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Analyzing Mediated-Action with Activity Theory in a Digital Learning Community

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As promising benefits of online collaborative learning are evidenced, a digital learning community is taking its place as a popular learning environment. Despite the many benefits of collaborative learning, learners experience ambivalence. The promising benefits of a learning community cannot be obtained without purposeful facilitation. The primary goal of this study is to see if activity theory is useful to analyze and explain the learning process in a digital learning community. The secondary agenda is to capture the conflicts or contradictions manifested in the activity system. As a pilot study, this paper examines the applicability of activity theory to collaborative e-learning scenarios.

Keywords: collaborative learning, digital learning community, activity theory

Introduction

Online collaborative learning is in vogue and many researchers claim that collaboration and online discussion are powerful means for critical and reflective thinking, and constructing shared knowledge (Williams, Watkins, Daley, Courtenay, David, & Dymock, 2001). As promising benefits of online collaborative learning are evidenced, a digital learning community is taking its place as a popular learning environment.

Despite the many benefits of collaborative learning, learners experience tensions coming from mixed feelings of wanting to be independent in their learning and a fear of being isolated from the community (Dirkx & Smith, 2005). Also, how a group of learners collaborate is not fully explained in CSCL (Computer-Supported Collaborative Learning) theory and still remains an abstraction, defined as "synergy" (Stahl, 2006). Providing a technically transparent learning environment, therefore, does not guarantee a learning community's success.

Many quantitative attempts have been made to examine learning communities such as examining numbers of interactions among learners and the pattern of interactions. These quantitative measures, however, do not reflect what is really going on in the community and what the community members are experiencing during collaborative e-learning. The better we understand how a group of learners collaborate, the better we can design support for them.

The primary agenda of this research is to see if activity theory is useful to analyze and explain the learning process in a digital community. The secondary agenda is to see what information activity theory provides in terms of contradictions that learners experience, and based on these contradictions, to identify implications for practitioners and designers of digital learning communities.

Theoretical Background

Digital Learning Community

The term community has been used in many different fields of study and has different meanings and interpretations. Kang & Lim (2002) defined the digital learning community as a group of individuals who interact with each other through computer communication media, sharing knowledge and experience to achieve a common goal, and constructing new knowledge and experience to grow not only as individuals but also as a group at the same time.

In order for a digital learning community to become a meaningful learning environment, it should meet the following criteria. First, the goal of a learning community should be to gain a deeper understanding of knowledge by learning from other members in the community. Second, a learning community should provide various learning activities that enable community members to both develop individually and collaboratively construct knowledge. Third, the role of teachers in a learning community changes to that of facilitator or organizer of student-directed activities. Students feel responsible not only for themselves but also for other members in a community and furthermore, students should be able to find a way to evaluate the growth of the community as well as their own growth. Fourth, a learning community should consider the level of each member's contribution and address identity issues. Fifth, a learning community should share resources and learning processes and members should be considered as resources. Sixth, community members should be able to expect mutual feedback and should develop a means of sharing ideas, knowledge, and skills generated through negotiation and construction. Seventh, the members of a community should contribute to the growth of the community itself by understanding main concepts, and sharing knowledge and the learning process. Lastly, a learning community should produce outcomes and performance by working together during the specified time frame (Bielaczyc & Collins, 1999).

Activity Theory

Activity theory is a philosophy and multi-disciplinary framework to research various forms of human behaviors (Kuutti, 1995; Jonassen & Rohrer-Murphy, 1999). The root of activity theory stems from three historical origins: classical German philosophy from Kant to Hegel, the writings of Marx and Engels, and the Soviet Russian cultural-historical psychology of Vygotsky, Leont'ev, and Luria (Engestrőm, 1987). From the constructivist perspective, Vygotsky theorized that individuals actively construct their understanding of the environment while engaging in goal-oriented activities. Vygotsky described learning as a mediated action while learners construct meaning through interacting with artifacts and other people in their environment. The

applications of activity theory are found in learning (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002), human-computer interaction (Nardi, 1995), and instructional design (Jonassen & Rhorer-Murphy, 1999).

Activity theory has been further developed as a practical model of human activity, an activity system. An activity system has six interacting components (subjects, objects, tools, rules, division of labor, and community) (Engestrőm, 1987). It evolves over time as the subjects come across problems and it accommodates the changing objective or status of the components. Subjects are individuals or a group of individuals who are involved in an activity. Objects or objectives can be specific directions of an activity, sharable materials to be transformed or modified by the participants in an activity, or abstract things such as plans or ideas. Tools can be anything that are used to help the transformation process such as computers and pens, psychological things such as language or ideas that help to carry out activities, or they can be models or experiences. Rules are customs, conventions, social relationships, schedules or processes that govern behaviors of community members. A division of labor is the distribution of subjects' roles, powers, and responsibilities. Lastly, a community is a group of people who consistently interact with the environment to pursue the object.

Activity systems are not static but dynamic and therefore, reveal inner contradictions within. Contradictions indicate unfits within components and manifest themselves as "problems, ruptures, breakdowns, clashes, etc." (Kutti, 1995, p. 29). The system is energized by contradictions and their consequential instability. The efforts to resolve the issues and the intentions to renovate are generated and the activity system moves to reach equilibrium (Engestrőm, 1987). In reality, contradictions are helpful to locate where community facilitators need to intervene and to improve the activity system.

Method

Participants

For this pilot study, the researcher chose one learning group (10 students) who enrolled in a college-level class in the fall semester of 2005 at a major university in Seoul, Korea. Though the class met offline every week, the group also worked independently online on the final project for five weeks. The instructor gave the group an instructional method to research. At the end of the semester, each group submitted a final report containing what they have researched and a summary of authentic cases regarding the instructional method, and gave a short presentation to the class. The instructor outlined criteria for evaluation as well as course procedures. The group project accounted for 40% of the grade and all the group members received the same score. This particular group (W group) was selected because the group showed the highest level of interactions, implying that it would give more information to answer the research question.

Apparatus

Since 1997, Ewha Cyber Campus has offered online courses. Today it has become a major means of delivering about 13,000 online courses and provides digital learning communities for

blended learning. The study used online transcripts posted in Ewha Cyber Campus including instructor's notices, Q&A board, a team project cyber-room for members' use, and the documents created by the group.

Procedures

The data were collected in the cyber campus system. During five weeks, the group exchanged messages in a group discussion board created for them by the instructor. The instructor announced that participation is one criterion for scoring the group project performance. Therefore, the participants use the cyber project room as their primary means of exchanging ideas and information. There were 123 threads in the cyber project room with 157 replies to those messages.

First, the online transcripts were categorized into the related six components: subjects, objects, tools, rules, a division of labor, and community. By the definition of each component (Engestrőm, 1987), the related phrases in the messages were inserted into each component for each week. Second, the categorized messages were reviewed to discover any evidence of contradictions among the six components. Contradictions were operationally defined as misfits, conflicts, or breakdowns between the components in the activity system.

Results

The primary goal of the research was to see how we can use an activity system as an analysis framework to better understand the evolving process in a digital learning environment. Table 1 shows observations of evolving processes by each component of the activity system during the five-week period. Subjects were the ten members of the group in this study. Initially individuals acted independently but as a leader was selected, subjects were acting accordingly to their respective roles. At the third week, subjects were divided into four entities: a leader, and three functional sub-groups. At the end of the project, as the final outcome was consolidated for a presentation and final report, these sub-groups were stabilized and showed a sense of community.

Initially, the object was to understand the project theme and the required outcome. Objects became more specific toward the final goal of the project such as collecting, sharing, and valuing the necessary materials. Tools used by subjects also revealed the object's evolving nature as subjects employed appropriate communication channels and other tools for a specific object. In terms of rules, subjects initially tried to confirm their understanding of the rules established by the instructor. Rules were, however, gradually expanded and refined to enable the project to continue. A division of labor was defined when a leader was selected and the sub-tasks were defined more clearly. At the third week, participants' roles were stabilized as presenter, resource group, development group, and case study group. These roles were stabilized as sub-group members were needed to work together to complete the same milestone.

The secondary agenda of the study was to discover instances of contradictions during a group project through the lens of an activity system. Table 2 shows the contradictions manifested and

sample transcripts found in the group discussion board. It represents when the contradiction occurs and which components are involved in the specific contradiction.

	ASwk1	ASwk2	ASwk3	ASwk4	ASwk5
Subject	W Group students	W Group students	W Group divided into three functional sub-groups	Sub-groups are stabilized	W Group holds a sense of community
Object	Plan group project Understand the scope of project Get to know group members	Collect and share related material	Select a leader and assign roles for project milestones	Manage collected material and construct them into a final output	Offer presentation, Build educational WBI site Submit final report
Tools	Cyber Project Room Email, Cell phone, Contact List	Internet Search Engine	List of sub-groups	Web authoring tool, documentatio n software	Web authoring tool, documentation software
Rules	Theme of project Final output format Time frame for project	Presentation date, Channel of communica- tion	Roles of sub-group and each member, Expansion of project scope	Sub-group milestone due date Project time frame	Conform project rules
Division of Labor	Not defined	Not defined	Presenter (Leader), Resource group, Development group, Case study group	Coordinate work among sub-groups	Provide feedback and support for the areas in need
Commu- nity	Other groups Instructor, Teaching Assistant (TA)	Other groups, Instructor, TA	Other groups, Instructor, TA, Experts	Other groups, Instructor, TA	Other groups, Instructor, TA

 Table 1. Observations of a Group Activity in a Digital Learning Community

(ASwk*n* Activity System week *n*)



 Table 2. Contradictions manifested in a Digital Learning Community

(S: Subject, O: Object, T: Tools, R: Rules, DoL: Division of Labor, C: Community, ASwkn Activity System week n, Lighting signal indicates a contradiction)

Conclusion and Discussion

In conclusion, activity theory is a powerful framework to observe the evolving process of group work in a digital learning community. Though one case study may not create sufficient momentum to prove the researcher's point, an activity system has its strengths nonetheless. First, an activity system reveals how a learning community evolves over time. Second, an activity system provides specific components with which we can examine a collaborative learning process. Third, an activity system helps us to detect contradictions that occur while key components interact during collaborative learning.

In this study, however, an activity system did not provide the level of details required to analyze collaborative behaviors. An activity system can be used as an entry point for collaborative learning analysis. There is, however, a need for more empirical research to provide more granularities of collaborative behaviors.

As a pilot study, this study used only ten members of a group and might not reflect online collaborative learning behaviors in general. It examines the applicability of activity theory to collaborative e-learning scenarios, based on a small scale study. The analysis framework should develop with more detailed levels of collaborative behaviors on top of the activity system. A follow-up study is in progress with more participants and a revised research methodology.

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