November 16-20, 2002. ACM Press, pp. 176-185.
- [8] Ackerman, M.S., & Halverson, C.A. (2004). Organizational memory as objects, processes, and trajectories: An examination of organizational memory in use. *Computer Supported Cooperative Work*, 13(2), 155-189.
- [9] Lee, P.C. (2007). Boundary negotiating artifacts: Unbinding the routine of boundary objects and embracing chaos in collective work. *Computer Supported Cooperative Work*, 16, 307-339.
- [10] Garrety, K. & Badham, R. (2000). The politics of socio-technical intervention: An interactionist view. *Technology Analysis & Strategic Management*, 12(1), 103-118.
- [11] Briers, M. & Chua, W.F. (2001). The role of actor-networks and boundary objects in management accounting change: A field study of an implementation of activity-based costing. *Accounting, organizations & Society*, 26, 237-269.
- [12] Carlile, P.R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organization Science*, 13(4), 442-455.
- [13] Friedrichsen, P.M., Munford, D., & Orgill, M. (2006). Brokering at the boundary: A prospective science teacher engages students in inquiry. *Science Teacher Education*, 90, 522-543.
- [14] Levina, N., & Vaast, E. (2006). Turning a community into a market: A practice perspective on information technology use in boundary spanning. *Journal of Management Information Systems*, 22(4), 13-37.
- [15] Corbin, B., McNamara, O., & Williams, J. (2003). Numeracy coordinators: 'Brokering' change within and between communities of practice? *British Journal of Educational Studies*, 51(4), 344-368.
- [16] Pawlowski, S.D., & Robey, D. (2004). Bridging user organizations: knowledge brokering and the work of information technology professionals. *MIS Quarterly*, 28 (4), 645-672.
- [17] Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: University Press.
- [18] Saunders, P. (1981). *Social theory and the urban question*. Hutchinson & Co.
- [19] Park, R. (1952). *Human Communities*. N.Y., Free Press.
- [20] Park, R. (1936). Human Ecology. *American Journal of Sociology*, 42, 1-15.