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Graduate Students' Discourse Activity in Synchronous Online Classroom Discussion

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Graduate Students' Discourse Activity in Synchronous Online Classroom Discussion

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Graduate Students' Discourse Activity in Synchronous Online Classroom Discussion

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This study is about graduate students' discourse practices in a classroom text-based synchronous computer-mediated discussion (SCMD). Cultural historical activity theory (in short, Activity Theory) is the primary theoretical lens through which the data are analyzed. Engeström's (1987) Activity System model among the various theoretical positions or perspectives of activity theorists has guided the overall process of the study, especially having the researcher focus on the identification and description of the model's six key elements: subject, object, tool, community, rule, and division of labor.

Several emerging themes were identified. An activity system in SCMD is situated in multiple dimensions of context: physical/biological, cultural/institutional, social/emotional, and cognitive/intellectual dimensions; instead of a single utterance, a topical pair needs to be investigated as a unit of analysis in SCMD research; a collective unit of actions emerges through the discourse activity; and, finally, an ecological view is needed to understand an activity system as a whole. Based on these emerging themes, I conclude

with a modified model of the activity system in the situation of dialogical transactions such as SCMD.

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CHAPTER I.

INTRODUCTION

This study is about graduate students' discourse practices in classroom text-based synchronous computer-mediated discussion (SCMD*) in a classroom. From socio-cultural perspectives, learning is a process of socialization and enculturation. According to Bruner (1986), "learning in most settings is a communal activity, a sharing of the culture" (p. 27). He postulated that education should provide both the beliefs that are valued in the culture and the "toolkits" of the practices that the members of the culture are expected to utilize. These toolkits include a variety of tools a given culture uses to make sense of the world: such as culturally developed representational systems, technologies, and ways of thinking. Throughout learning processes, cultural values and toolkits are embodied into learners, and students become members of the culture.

This cultural approach to learning has its foundation in Vygotsky's contention that learning is social. The claim is based on two main arguments: learning is an internalization of cultural means; and the process of internalization is rooted in social interactions (Vygotsky, 1978). In human practice, psychological tools, which have been produced in ontogenetic or phylogenetic history of human beings, mediate the encounters between the human mind and the external world. Learning is viewed as a social process

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* In this dissertation, I will use both synchronous computer-mediated communication (SCMC) and synchronous computer-mediated discussion (SCMD). The former refers to the technology itself, and the latter to the activity of discussion using the technology. However, SCMC may be used at times to indicate the conversational activity using online synchronous communication tools.

of being equipped with, extending, and sophisticating the cultural means that will be applied to future practices.

Vygotsky (1981) also argued that, in the history of the cultural development of a person, internalization originates in social interactions with others. In his frequently quoted paragraph he states:

> Any function in the child's cultural development appears twice or on two planes. First, it appears on a social plane, and then on the psychological plane. First, it appears between people as an interpsychological category, and then within the child as an intrapsychological category (Vygotsky, 1981, p. 163).

For him, all of the sources, processes, and outcomes of learning are the products of socio-cultural history; and, therefore, learning is social.

Rogoff (1995), applying Bakhtin's idea to the Vygotskian approach, defined learning as a "participatory appropriation" of cultural means. Bakhtin (1986) argued that what should be placed at the center of the investigation of language use is not the isolated thinker's manifested thoughts but the dialogue in which utterances react to each other and acquire meaning by mutual relation and conflict. Every utterance is a response to preceding utterances either explicitly or implicitly with an expectation that it will be reciprocated from others in the future. Bakhtin (1981) claimed that this dialogical chain of utterances continues through the process of "appropriation," which refers to the reuses or reanimations of words and meanings uttered in the past. He stated: "Prior to this moment of appropriation, the word… exists in other people's mouths, in other people's contexts, serving other people's intentions: it is from there that one must take the word, and make it one's own" (Bakhtin, 1981, pp. 293-294). Hence, for Rogoff (1995), learning

is the process of participation in a series of dialogues by appropriating cultural means, which is the prior utterance or a part of it, that once belonged to others.

Lave and Wenger's (1991) illustration of the learning process as a "legitimate peripheral participation" situated the concept of participation and appropriation into the more concrete socio-cultural context, into a community of practice. From anthropological perspectives, they depicted learning as movement from peripheral participation to full or central participation, and changes of roles from a newcomer to an old-timer in a given community of practice. Instead of separating the process of internalization from the whole practice of the community, they argued that "learning" should be conceived "as increasing participation in communities of practice," which "concerns the whole person acting in the world" (Lave & Wenger, 1991, p. 49).

This is consistent with Leont'ev's (2009) concept of activity. He insisted that the object of psychological studies should be the whole activity in practices including human consciousness and the objective world (Leont'ev, 1978). Engeström (1987), elaborating on Leont'ev's theory, presented a systemic model of human activity encompassing the various components of the socio-cultural context for consideration. In the model, individual action, described as object-oriented and tool-mediated, is situated in a broader context of rules, division of labor, and communities of practice, which results in an outcome as the product of the collective activity that includes the whole system.

Based on this socio-cultural account of learning, the study presented here assumes that students' participations in SCMD represents cultural practices, in which cultural means are appropriated and internalized that cannot be isolated from the context in which they are situated. In a text-based SCMD, students interact with others by posting

messages; their interactions are mediated by words, concepts, and propositions that have once belonged to others and are appropriated for the current purposes of the authors; the outcomes of their individual actions form a complex system of utterances and an interwoven network of appropriation; and the system is situated in a socio-cultural system of contexts such as a classroom community and academic thought communities more broadly, especially for graduate students. Throughout the complicated "participatory appropriations," students are expected to be equipped with "cultural tool-kits," such as academic concepts and professional ways of communication, and to become a more deeply engaged member of a given community of practice. Therefore, to understand students' learning in SCMD, we need identify the cultural means introduced and appropriated and the ways they are used in the community through rules and division of labor. A systemic approach is also needed to explicate the phenomenon in which socio-cultural factors interact with and influence each other dynamically.

Educational researchers have been acknowledging the need for comprehensive theoretical frameworks that provide both systemic and socio-cultural perspectives (Luppicini, 2007; Resta & Laferrière, 2007; Tolmie & Boyle, 2000). Responding to the issue, I explored in this study students' participation and practice in SCMD through the theoretical lens of Activity Theory, postulating that its systemic and cultural-historical affordances would enable us to untangle the intertwined phenomena.

Statement of Problem

Since the introduction of synchronous computer-mediated communication (SCMC) to educational practices, its technological affordances of both real-time and

remote interactions have been supposed to enrich and promote students' social interactions, and, consequently, their learning. This assumption has made more and more educators adopt the technology in their practices to facilitate peer discussions and interactions*.

Research has provided empirical evidence of the pedagogical benefits of SCMC. Students participate in SCMC-based activities more actively compared to face-to-face activities (D. Beauvois & Jamieson, 1997; Kern, 1995); SCMC promoted the equality in student participation (Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996); the quality of discussion aspects in SCMC such as wide array of discourse functions, complexity of syntactical, and lexical structure is higher than the discourse in oral interactions (Chun, 1994; Sotillo, 2000; Warschauer, 1996); students show more positive attitude toward the activities in SCMC (M. Beauvois, 1992; Warschauer, 1996); instructors reported that they could present new concepts for discussion, foster interaction and explanation, and receive confirmation of understanding successfully through SCMC tools (Dickey, 2003); teachers could share their new ideas and teaching experiences with other teachers effectively (Shotsberger, 2000); SCMC provides learners with less risk in self-disclosure (Lobel, Swedburg, & Neubauer, 2002); and synchronous online chat is effective in developing a sense of community among students (Duemer et al., 2002).

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* Although there are various advanced applications of online synchronous communications with multimedia capacities and file sharing functions including instant messaging (IM), voice over IP (VOIP), video conferencing, and 3D multi-user virtual environment (MUVE, e.g., Second Life, Active Worlds, etc.), their uses for classroom discussions are still limited due to issues of bandwidth and capacity of local infrastructures. For that reason, most software that supports multimedia synchronous communication includes a text-chat function as a supplement of other modes of communication. This study focused on text-based, multi-user, and chat-type SCMC.

In contrast to these positive findings, however, other researchers have highlighted the problems associated with the educational use of CMC, including SCMC. There are some indications that CMC results in more evaluative comments that are occasionally too critical (Kiesler & et al., 1985; Smilowitz, Compton, & Flint, 1988). Participants sometimes respond in an insulting manner, and then the conversation can degenerate into what the on-line world calls a flame war, an exchange of angry or derogatory remarks.

In addition, text-only SCMC is also criticized by its incoherency in various ways: fragmented, agrammatical, and interactionally disjointed (Hafner & Lyon, 1996; Herring, 1997). Herring (1999) claimed that these problems are derived from the technological affordances of SCMC:

> Two properties of the medium are often cited specifically as obstacles to interaction management: (1) lack of simultaneous feedback, caused by reduced audio-visual cues and the fact that messages cannot overlap; (2) disrupted turn adjacency, caused by the fact that messages are posted in the order received by the system without regard for what they are responding to (n.p.).

These properties make SCMC problematic for communicational purposes in several aspects (Herring, 1999). First, text-only SCMC becomes the "lean medium" that is deprived of various audio-visual channels. Second, there cannot be real simultaneous interaction because participants can only see the final message that is posted by pressing the send-button or enter-key. Third, topical threads can be developed incoherently, which results in users feeling that the conversation is chaotic.

The technological affordances, claimed as shortcomings of SCMC, however, have also been pointed out as strengths that can facilitate active and dynamic interactions. Although the richness of audio-visual cues in face-to-face situations can produce rich and

well-organized interactions, it may also come because it prevents or excludes such contributions considered to be irrelevant or less important. Highlighting this issue, some researchers have argued that fewer cues may encourage greater participation of students (Althaus, 1997; Harasim, 1987; Olaniran, Savage, & Sorenson, 1996). Disrupted turns may also result in unexpected insights on the topic, and enable the topical threads to converge and diverge dynamically, which may make the discussion richer and broader. The conflicted arguments of researchers exhibit that a phenomenon cannot be attributed to a single factor, and a factor does not produce a single phenomenon. In SCMD, students' interactions and practices should be viewed as a confluence of various factors and each factor should be identified on a relational level with other factors in a given system as a whole.

Based on comprehensive reviews of CMC literature, researchers have raised the same issue. Luppicini (2007) argued that CMC needs be treated as a complex system in which multiple factors dynamically interact with each other and is situated within a broader socio-cultural context (M. De Laat & Lally, 2003; Luppicini, 2007). Employing limited sets of measure, Tolmie and Boyle (2000) pointed out that previous research could only elucidate some isolated parts of the whole complex system of CMC. Resta and Laferrière (2007), highlighting the issue in computer supported collaborative learning (CSCL) research, pointed to the usefulness of systemic models such as Engeström's (1987) activity system and Bigg's (1989) 3P model (presage, practice, and product) to integrate various factors and aspects affecting the use of technology for collaborative learning.

In brief, although SCMD has gathered much attention from educational fields, we do not have clear and consistent evidence of the effectiveness of its pedagogical uses, and even such detailed guidelines, which most researchers agree upon, as what factors need be identified to elucidate the complicated network of students' interactions in SCMD. Acknowledging that students' interaction in SCMD forms a complex system that is situated in socio-cultural contexts, researchers have suggested that a comprehensive theoretical framework, equipped with systemic and cultural-historical apparatuses, is necessary.

Brief Introduction to Cultural Historical Activity Theory

I argue that Activity Theory may be an alternative framework that can provide both systemic and cultural historical accounts for the practices in SCMD. In this section, I will introduce it in brief.

Vygotsky's socio-cultural theory of learning is the root of Activity Theory. He introduced the theoretical framework of learning as a tool-mediated activity to illustrate the uniqueness of human intellect (Vygotsky, 1978). According to him, we cannot successfully identify uniqueness of human psychology with any theoretical assumption of direct encounters between a subjective agent and an objective world. It will lead us to either material determinism in which the agent is considered a sum of reflected objective world, which does not take the dynamic roles of human beings in practices into account, or cultural reductionism in which the symbolized culture in the human mind determines the interpretation of the world, which is not capable of explaining the critical role of the objective world in human intellects.

To explicate the unique aspects of the human mind, Vygotsky (1978) insists the tool-mediatedness of human activity, in which a subject and the external world are mediated by material and psychological means produced in the past of the subjects' individual or the societal history. Of course, this is not the first attempt to introduce a mediator to explain human mind. Influenced by Emmanuel Kant's categories of mind, Piaget suggests the concept of schema (Duncan, 1995). An individual cannot come across the external world directly. The encounter is only possible through schema that belongs to the individual who is actively trying to interpret the world to survive in it. To achieve equilibrium between the inner schema and the outer condition, the cognizant is continuously assimilating the external world and accommodating the internal schema, which leads the genetic process of cognitive development. In his framework, the cognitive schema mediates an individual's biological needs of seeking equilibrium and the external environments' affordances affecting and limiting the realization of the agent's needs. In addition to that, he argues that, being consistent with Kantian meta-physical epistemology, the cognitive development follows universal structure, which is presumed to individual experiences a priori.

Similar to Piagetian theory, Vygotsky's cultural tool needs also be seen as a lens through which a person can have relations with the external world and that forms or conditions the relationship, not a simple device to facilitate human activity. In the system of tool-mediated activity, the subject representing the human mind can only run into material environment through the help of cultural artifacts or instruments, which is the role of cognitive schema in Piagetian theory.

What distinguishes Vygotsky's psychological tool from Piaget's cognitive schema as a mediating means is the social origin of the mediator (Wertsch, 1998). Contrary to Piagetian accounts based on biological heredities and metaphysical structure, Vygotsky places the social origins of the auxiliary tools and the developmental stages at the center of his theory. Vygotsky's mediator is also a social product of one's own or others in the society, while the cognitive schema of Piaget is based on the universal structure given a priory to any individual's experiences.

Extending and elaborating Vygotsky's idea, Leont'ev (1978), his student and colleague, proposed an activity theory called Cultural Historical Activity Theory later. He asserts that the object of psychological study should be neither objective behavior nor subjective consciousness of the human mind, but the whole object-oriented activity. In practice, a subject, participating in object-oriented activity, confines herself to the condition of the object to realize her intention, and the object is subjugated under the motive of the subject. He calls the former as "objectification of the subject" and the latter as "subjectification of the object" (Leont'ev, 1978). Subject and object do not exist indifferently any more, but interdependently in human activity, which is the way that Activity Theory resolves the traditional contradiction of subject versus object.

Leont'ev (1981) distinguishes three levels of activity – activity, action, and operation – by analyzing the division of labors in collective practices, which are connected to collective motive, individual goal, and the condition of material and semiotic tools in order. The *action* of a pitcher throwing a ball to a catcher in a baseball game cannot be understood without the consideration of the *collective motive* of the team, winning a game, and the *operations* of the material and semiotic tools such as balls,

gloves, game rules, and so forth. While Vygotsky's model is based on dyadic interaction between a child and an adult or a more advanced other, Leont'ev's framework extends it to individual actions in a collective activity, which can be properly construed only through systemic lenses.

Engeström (1987) articulates and visually depicts Vygotsky and Leont'ev's arguments. He situates Vygotsky's tool-mediated and object-oriented action into Leont'ev's collective activity, and formulates an activity system model, in which social factors such as rule, community, and division of labor are incorporated to illustrate the interconnectedness of each component of the system. In the system, community is defined as a group of people who share the same general object; rule refers to the explicit and implicit regulations, norms, and conventions that constrain actions and interactions within the system; and division of labors indicates that the division of tasks between members of the community both horizontally and vertically.

Definitions of Terms

This section provides a list of definitions that are specific to the study.

DISCOURSE UNITS

To describe the participants' discourse practice, six types of discourse units were distinguished.

Message Unit. This is the chunk of texts that a subject posts to the server by a click of the enter key. It shows up on the list pane of each user's monitor with the

sequential numbers according to their posted orders. This is the minimum unit that a subject participates in the collective activity of SCMD.

Exchange Unit. This is the minimum unit that a writer interacts with other readers in SCMD. It indicates a unit of written texts that has its distinctive theme and recipient or recipients. In most cases, this unit is the same with a message unit. However, there were also occasions that a message includes apparently multiple different themes and recipients. In those cases, the message unit was divided into different exchange units.

I also employed three different terms to indicate the exchange unit in this report: utterance, speech act, and comment. *Utterance* is utilized when I need to emphasize both the structural and the procedural wholeness of the production and the use of the unit. *Speech act* stresses the subjects' social intentions of their communicational acts, while *comment* focuses on the content delivered through the unit. These terms indicate the same type of discourse forms with different attentions. Nonetheless, there may be the cases that the terms are applied interchangeably without clear distinction.

Discourse Units Smaller than an Exchange Unit. In general, a message or an exchange unit has in the form of a paragraph including multiple *sentences* or equivalents that include one or more *clauses* and *phrases*. Although these units will be rarely discussed, because the current project's level of the analysis will not proceed to that far, I will use the term of *move* to point out the smaller units than the exchange unit, when needed.

Discourse Units that Includes Multiple Exchange Units. The participation in SCMD is implemented through dialogical interactions. An explicit or implicit utterance as an initiation precedes; a response is connected to it; and, consequently, a *dialogical* or

topical pair appears. A *conversational* or *topical thread* emerges through the interconnected pairs, which may be identified with the first exchange, which has no explicit recipient or designated utterance in the current session, and the last exchange, which is connected to the initiation either directly or indirectly but has no response from others. A *session* is the online discourse activity from the first exchange to the last one. It indicates the whole exchanges posted in the chat room of the week.

SIX ELEMENTS OF ENGESTRÖM'S ACTIVITY SYSTEM

Subject: Individual or subgroup chosen as the point of view in the analysis. In this study, it is an author of a speech act.

Tool: Cultural means employed to attain a desired outcome. The locutionary statement that comprises propositions and concepts as mediating tools is the focus of this study.

Object: Motive driving an action or the target that a subject works on. In this analysis, it is the discourse topic that the students dwell upon to participate in and develop the discourse.

Outcome: Product of an action, which is a speech act in the study.

Rule: Explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system.

Community: Multiple individuals and/or sub-groups who share the same general object and who distinct themselves from other communities.

Division of labor / roles: both the horizontal division of tasks between the members of the community and the vertical division of power and status.

Purpose of Study

Although the synchronous communications through wired or wireless network of computers are popular in current days, the pedagogical application of the technology has not been fully explored, and, furthermore, theoretical explication of it does not have any sound foundation that most researchers agree upon yet. Researchers have emphasized the needs of more comprehensive theoretical framework that provides both socio-cultural and systemic accounts for the educational use of the technology. This study was an explorative attempt to use Activity Theory as a theoretical and a methodological framework for the analysis of students' discourse practices in SCMD. Therefore, the purpose of this study was to describe and understand students' discourse activity with SCMC technology through the lens of Activity Theory.

Research Questions

To achieve the purpose, I set up the following research questions deriving from Engeström's (1987) activity system model, which have guided the whole process of the investigation.

1. Subject: Who were the subjects of the Activity Systems in the SCMD?; and what were the subjects' needs that drove their participations in the SCMD?
2. Object: What were the objects of the activities in the SCMD?
3. Tool: What were the mediating tools utilized in the SCMD?
4. Community: What kinds of sub-communities did emerge through the SCMD?
5. Rule: What kinds of rules, norms, or conventions were found in the SCMD?

6. Division of labor: What kinds of roles or divisions of labor were identified in the SCMD?

CHAPTER II.

LITERATURE REVIEW

Synchronous Computer-Mediated Communication

Computer-mediated communication (CMC) refers to any form of human communication via computers. Berge and Collins (1995) use this term to describe how people utilize networked computer systems to transfer, store, and retrieve information, with the emphasis always on communication. CMC is analyzed under two broad categories, asynchronous and synchronous, according to the degree of time delay between the messages of two interlocutors. The synchronous mode occurs in real time, whereas the asynchronous mode does not. The asynchronous mode includes e-mails, threaded discussions and bulletin boards. The synchronous mode covers types of communication, such as voice over IP (VOIP), video conferencing, multiuser virtual environments, and chat systems including instant messaging and multi-user chat rooms. This study focuses on the chat type SCMC that occurs in classroom discussions.

TECHNICAL AFFORDANCES AND EDUCATIONAL USES OF SCMC

Chat type SCMC is a form of synchronous text-based communication that can occur among many individuals (Anderson, 1999). Communications afforded by the synchronous technology are characterized by its synchronity and textuality. Chat rooms allow students and instructor to meet electronically at the same time, regardless of location (Eastman & Swift, 2002). They interact with peers through textual messages

displayed on each screen and archived for future use (Kittleson, 2002). These technical properties make the communicational interactions unique in various ways.

Synchronous Communication among Multiple Users

One of the main features of SCMC is its immediacy of interaction. It makes SCMC more similar to face-to-face (F2F) communication (Ingram, Hathorn, & Evans, 2000). Researchers see real-time social interaction between students as an advantage of SCMC, which makes the interaction in SCMC more dynamic and productive (Lobel, Neubauer, & Swedburg, 2005; Orvis, Wisher, Bonk, & Olson, 2002).

Interactions in SCMC, however, do not occur in purely synchronous method. Students only share the final product of each message, not the process of its production. Even if an author revises her own message several times before posting it, others cannot notice the process of production and revision (D. Beauvois & Jamieson, 1997; Kitade, 2000; Lai & Zhao, 2006; Ortega, 1997; Pellettieri, 2000; Smith, Alvarez-Torres, & Zhao, 2003; Tudini, 2003). Addressing the issue, Garcia and Jacobs (1999) suggested the term 'quasi-synchronous' instead of 'synchronous'. Due to the local asynchronity, the conversational tempo in SCMC is slower than that in F2F situation (O'Rourke, 2008; Pellettieri, 2000).

Digitalized Text-Based Communication

Whereas F2F oral communication is based on sounds, the main form of interaction in chat type SCMC is digitalized texts. It makes textual CMC lack various

conversational cues that are available in F2F communication (Herring, 1999; Kellermann, Reynolds, & Chen, 1991), which Herring (1999) called "lean medium."

However, the texts used in SCMC have unique features, which are different from those in other analogous media such as paper, blackboard, and so forth. Digitalized information can be archived, modified, and manipulated more freely and creatively than analogous forms (Negroponte, 1995). Students' inputs are converted into binary units of 1s and 0s, which are transmitted, saved, and retrieved through electronic operations. The digitalized aspect makes SCMC unique compared to F2F communication: digitalized signals are converted into visual texts and displayed on each screen, which enables participants to see the visual outputs (Ortega, 1997); learners can re-use new vocabulary by using copy and paste (Kitade, 2000); users can review what has been discussed in a session by scrolling back in the output pane (Kitade, 2000; Tudini, 2003); and students can examine output logs after the SCMC session (D. Beauvois & Jamieson, 1997; Tudini, 2003). Some researchers argue that these properties of SCMC enable students to perceive and learn from the contents of the discussion more easily because "visual information may be processed faster and more easily than aural information and is, in any case, amenable to repeated inspection, acting as a built-in external memory aid" (Ortega, 1997, p. 85).

Interactional Features and Educational Uses of SCMC

The technical affordances of SCMC affect students' interactions. Darhower (2002) identified a variety of interactional features in the use of SCMC for educational purposes; some of which interact with the socio-cultural aspects of the participants in significant ways. These interactional features include (1) inter-subjectivity (e.g., a shared

orientation on a collaborative task), (2) off-task discussion (e.g., alteration of the assigned discussion topic to chatters' own chosen topic), and (3) social cohesiveness (e.g., greetings and leave-notifications, teasing and joking, role playing, gender identification, flaming, and insulting). In addition, the author found that flaming, cursing, or insulting appeared often in the learner-centered SCMC. Students in SCMC may feel more comfortable teasing others while hidden behind their computer screens than in face-to-face conversation (Darhower, 2002, p. 271). Furthermore, the author suggested that if the online chatters used these features wisely, it would allow them to feel that they were taking ownership of the online chatting environment and, at the same time, raising their sociolinguistic competence. Consequently, SCMC does not only function as a strong mediator, but it can facilitate interaction and learning.

Based on these interactional features, SCMC has been used in educational settings for a variety of purposes and reasons. Branon and Essex (2001) and MacDonald and Caverly (2000) listed the educational uses of SCMC: (1) brainstorming, (2) team working, (3) community building, (4) addressing technical issues, (5) holding online office hours, and (6) extending classroom discussion.

ADVANTAGES AND DISADVANTAGES OF SCMC IN EDUCATION

Researchers have reported various educational advantages of SCMC. They assert that SCMC can afford more spontaneous and equal participation and can facilitate asking questions and providing feedback (Chou, 2001; Davidson-Shivers, Muilenburg, & Tanner, 2001). Osman & Herring (2007) compared SCMC and ACMC, and argued that in SCMC the energy level in intellectual collaboration can be maintained, which can foster more dynamic and potentially creative exchanges.

Kerr and Murthy (2004) found that students using SCMC generated more ideas in a problem-solving process than F2F students. The results indicate that participants in synchronous CMC environments may feel freer to propose ideas as they do not have to face the other participants' non-verbal objections, and they can produce ideas without any kind of interruption from their peers. In this way, a SCMC environment may support the important brainstorming phase during the first PBL meeting.

Armitt, Slack, Green, and Beer (2002) found that quality synchronous discussions are possible, and that chat type SCMC provides a complementary, more dynamic form of reflection than that enabled by asynchronous discussions. Levin, He, and Robbins (2006) reported that pre-service teachers demonstrated more critical reflective thinking in synchronous discussions than they did in asynchronous forums. Mercer (2003) explained that chat "significantly contributes to developing more authentic group collaboration and knowledge building" (n.p.). Similarly, Paulus (2003) found that advanced stages of knowledge construction were evident in chat to a greater extent than in asynchronous forums or email.

According to Wang and Morgan (2008), SCMC heightened students' perceptions of their contact with the instructor; student reciprocity and cooperation improved as a result of using SCMC for online discussion; the amount of active learning that the students experienced in the online environment increased; and prompt feedback from both students and instructor during their online discussion is promoted.

Limitations of SCMC in education have also been reported. Like other modes of CMC, SCMC is also subject to certain technical limitations. Internet disconnections and system overload resulting in the disappearance of messages are cases in point (Teng &

Taveras, 2004-2005). In addition, many students lack the skills and speed needed for typing efficiently (Branon & Essex, 2001; Teng & Taveras, 2004-2005). This, in turn, impacts participation; and better typists often dominate chat discussion (Bober & Dennen, 2001; Teng & Taveras, 2004-2005). Chats can be hard to follow. It is often difficult to see the relationship between different messages, especially if there is more than one discussion thread taking place (Bober & Dennen, 2001; Gonzales & de Montes, 2001; Harmon & Jones, 2001; Herring, 1999). An increase in the number of participants makes following discussions even more difficult (Bober & Dennen, 2001; Branon & Essex, 2001; Ingram et al., 2000). "Chat sessions frequently result in overlooked comments as well as comments indicating that the reader was unsure of a previous remark's context" (Bober & Dennen, 2001, p. 245). In cross-cultural chats, limited language proficiency can further impede communication (Toyoda & Harrison, 2002).

Although the immediacy of interaction in SCMC has been acknowledged as a strength of the medium, such immediacy in online communication may not necessarily be appreciated or uniformly valued across different categories of students. Stewart, Shields, Monolescu, & Taylor (1999) studied gender and participation in synchronous online interaction. In their sample, women contributed not only significantly fewer, but also significantly shorter messages that the male subjects. Veerman, Andriessen and Kanselaar (2000) found that while synchronous online communication could be used to "coach" students through various comparative and analytical tasks, the synchronous medium itself seemed to interfere with meaningful interaction. They hypothesized that this might be due to the necessity to complete messages before sending them in the synchronous environment. In the absence of visual or auditory cues, a student, composing

a long message, was often interrupted by messages from others, who were unable to tell that the conversation was still underway.

Garcia and Jacobs (1999) highlighted the local asynchronicity issue in SCMC, and asserted that this may constrain the turn-taking process in the group, whereas a student might be occupied with message production while the other participants, unaware of the response being under production, move the discussion on to new topics. When the student finally enters a message into the discussion, it could have moved away from the topic that initially elicited her response. The sequential context has changed, making it harder to interpret one's message. This may obviously be a problem in the coordination of the discussion, a problem not present in turn-taking processes in F2F communication.

In brief, both strengths and limitations of SCMC in educational practices have been reported due to its technical affordances. Researchers have attributed the inconsistent evidence to theoretical and methodological limitations of the previous literature such as the lack of a systemic approach and limited range of measures (M. De Laat & Lally, 2003; Luppicini, 2007; Resta & Laferrière, 2007; Tolmie & Boyle, 2000). According to them, research on SCMC has failed to identify various factors that influence students' interaction and learning and to reveal their structural and dynamic relationships within a holistic and systemic framework.

Systemic Approaches and Their Limitations

There have been attempts to apply network and system theories, rooted in mathematics and natural sciences, to CMC research. For instance, some researchers explore social network analysis (SNA) as both a theoretical and methodological alternative, which can provide more systemic accounts of students' learning in CMC

(Maarten De Laat, 2002; Erlin, Yusof, & Rahman, 2008; Fahy, Gail, & Mohamed, 2001; Tateo, 2005). Instead of individual characteristics of each student's contribution, the researchers focus more on the social relationships among people. The participants in CMC interact with each other through the exchange of information. These social interactions illustrate a network in which the participants are marked as nodes and their relationships as links. With the help of mathematical graph theory, SNA provides some coefficients such as the position of an agent in the network and the degree of coherence of the social network.

Other researchers borrow concepts from complex adaptive system (CAS) theory to describe the dynamics of interactions in CMC (Davis & Simmt, 2003; Hills, Hurford, Stroup, & Lesh, 2006; Jordan et al., 2007). Although SNA enables us to summarize the static properties of the network, the concept of CAS yields insights on the relations among diverse agents and the changes of the system as a result of the interactions between them. Agents in CAS are not isolated but interdependent. The patterns of their interdependencies, emerging from the interactional processes between agents and sub-systems, characterize the properties of the system, allowing it to self-organize and evolve. Conceptualizing CMC as a CAS, researchers try to understand how the system self-organizes and how the students' interactions create the system's properties (Jordan et al., 2007).

Although these systemic approaches help illustrate the outline of the structure and dynamics of interaction and learning in SCMC, there is still a large gap between the abstract concepts, originated from mathematics or natural sciences, and the concrete phenomena, situated in educational contexts. For example, SNA can answer such

questions as how dense a network is or how central a participant is, but it does not provide any evidence of what kinds of knowledge the students construct or what is the socio cultural factors that influence the interaction. With the systemic approach of CAS, we are able to describe the abstract pattern of interactions among agents, as well as, between systems of learning, but it requires another framework to identify the content of learning, which is one of the main interests of educational researchers.

Some researchers tried to combine SNA and content analysis methods as supplements to each other: the former is related to the structure of interaction while the latter is to the content of it (Erlin et al., 2008; Fahy et al., 2001; Tateo, 2005). If we can assume that knowledge is the same with the isolated information, identified with the content analysis schemes, that can be transmitted from one person to another in its objective form, then the combination of the abstract network or system theory and a tool, which can identify the kind of information contained in a message, would be enough to fully understand students' interaction and learning in SCMD. What makes the situation more difficult is the content or knowledge itself is situated in multiply layered contexts.

Contrary to positivist perspectives on knowledge and learning, researchers, following the spirit of socio cultural approaches, argue that knowledge is situated in community of practices (Lave & Wenger, 1991), and distributed to cultural artifacts (Hutchins, 1991; Norman, 1991) and other community members in the form of cultural funds or capital (Bourdieu, 1977; Moll, Amanti, Neff, & Gonzalez, 1992). According to them, knowledge and learning cannot be isolated from their cultural and historical contexts. Out of context, any single meaning cannot be finalized or interpreted (Bakhtin, 1981; Toulmin, 1969). A theoretical framework, relevant to analyzing the structure and

dynamics of students' interaction and learning in SCMD, should enable us, not only, to view the phenomena systemically, but also to take the cultural historical context into account.

Cultural Historical Activity Theory

Cultural historical activity theory (Activity Theory in short) comprehends human psychology as object-oriented and tool-mediated activity, which situates in social contexts consisting of rules, community, and divisions of labor. Leont'ev initiated the theory and Engeström elaborated it, both of which are based on Vygotsky's socio-cultural theory of learning. In this section, I will describe the main concepts of the major scholars in the history of Activity Theory.

TOOL-MEDIATED HUMAN ACTIVITY

Vygotsky has been ascribed as the originator of Activity Theory (Engeström, 1987; Leont'ev, 1978). One of the main tenets of Vygotsky is the social origin of mind, which is based on Marx's theory of practice (Bruner, 1984; Luria, 1979; Wertsch, del Rio, & Alvarez, 1995). In Marx's framework, the human mind is neither an instance of the unfolding Absolute (Hegel), nor a simple reflex of the external world. The human mind is rooted in a material world that is created by human practice. Marx (1845) stated:

> Man must prove the truth, i.e., the reality and power … in practice… The materialist doctrine that men are products of circumstances and upbringing, and that, therefore, changed men are products of changed circumstances and changed upbringing, forgets that it is men who change circumstances and that the educator must himself be educated… The coincidence of the changing of circumstances

> and of human activity or self-change … can be conceived and rationally understood only as … practice (n.p.).

Vygotsky's introduction of tool-mediation to human psychology is an attempt to rebuild the totality of the human being through the lens of the Marxist concept and practice. While Marx had tried to dispute philosophical idealism and metaphysical materialism, Vygotsky's work started from the rejection of the main streams of psychology in the early 1920's: "a small non-influential group… who continued the traditional focus on consciousness as the object of psychological research", and "a much larger and clearly dominant group… who eschewed the study of subjective phenomena and defined psychology as the science of behavior, reflexes, or reaction" (Minick, 2005, pp. 33-34).

Vygotsky (1986) criticized the former subjectivist approach. Researchers in the group separated consciousness from human behavior, and tried to investigate it using introspective methods. Vygotsky argued that this kind of isolation had led to a false definition of the object of psychology. For him, human behavior, not only biologically, but also socially and culturally organized, cannot be omitted from any proper endeavor to understand human intellect.

In addition, Vygotsky criticized the later behaviorist researchers. Although the human mind should be explained by its connection to its behavioral embodiment, the behavior itself is not the human mind. If the object of psychology is human behavior that can be understood by the behavior itself, then, Vygotsky argued, it is a tautology based on "the same dualism." Referring to the behaviorist approach, he wrote:

> This is the other half of the same dualism. Previously we had mind without behavior. Now we have behavior without mind. In both cases, we have "mind"

> and "behavior" understood as two distinct and separate phenomena (as cited in Minick, 2005, p. 34).

For Vygotsky, neither consciousness nor behavior can be explained by itself. If one is to become a subject of study, then the other needs to be referred as an explanatory principle (Tulviste, 1999). Explaining Vygotsky's points to this issue, Kozulin (2005) stated:

> If consciousness is to become a subject of psychological study, some other layer of reality should be referred to in a course of explanation. Socially laden activity, then may serve as such a layer and as an explanatory principle. Vygotsky thus broke the vicious circle of explanation of consciousness through consciousness, and of behavior through behavior, and established premises for the unified theory of behavior and mind (p. 101).

Inferred from the argument, the primary goal of Vygotsky's project was the reformulation of psychological study so that it could comprehend both consciousness and "socially laden activity" and could exhibit the connection between them. The adoption of the auxiliary psychological means into human mental practices is the key of the reformulation. The tool plays a role of mediator that connects between consciousness and social activity (Wertsch, 1998).

The psychological tool transforms the elementary (or lower) mental functions to the higher mental functions (Vygotsky, 1978). He defined the former as those dependent primarily upon biological maturation, such as sensation and spontaneous memory. Higher mental functions, such as reading, were viewed as products of the socio-cultural milieu in which they had developed (Cole, 1985).

Vygotsky (1978) illustrated this difference graphically using a triangle (Figure). Lower mental functions are defined as those running along the top of the triangle,

represented by the direct connection of stimulus (S) and response (R). Higher mental functions travel through the bottom of the triangle, connecting stimulus and response through the use of an auxiliary stimulus or mediator (a physical or mental tool) identified as X.

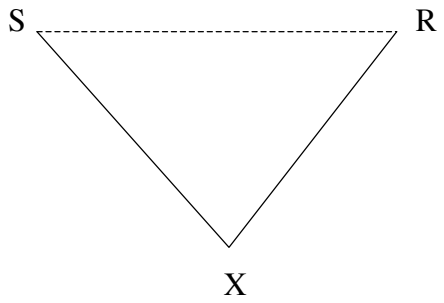


Figure 2.1 Vygotsky's Depiction of Higher Mental Functioning (p. 40)

Vygotsky (1978) explained the difference between lower and higher forms of memory with practical examples. While lower forms of memory are "very close to perception, because [they] arise out of the direct influence of external stimuli" (p. 39), seeing something and recognizing it, for instance; higher forms of memory allow aids (a knotted piece of string, for example) to intervene in the memory process, enabling us to focus our recall in certain directions, even without the sort of physical stimulus required in the lower example. While, before the mediating tool, people "think to remember," now with psychological tools, they "remember to think" (Vygotsky, 1978).

Wertsch (1985) identified four major criteria used by Vygotsky to distinguish between elementary and higher mental functions. These are:

> (a) the shift of control from the environment to the individual, that is, the emergence of voluntary regulation; (b) the emergence of conscious realization of mental processes; (c) the social origins and the social nature of higher mental functions; and (d) the use of signs to mediate higher mental functions (p. 25).

In the development of higher mental functions, physical or technical tools and mental tools or signs work simultaneously in opposite directions (Vygotsky, 1978). Of physical tools he wrote:

> [A] tool… serves as a conductor of humans' influence on the object of their activity. It is directed toward the external world; it must stimulate some changes in the object; it is a means of humans' external activity, directed toward the subjugation of nature (p. 125).

Psychological tools play largely parallel roles. Rather than directing themselves toward the subjugation of the external world, however, they direct themselves inward as a means through which to control one's own behaviors. Examples include language, various systems for counting, mnemonic techniques, and writing.

Wertsch (1985) identified a couple of features critical to the understanding of this formulation. The first is Vygotsky's suggestion that, by being included in the process of behavior, the psychological tool alters the very flow and structure of mental functioning. Wertsch (1985) noted that:

> [I]n other words, Vygotsky viewed the introduction of a psychological tool (language, for example) into a mental function (such as memory) as causing a fundamental transformation of that function. In his approach, psychological tools are not viewed as auxiliary means that simply facilitate an existing mental function while leaving it qualitatively unaltered. Rather, the emphasis is on their capacity to transform mental functioning (p. 79).

This concept is key to Vygotsky's view of development as a series of qualitative transformations or revolutions marked by the introduction and use of psychological tools.

It is worth noting that psychological tools not only transform cognition, but develop socially. Wertsch (1985) identified two scenarios. The first suggested that psychological tools resulted from socio-cultural evolution. Psychological tools are neither

invented by the individual, nor discovered through interactions with nature. Instead, they are appropriated through interactions within the social milieu. The second noted that "a sign is always originally a means used for social purposes, a means of influencing others, and only later becomes a means of influencing oneself" (Wertsch, 1985, p. 81).

STRUCTURE OF ACTIVITY

As noted earlier, Vygotsky's approach should be understood from the Marxist perspective on practice. Without the connection, one may mistakenly interpret the tool mediation as the same notion as a revised behaviorist 'Stimulus (S) → Organism (O) → Response (R)' model, of which the intervening variable organism represents the conditions of an individual such as biological needs or social motives. In contrast, it may be misconceived as cultural determinism that substitutes the objective stimuli with the cultural ones that are interpreted by the subject. Leont'ev (2009) argues that human psychological life cannot be reduced to any isolated form of either its objective or subjective element, saying that,

> But what is human life? It is that totality, more precisely, that system of activities replacing one another. In activity there does take place a transfer of an object into its subjective form, into an image; also in activity a transfer of activity into its objective results, into its products, is brought about. Taken from this point of view, activity appears as a process in which mutual transfers between the poles "subject-object" are accomplished. "In production the personality is objectivised; in need the thing is subjectivized," noted Marx (p. 84).

In human activity, subject and object, stimulus and response, or cultural interpretation and behavior do not exist independently any more. Conversely, the subject creates and transforms the object, and the object regulates and forms the subject. The

subject becomes objective by transforming its subjective motive into objective outcome. The object turns into being subjective by subjugating itself under the subject's needs or goals. Without this totality in mind, our understanding on human psychology will be inevitably incomplete and distorted, argued Leont'ev (2009).

The most fundamental principle of analysis, within Leont'ev's framework, is the hierarchical structuring of activity in larger collective context (Barab, Evans, & Baek, 2004). Daniels (2001) depicts the hierarchical structure of Leont'ev's activity framework with a triangle consisting of three levels: activity, action, and operation (Figure 2.2).

At the summit, lies Leont'ev's notion of activity, distinguished by its underlying object or motive. Actions are those processes aroused by the underlying motive of the agent, but subordinated to the attainment of specific sub-goals. Operations, depicted as the base of the activity triangle, are the methods by which specific actions are accomplished.

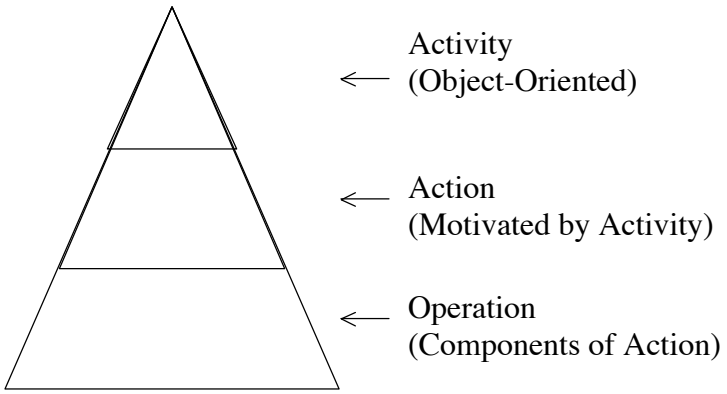


Figure 2.2 Leont'ev's Hierarchical Structure of Activity (Daniels, 2001, p. 87)

Leont'ev (1978) illustrates the structure of activity through two well-known examples:

> When members of a tribe are hunting, they individually have separate goals and are in charge of diverse actions. Some are frightening a herd of animals towards other hunters who kill the game, and other members have other tasks. These actions have immediate goals, but the real motive is beyond hunting. Together these people aim at obtaining food and clothing-at staying alive. To understand why separate actions are meaningful, one needs to understand the motive behind the whole activity. Activity is guided by a motive (pp. 62-63).

In the passage, Leont'ev indicated the difference between individual goals and the collective motive, and the coordination of separate actions through division of labor.

An action is also conditioned by the operation of material or symbolic tools. In the example, drums and sticks can assist the frighteners in achieving their immediate goal. Depending on the physical configuration of the tools and social rules of how to operate them, the pattern of his action will be specified.

Operations are usually accomplished unconsciously. However, in the history of the person's activity, they have once been objects of conscious actions. The frightener should learn how to operate the tools prior to the hunting activity. The operation in the current action has been an action in the past. Hence, in the process of learning, there are dynamic movements from one level in the structure of an activity to another (Leont'ev, 1978):

> Initially every operation, such as shifting gears, is formed as an action subordinated specifically to this goal and has its own conscious 'orientation basis'. Subsequently, action is included in another action,… for example, changing the speed of the car. Shifting gears becomes one of the methods for attaining the goal, the operation that effects the change in speed, and shifting gears now ceases to be accomplished as a goal-oriented process: its goal is not isolated. For the consciousness of the driver, shifting gears in normal circumstances is as if it did not exist. He does something else: he moves the car

> from a place, climbs steep grades, drives the car fast, stops at a given place, etc. Actually this operation may, as is known, be removed entirely from the activity of the driver and be carried out automatically. Generally, the fate of the operation sooner or later becomes the function of the machine (p. 66).

ACTIVITY SYSTEM

Building upon Vygotsky and Leont'ev, Engeström (1987) has significantly shaped the field's current understanding of these theorists' important works. Combining Vygotsky's depiction of higher mental functioning and Leont'ev's object-oriented activity, Engeström (1987) conceptualized the activity system in an effort to depict the contextualized nature of human activity.

Extending Leont'ev's view of collective activity, Engeström described human activity as a socially constructed and culturally situated system. His depiction of the activity system (Figure) includes, at its summit, Vygotsky's original model of mediated action. Engeström recast Vygotsky's elements of stimulus, tool, and response (S-X-R) as subject, instrument, and object, respectively, and expanded this model of mediated action in an effort to depict the complex social systems shaping these actions. To do so, he added three contextual elements: rules, community, and division of labor.

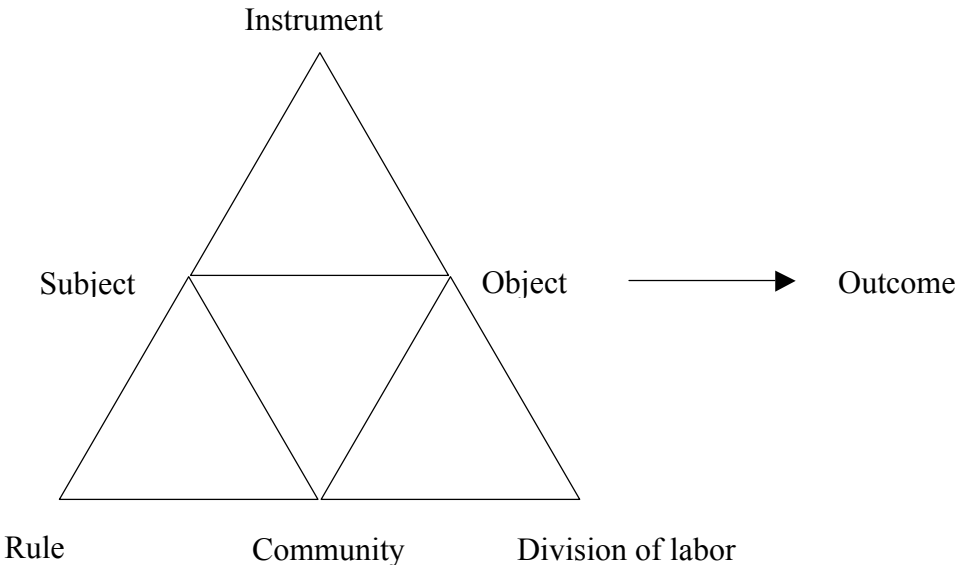


Figure 2.3 Extended Activity System (Engeström, 1987)

The components of the triangle are defined as follows.

Subject: Expanding upon Vygotsky's original depiction in Figure 2.1, Engeström (1987) acknowledged the potentially collective, social nature of activity – defining the activity system's subjects as either "the individual or subgroup whose agency is chosen as the point of view in the analysis." In short, subjects are the "who" of the activity system.

Instrument (mental and physical tool): As defined by Vygotsky, these instruments (physical and symbolic, external and internal) are the socially constructed means through which the subject(s) attain a desired outcome. In other words, instruments are the tools available to help us get the job done (e.g. fulfill our motives). In this sense, instruments relate to the "how" of the activity system.

Object: The personal or collective motives driving action within the system. Object lies at the heart of activity, defining its very purpose – and therefore helping to

distinguish activity from its subordinate actions. Object (and thus activity) is the fundamental "why" of the system.

In his efforts to better define the collective nature of the activity system, Engeström (1987) expanded upon Vygotsky by adding three additional elements to the activity system:

Community: It consists of multiple individuals and, or sub-groups who share the same general object and construct themselves distinctly from other communities. Within the broadest, societal conceptualizations of the activity system, these may entail subgroups charged with the fulfillments of specific actions required to accomplish the collective, object-oriented activity.

Rules: The explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system. Here, Engeström's conceptualization of rules extends beyond our traditional classroom definition – a set of behavioral expectations – but instead broadly describes the system's socially constructed/understood conventions in sum.

Division of Labor: This refers to both the horizontal division of tasks among the members of the community and the vertical division of power and status within an individual activity system.

CONTRADICTIONS IN ACTIVITY SYSTEM(S)

Within an activity system, all elements constantly interact with one another and are virtually always in the process of working through changes (Kuutti, 1996). Activity theorists argue that changing tools will lead towards a change in the members' roles within a learning community and vice versa. For example, changes in the design of a tool

may influence a subject's orientation toward an object, which, in turn, may influence the cultural practices of the community. In addition, it is possible that the object and motive themselves will undergo changes during the process of an activity (Kuutti, 1996). Therefore, Engeström (1987) called an activity system "a virtual disturbance-and-innovation-producing machine" (p. 11) and emphasized the importance of contradictions, the driving force of these changes.

Contradictions can be defined as "historically accumulated structural tensions within and between activity systems" (Engeström, 2001, p. 137). They "manifest themselves as problems, ruptures, breakdowns, clashes" (Kuutti, 1996, p. 34). Engeström (1987) drew parallels between contradictions among and within activity systems: "internal contradictions find their outward expressions in external ones. The latter are no less real, but derivative in genetic terms" (n.p.).

He discerned four levels or sources of contradictions in human activity, and depicted them as Figure 2.4 (Engeström, 1987). The primary contradiction of activities exists within each component of activity system. A misunderstanding from an equivocal statement may be an instance. The secondary contradiction refers to the tensions between the components. If a person fails to open a word document file using graphic editing software, we may find the contradiction between the object and the tool.

The tertiary contradiction lies between the current central activity and the culturally more advanced central activity. For example, if a student, who is only familiar with a behaviorist account of the human mind, has difficulty understanding an instructor's lecture based on a socio-cultural approach to learning, a problem may result from the tertiary contradiction. The last contradictions are the conflicts between the

central activity and the neighboring activities. These neighboring activities include instrument-producing activities, subject-producing activities (e.g., schooling), rule-producing activities, and so forth. If a research project is delayed by a postponed IRB decision, we may find a contradiction between neighboring activities.

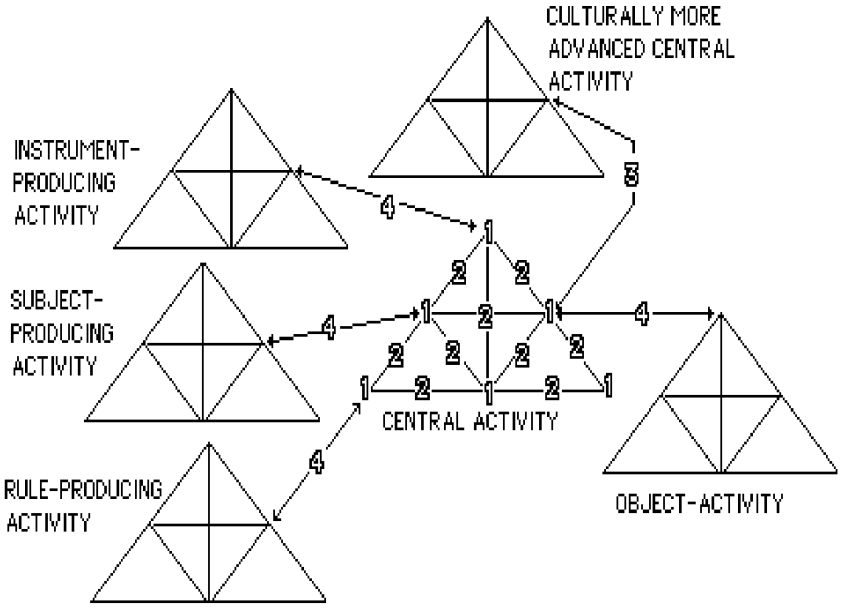


Figure 2.4 Sources of Contradiction (Engeström, 1987)

SUMMARY

Vygotsky's socio-cultural perspective directs educational researchers' attention to the cultural contexts of the human mind. In his framework, learning is defined as the process of internalization of cultural means through social interactions (Vygotsky, 1978). The cultural means denotes not a simple device that facilitates an action, but a mediator that shapes or forms the relationship between the subject and object in human practice, which has once belonged to others and is internalized through social interactions. This notion implies that in order for a researcher to investigate the phenomenon of learning in

a given situation, he/she should consider the kinds and roles of cultural means and social interactions.

Developing Vygotsky's idea, Leont'ev initiated Activity Theory. According to him, the object of psychological study should be neither the subjective consciousness nor the observable behaviors but the object-oriented activity as a whole. His theory of activity distinguishes three levels of activity (activity, action, and operation), which indicates that an individual action cannot be properly construed without the consideration of the motive that drives collective activity and the conditions that affect the operation of cultural means in an action.

Engeström (1987) elaborated on Leont'ev's theory by depicting his ideas as a systemic model in which contextual factors such as community, rules, and divisions of labor are incorporated into Vygotsky's subject-tool-object triangle. Furthermore, in his account, the Hegelian concept of contradiction is introduced as a driving force of change and development of the activity system, and four sources of the tensions or double binds are identified. The activity system model, acknowledged as a productive theoretical and analytical framework, will be applied to the current study to illustrate the structure and dynamics of students' interaction and learning in SCMD.

CHAPTER III.

METHOD

Site and Participants

The site of this study was a graduate course offered in the Department of Educational Psychology at a large research university in the southern United States in the fall semester of 2009. The course, open to both master's-level and doctoral students, had been offered every other year for more than 20 years. The instructor has been employed the classroom online discussion using either synchronous or asynchronous CMC technology since 1994. According to her, approximately 10 ~ 15 students usually had enrolled in each semester from a variety of different academic programs including educational psychology, language and literacy, instructional technology, foreign language education, and so forth. It was basically a seminar-type course for advanced graduate students, in which peer discussions in both face-to-face and CMC modes were the primary classroom activities rather than teacher-led lectures.

Students were required to meet weekly to discuss three or four articles on theories of writing and composition in general. The instructor, whose perspective was largely influenced by socio-cultural approaches in both educational psychology and psycholinguistics, was an experienced professor and a facilitator of students' face-to-face and online discussions.

Each week, the class met first in a classroom in which the instructor and students sit at tables arranged in a large circle encompassing all the class members. After a short

announcement and lecture-type summary of the readings, the instructor typically began the oral discussion by inviting the students to share their ideas on the readings with other classmates and to raise any issues related to the topics. The oral discussion usually lasted for an hour and 30 ~ 45 minutes.

After a 10 to 15 minute break, students walked to a computer lab, and continued the online discussion using a Web-based chat system. The computer lab was configured to be more relevant to lecture type activity or individually separated works than small group collaborations, which turned out to be helpful for students to focus on the discussion displayed on each monitor. Other sounds, however, such as typing keyboards, clicking mouse buttons, and laughing, were somewhat distracting for students' concentration.

During each session of online discussion, students saw a window on their screens, embedded in a Web page, with two panes separated by a horizontal line. In the top pane, they read the messages as they were posted. Whenever a participant sent a comment, it was posted to the discussion in the order received by the server. Comments were displayed in the top pane chronologically, one after the other, with the ordinal numbers and the authors' names. All comments previously posted in the discussion were available for the participants to read at anytime. If a participant intended to read a comment posted earlier in the discussion, he or she might simply scroll up the list in the top pane to locate it.

In the bottom panel, students composed their own messages by typing and editing just as they would do with word processing software. Unlike other current synchronous instant messaging programs, the software did not provide any functionality of noticing if

others were composing their message currently. The users could not have any indication of whether others were composing a message until the comments were posted. A participant had to hit the "enter" or "return" key to send a message, and it appeared in the top panel as part of the public discussion.

Of the nine students enrolled in the course on the 'theory and practice of writing seminar,' six were women and two were men. The students came from various programs in the college of education at the doctoral level: three students from Educational Psychology; three students from Language and Literacy; two students from Foreign Language Education (FLE); and one student from Special Education. This group of students was also diverse in terms of ethnicity. There were two Asian, two Mexican-American, and five white Americans (Table 3.1).

Table 3.1 Participants' Background Information

Name	Gender	Ethnicity	Program	Years
Amy	Female	White American	Language and Literacy	3rd
Henry	Male	White American	Educational Psychology	3rd
Hyosun	Female	Asian	Foreign Language Education	2nd
Joyce	Female	White American	Special Education	3rd
Kaylin	Female	White American	Language and Literacy	3rd
Mario	Male	Mexican American	Educational Psychology	3rd
Raymond	Male	White American	Educational Psychology	3rd
Salena	Female	Mexican American	Language and Literacy	3rd
Yoonjin	Female	Asian	Foreign Language Education	2nd
Donna	Female	White American	Educational Psychology	Instructor

Data Sources

The primary source of data was the transcript of SCMD. There were 13 online synchronous discussion sessions out of 14 classes. The first session was a kind of exercise for students to experience the SCMD, which lasted about 10 minutes, and there were no online session at the last class meeting when students and the teacher met at a place outside the campus. Except for the first exercise session, the members as a group produced 82 (the seventh session) to 158 (the second session) messages for about 30 to 45 minutes. The transcripts were saved on the server as a downloadable text file.

As secondary data sources, weekly readings, field notes from the observation of classroom oral discussions, recorded audio-files of them, and other documents that students wrote as class assignments were collected and analyzed as needed.

Data Analysis and Research Procedure

NATURALISTIC OBSERVATION

I attended all of the class meetings and observed all of the oral and electronic discussions. On the day of the first class meeting, Donna introduced herself and asked students to do the same. She then introduced me as a researcher who would be observing the classes and asked students to participate in a research study.

At each meeting, I sat at the corner of the classroom with the students during the oral discussion portion of the class. I observed and took field notes that had five columns of the ordinal number of turn-takings, speaker, time marker of the staring point, key words or summary of each utterance, and the researcher's comment on it. These

observation data were not systematically analyzed, but, being coupled with the recorded audio file, were frequently referred to as I traced the origin of the related topics in online sessions. Whenever I needed to retrieve the classroom oral discussion, the field notes were first reviewed to find the time of an occurrence; and the portion of the audio file near the time marker was replayed and transcribed as needed.

ANALYSIS OF TRANSCRIPTS

Unit of Analysis

The initial unit of analysis of this study is an exchange unit. Typically, one message, posted to a server by clicking the return key, represents an exchange in SCMD, which has been reported as a more reliable unit of analysis for CMC research (De Weaver et al., 2006; Rourke, Anderson, Garrison, & Archer, 2001). There were, however, apparent occasions that a single message comprised multiple speech acts or multiple messages constituted a single utterance. For example, when there is a message such as "Jane, I like your idea… Tom, would you call me later today?" the message should be separated into two different segments. On the other hand, there may be times when someone who posts one sentence, splits it into three messages to hold others' attention: "I // agree // with you". In this study, I used the exchange units instead of the message units.

The transcripts had been read thoroughly to draw an overall picture of the discussion before any codes were assigned. After a couple of initial readings, each message were either split or combined into exchange units. However, the chunks of exchanges such as topical threads and whole discussion sessions were also analyzed as a

unit in the later phases of the study to investigate the patterns of systemic developments or changes of SCMD as a whole.

Coding Responsive Connections and Speech Act Types

Responsive Connections

Drupal Chat, the SCMC software, presented the linear list of exchanges, which was chronologically ordered. I coded each exchange unit with the number of the exchange to which the current utterance was responding. If it was the first initiation and not designated to any specific exchange in the SCMD session, the utterance was coded as 'I' denoting an initiation.

Speech Act Types

After having identified the conversational links, I coded the exchange units according to their speech act types to analyze the subject's intentions and the patterns of their social interactions. The speech act codes derived from Speech Act Theory initiated by J. L. Austin.

According to Austin (1962), when an utterance is made, it is not only intended to express the meaning behind it, but also to accomplish something by saying it. For instance, we make promises, ask questions, make requests, and show gratitude through speaking words. In traditional Saussurean linguistics, this pragmatic aspect of language has been ignored. Austin (1962) argues that interlocutors, participants in a conversation, exchange speech acts by performing locutionary, illocutionary, and perlocutionary acts. *Locutionary act* is the performance of an utterance. *Illocutionary act* is the intentional

force embedded in the utterance. *Perlocutionary act* relates to the consequence in the world caused by the utterance. These are not different kinds of speech acts, but refer to different levels of a speech act. If a student, in an SCMD, posts a message stating, "The author argues that learning is social," then the posted message itself is a locutionary act, providing information to the author's argument in the post is an illocutionary act, and persuading others that the argument is true represents a perlocutionary act. To clarify the distinction, some researchers use locutionary statement, illocutionary intention, and perlocutionary effects rather than the original terms (Kissine, 2008).

Searle (1969) developed Austin's idea into a more systematic theory of speech acts. He analyzed various instances of speech acts, and proposed five categories: constatives, directives, commisives, expressives, and declaratives. *Constatives* are utterances that inform the addressee of any specific idea, proposition, or belief (e.g., "it's raining"). *Directives* focus on making the listener accomplish something (e.g., "come here"). *Commisives* refer to phrases that commit oneself to a future action (e.g., "will turn it in by tonight"). *Expressives* relate to the expression of feelings or emotions to the addressee (e.g., "sorry to hear that"). *Declaratives* are statements that are able to change a state of affairs or status (e.g., "you're fired").

Searle (1969) argued that a speech act consists of two sub parts: proposition and illocutionary force. He recognized that the illocutionary force or intention of a speech act is not always discernable just by looking at the proposition. For example, the meaning in the locutionary statement of "it is too warm here" may be an expression of the speaker's feeling, or a polite request to the listener to open the window. To solve this problem, he distinguished between an illocutionary verb and an illocutionary point.

Table 3.2 presents the coding labels, definitions, illocutionary verbs, and examples.

Table 3.2 Speech Act Types, Definitions, Illocutionary Verbs, and Examples

Illocutionary Force	Definition	Illocutionary Verbs	Examples
Constatives	Informing the addressee of any specific idea, proposition, or belief	affirming, alleging, answering, attributing, claiming, classifying, concurring, confirming, conjecturing, denying, disagreeing, disclosing, disputing, identifying, informing, insisting, predicting, ranking, reporting, stating, stipulating	"I think more/less voice depends more on what your purpose for reading/writing"
Directives	Making the listener accomplish something	advising, admonishing, asking, begging, dismissing, excusing, forbidding, instructing, ordering, permitting, requesting, requiring, suggesting, urging, warning	"Can you recommend any articles of theirs about writing?"
Commisives	Committing oneself to a future action	agreeing, guaranteeing, inviting, offering, promising, swearing, volunteering	"I'll make sure to include a reading where the construct is central."
Expressives	Expression of feelings or emotions to the addressee	apologizing, condoling, congratulating, greeting, thanking, accepting	"Salena – I really like your connection between voice and engagement in the reader"
Declaratives	Statements that are able to change a state of affairs or status	announcing, appointing, nominating, decreeing	"Ok. Cool. I think this will be enough for today."

The transcripts were converted into Microsoft Office Excel file, and the codes for each exchange were entered into the spreadsheet. Table 3.3 presents an example of the coding sheet.

Table 3.3 Example of Coding Sheet

Message Unit	Exchange Unit	To	Speech Act Type	Author	Utterance
80	1	75	1	Raymond	Salena, you never know: one of the earliest examples of great epic poetry in the English language tradition is Beowulf, which would certainly qualify as fantasy literature, as well as poetry :)
81	1	74	1	Joyce	Raymond, I agree. I think learning the rules of writing often overpowers creativity.
81	2	73	1	Joyce	Going to Amy's comment-- we really need to think about what we teach and how we are teaching it.

Threaded Layouts and Coherence Graphs

Based on the coding of the responsive connections, the transcripts were rearranged to a threaded layout using a small applet, based on PHP and MySQL, that I had programmed for the purpose of this project (Figure 3.1). The threaded display of the transcripts was very helpful to me to follow a topical thread without being distracted with other simultaneously evolving threads.

70	Amy	we anyone else intrigued that the beginnings or writing were to do with money? what do we make of that?
»72	Henry	Amy- well, the materialist in me says everything has to do with money, but beyond that, it seems like more a question of audience.
-»78	Henry	Storytellers had local audiences and private things could remain in your head. Transactions across distances with strangers were definitely commerce centered.
- -»82	Amy	Henry, I think you're right... about audience... about writing being about bringing together people's ideas in spaces where they are not physically together. we can be together even when we are not (or our sheep are not)
- - -»90	Henry	Amy, right. And I don't think stories or personal writings had the same compelling interest for strangers across distances.
- - - -»93	Amy	but then there is Homer, right? stories travelling across distances by word of mouth, being repeated by storytellers. can't recall how many millenuium would have passed before stories got written down.
- - - - -»96	Henry	Amy, sure, but with oral traditions accuracy is not that important, either.

Figure 3.1 Threaded Layout of Transcripts

In addition, the applet could also draw topical coherence graphs (Schallert, et. al., 1996) based on the responsive coding (Figure 3.2). In the graph, exchange units were represented as nodes with the authors' names in the order displayed on the screen, which were connected by lines between a specific speech act and the responding one. The graph enabled the researcher to identify different conversational threads unfolding simultaneously and their dynamic development patterns as SCMD continued. Furthermore, being coupled with simple scripts, I could add some functionality such as coloring each node according to its speech act type.

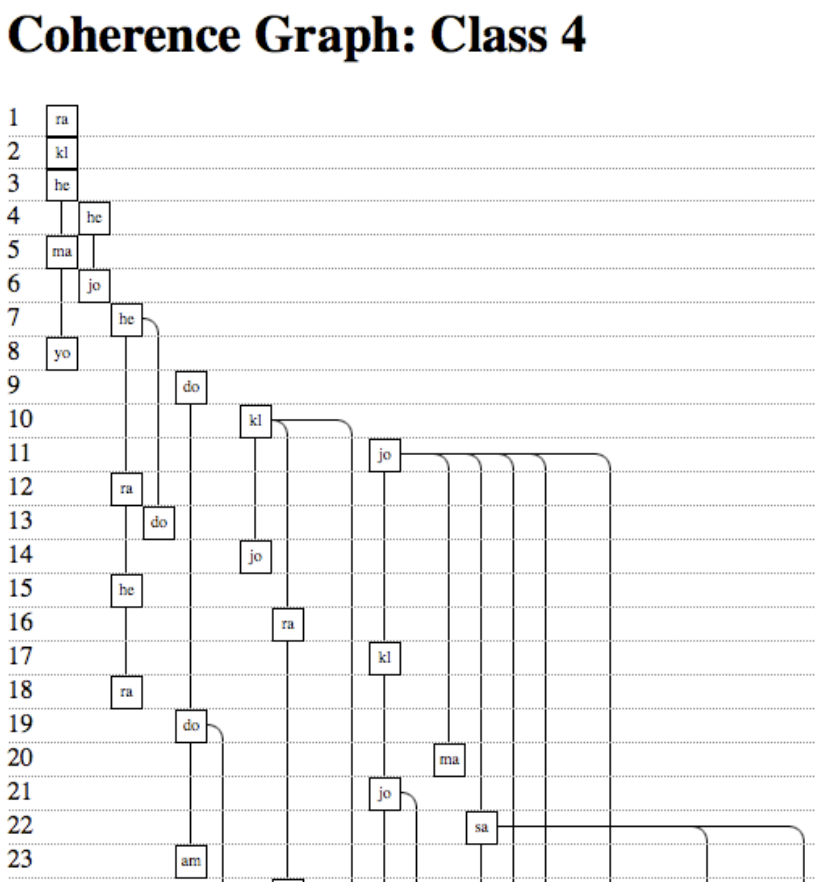


Figure 3.2 Example of Topical Coherence Graph (from the fourth SCMD session)

Social Network Matrix and Sociograms

Based on the responsive coding, I developed a social network matrix for each SCMD session. Table 3.4 is an example of the matrix from a session.

Table 3.4 A Social Network Matrix (from the second SCMD session)

From \ To	Amy	Henry	Joyce	Kaylin	Mario	Raymond	Salena	Donna	Yoonjin	Initiation	Response	Total
Amy	-	4	-	2	3	1	2	4	1	3	17	20
Henry	5	-	2	1	1	-	2	9	-	-	20	20
Joyce	-	1	-	-	-	1	2	4	-	2	8	10
Kaylin	5	-	1	-	2	1	1	2	-	1	12	13
Mario	4	1	1	3	-	2	4	4	-	2	19	21
Raymond	4	-	4	1	-	-	5	3	-	-	17	17
Salena	4	1	1	2	3	6	-	4	1	-	22	22
Donna	3	3	1	1	2	-	1	-	1	6	12	18
Yoonjin	1	-	1	-	-	-	1	-	-	-	3	3
Total	26	10	11	10	11	11	18	30	3	14	130	144

The authors who wrote comments are listed in the first column on the left, and the participants who received them are presented in the first row on the top. For example, the number five in the third row and second column means that Henry sent Amy five exchanges, and, at the same time, Amy received five utterances from Henry. The Initiation column includes the number of exchanges that had no designated recipient; the Response column presents the total number of responsive comments; and the Total column shows the sum of Initiations and Responses. The exchanges that continued one's own utterance are excluded from the matrix. For example, the cells, from Amy to Amy, from Henry to Henry, and so forth, are empty. The last row, Total, is the total number of exchanges that each participant received from others.

To represent the social network matrices visually, I have drawn sociograms based on them. Two kinds of networks were delineated: the whole class social network, and

egocentric network for each participant. The former was derived from the summary of the whole social network matrix and exhibited the pattern of the whole group, whereas the latter was drawn according the column and the row of each student and illustrated the pattern of a particular person's social interaction. Figure 3.3 and 3.4 are examples of sociograms. Here, I present them to provide the outline of the analytical procedure, but, in the following results chapter, they will be re-presented to explicate students' sub-communities emerging from their dialogical activity. Those illustrations are produced manually, based on the social network matrix, using Inspiration version 8, which is a commercial concept mapping software.

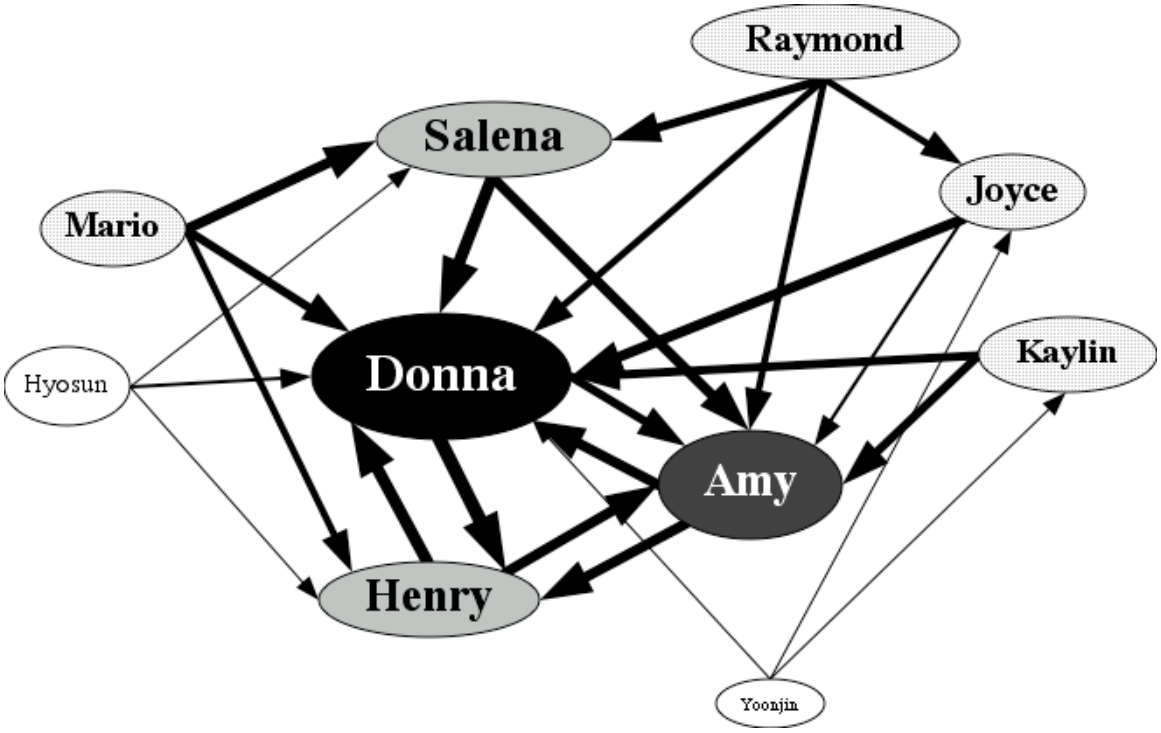


Figure 3.3 A Sociogram of the Whole Social Network

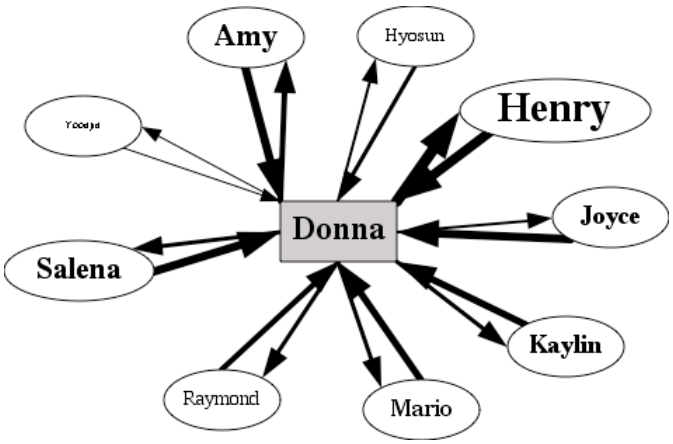


Figure 3.4 A Sociogram of Egocentric Social Network

OVERALL PROCEDURE OF THE RESEARCH

Step 1. Reading articles for each class and observing in-class oral discussion

To comprehend students' discourse activity in SCMD, I read the weekly readings before every class to help equip me with psychological tools, such as theoretical concepts related to writing research, to cope with the flow of classroom oral and online discussions. Sitting in a corner of the classroom silently, I observed the class' F2F discussion and took field notes, both descriptive and reflective, trying not to interfere with their practices. Those oral discussions were audio-taped by the instructor as a common practice of her classes, and the audio files were retrieved whenever needed in the following analytical phases.

Step 2. Collecting and coding online transcripts

In the virtual space of the online chatting room, I also observed the SCMD through a computer in the lab as a silent observer. After each session, I downloaded the

transcripts in the form of a text file, and imported it from the MySQL database run on my local laptop computer so that I could manage the data with the applet I had developed for this project.

The transcripts were read thoroughly at least twice before starting any codification. During the reading of the transcripts, the exchange units were identified, and the message units were combined or split as needed. After that, I coded each unit with responsive links and speech act types.

Step 3. Calculating descriptive statistics and developing visual representations

Based on the results of the codification, descriptive statistics (e.g., frequencies, means, standard deviations, rank orders, percentiles, etc.) were calculated using Microsoft Office Excel 2008 for Mac. The transcripts imported into the local database were converted into threaded layouts and topical coherence graphs through the applet for the study.

The applet was also programmed to produce social network matrices based on the responsive coding. Referring to the matrices, I drew sociograms of both whole and egocentric networks.

Step 4. Inductively analyzing and synthesizing the various sources of data and results of the preceding analyses

Finally, to discern, describe, and analyze the six elements of Engeström's activity system, I followed the naturalistic procedures set out by Lincoln and Guba (1985). Although this is stated as the last stage of the analysis, in fact, it was an on-going procedure having started from the very beginning of the data collection, and also having

sustained after the preliminary analyses even until now. While I was in the process of collecting data, I was also continuously taking notes, keeping track of what I had done so far and analyzing it, arriving at new insights, and developing tentative themes to organize the findings and final discussions. The second part of the analysis occurred after all data had been collected and the other preliminary analyses were completed. This involved the final process of categorizing the emerging themes and developing a model of the activity system in discourse activity of SCMD synthesizing Engeström's original model and the emerging themes of the current study. Throughout the process, I also continually searched the existing literature for relevant constructs. As a result, I was able to incorporate additional theoretical approaches such as Alderfer's (1972) ERG theory and Systemic Functional Linguistics' theme/rheme structure of texts (Halliday, 2004), which helped this study being more elaborated.

Note on Trustworthiness

Lincoln and Guba (1985) have suggested various techniques to establish trustworthiness of qualitative research. This study employed some of their techniques: prolonged engagement, persistent observation, triangulation, peer debriefing, and keeping a reflexive journal.

To minimize possible distortions that might result from my presence in the classroom discussion, even as a silent observer, I sustained the engagement with the participants from the beginning to the end of the semester (*prolonged engagement*); participated in and took field notes of every classroom discussion to avoid any biased interpretation based on partially collected data (*persistent observation*).

Triangulation is the use of multiple sources of data, multiple settings, and multiple methods of data collection to support emerging research themes and to explain

the research findings (Lincoln & Guba, 1985). As described earlier, this study had a variety of data sources including audio files of classroom oral discussions, field notes from classroom observations, assigned readings, and other documents produced by students as well as the transcripts of SCMD sessions, which were collected utilizing multiple methods. The evidence from these different sources and different methods was continuously explored, connected, compared, and synthesized to construe the complicated structure and dynamics of SCMD.

The findings from on-going analyses and the interpretations of them were discussed with other colleagues who were not directly participating in the study (*peer debriefing*), and I recorded thoughts, decisions, questions and insights related to the research (*keeping a reflexive journal*). From my personal experiences with content analyses in SCMD, I expected that there would be many instances that have no clear evidence of what the comment means, which message it is responding to, what the primary purpose of the speech act is, and so forth. I used short and informal interviews with participants, as needed, to lessen the ambiguity of the data (*member checking*).

CHAPTER IV.

RESULTS

The purpose of the study was to describe and understand the students' activity systems having emerged from SCMD. To the end, I set up six guiding questions derived from Engeström's Activity System model, which was the theoretical and methodological framework of the research.

1. Subject: Who were the subjects of the activity system in SCMD, and what were their needs that had driven them into the SCMD?
2. Object: What were the objects of the activity systems in the SCMD?
3. Tool: What were the mediating tools utilized in the SCMD?
4. Community: What kinds of sub-communities of the class community did emerge through the SCMD?
5. Rule: What kinds of rules, norms, or conventions were found in the SCMD?
6. Division of labor: What kinds of roles or divisions of labor were identified in the SCMD?

In this chapter, I will present the findings of the investigation as it attempted to answer the questions. This chapter consists of seven sections. The first section summarizes the frequencies of the utterances and the types of speech acts that each student produced during the SCMD. The quantitative information may exhibit the general patterns of each students' and the whole class' participation. From the second section, I will describe the findings that correspond to the six research questions.

Quantitative Summary of the Outcomes

Before describing the findings derived from the research questions in detail, this section summarizes the frequencies of exchanges and topical threads and the types of their speech acts. The summary based on the observable surface data may provide readers of what the overall contour of the activity system in the SCMD looks like and how it was enacted through different patterns of individual participation.

CLASS TOPICS, EXCHANGES, AND THREADS

There were thirteen online sessions out of fourteen class meetings during the fall semester in 2009. The class met every week in a classroom first having one and half hour long F2F discussion, and moved to a computer lab to administer the online session. Because the last class was held in a place at the outside of the campus, there was no online session on the day.

The thirteen class topics of the semester were divided into two chunks: background and backdrop, and topics in current literature on writing. Throughout the thirteen SCMD sessions, the instructor and the students produced total 1,682 exchanges, which is about 130 per class, in which total 94 topical threads, 7.2 per class, emerged.

Table 4.1 Class Topics and Frequencies of Exchanges and Topical Threads per Class

Class	Class Topic	Exchange	Threads
The First Chunk of Class: Background and Backdrop			
1	Introduction and Discussion of Syllabus	68	9
2	Definitions of Writing	158	11
3	The Big Framework Debates	145	5
4	Methods Used in Writing Research: Products vs. Process	144	11
5	Methods Used in Writing Research: Retrospective Interviews, Ethnography, Critical Interpretation, and Longitudinal Studies	150	7
The Second Chunk of Class: Topics in Current Literature on Writing			
6	Reciprocal Influence of Reading and Writing	140	5
7	Reciprocal Influence of Knowledge and Writing; Epistemic Writing	82	5
8	Cultural Differences and Writing	145	7
9	Writer's Block; Influence of Emotions on the Writing Process	134	8
10	Voice, Self, and Presence in Writing	135	4
11	Writing Adolescents	130	5
12	Writing in a Computer Environment; Multi-literacies; CMC Research	119	6
13	Assessment Issues and Writing	132	11
Total		1,682	94
Average		129.4	7.2

PATTERNS OF INDIVIDUAL PARTICIPATION

The people in the SCMD showed different patterns of participation. To discern subtle differences of participation, it required the author to investigate the data at a deeper

level including the frequencies of contributions, the length of exchanges, and distances between the responding and the responded utterances.

Table 4.2 Averages of Frequencies, Length, and Distances between Exchanges (per Participants)

Students	Exchange	Words per Exchange	Distance
Amy	16	25.1	7.2
Donna	16	42.8	11.0
Henry	21	20.5	5.1
Hyosun	9	37.0	11.4
Joyce	13	23.0	6.5
Kaylin	12	39.5	8.6
Mario	12	20.3	5.1
Raymond	14	32.2	7.1
Salena	17	21.2	5.9
Yoonjin	6	20.5	11.4
Average	14	27.1	104

Frequency of participation. In terms of the average number of exchanges per session, Henry (21), Salena (17), Donna (16), and Amy (16) posted the most exchanges, while Yoonjin (6) and Hyosun (9) did the least. Raymond, Joyce, Kaylin, and Mario posted moderate numbers of exchanges. Based on the frequencies of exchanges, we may conclude that Henry, Salena, Donna, and Amy were the most active players.

Length of exchanges. The lengths of exchanges were also different by subjects. Donna (42.8), Kaylin (39.5), Hyosun (37.0), Raymond (32.2) posted more words per exchange than Mario (20.3), Henry (20.5), Yoonjin (20.5), Salena (21.2), and Joyce (23.0) did. It is interesting that only Amy's case (25.1) was ranked as the moderate level, while there were four people who were classified as the middle level in the frequency of exchanges. It shows that there was more variation in the length of each exchange than in the frequency of each individual's exchanges.

Distance between dialogical pairs. This is related to how promptly the subject responded to other's messages. The unit of distance is calculated as the ordered number of the responding message minus that of the responded utterance, thus it does not accurately represent the time elapsed between two exchanges. There were cases that several messages were posted in a very short time period, and just a few posts in somewhat longer period. However, the average distance may provide readers of a broad sense of how much time the subject spent in responding to another exchange. Henry (5.1), Mario (5.1), Salena (5.9), and Joyce (6.5) responded promptly, and Yoonjin (11.4), Hyosun (11.4), and Donna (11.0) were relatively slow to reply to others.

INTERACTION PATTERNS

I found different patterns in how the participants interacted with other members. This sub-section presents those different patterns by summarizing the frequencies of the exchanges they sent to and received from others and initiated new topical threads and analyzing the types of speech acts they produced.

Table 4.3 Frequencies of Initiating and Responsive Exchanges

	To Others		From Others		Initiation of Topical Threads[a]	
	Rank	Frequency	Rank	Frequency	Rank	Frequency
Amy	4	159	3	182	4	5
Donna	3	165	1	245	1	18
Henry	2	185	2	183	8	1
Hyosun	9	92	9	89	5	2
Joyce	7	139	5	160	3	10
Kaylin	8	127	6	133	2	12
Mario	6	140	8	115	10	0
Raymond	5	159	7	125	5	2
Salena	1	207	4	166	8	1
Yoonjin	10	69	10	44	5	2
Average	-	144.2	-	144.2	-	5.3

[a] The exchanges that initiated the threads of socio-emotional chats are excluded.

Donna (18), Kaylin (12), and Joyce (10) initiated topical threads more frequently than others did. They initiated 40 topical threads, which was about 75% of the total threads involved in topical discussion (53). Donna, as the instructor, initiated the most topical threads, and was also ranked high in the responsive interactions. Kaylin and Joyce also started many topical threads, while they were relatively inactive to respond to others' comments. Their participation showed an initiation-oriented pattern of interaction.

In contrast, Henry (1), Salena (1), and Mario (0) initiated few threads during the whole thirteen online sessions. It is interesting that Salena and Henry were the persons

who commented on others' utterances most frequently, and were highly ranked in the amount of the messages they received. Their cases may be the examples of a responsive interaction pattern.

Table 4.4 Participants' Speech Act Profiles

Name	Constatives	Directives	Commisives	Expressives	Declaratives
Amy	56.9	16.2	1.5	25.4	0.0
Donna	57.4	16.2	2.0	19.6	4.9
Hyosun	56.4	14.9	0.0	28.7	0.0
Henry	60.4	15.0	0.9	23.8	0.0
Joyce	52.8	22.4	0.0	24.8	0.0
Kaylin	57.5	26.9	0.0	15.6	0.0
Mario	57.5	9.8	1.3	31.4	0.0
Raymond	62.0	7.8	0.6	29.6	0.0
Salena	51.8	10.7	0.4	37.1	0.0
Yoonjin	47.1	13.2	0.0	39.7	0.0
Average	56.0	15.3	0.7	27.6	0.5
SD	4.3	5.8	0.7	7.4	1.5

Note. Each score is the percentage (%) of the exchanges that belong to a speech act type out of the total exchanges that the subject produced during the whole sessions.

In the context of online classroom discussion, in general, constatives are involved in assertions and statements about the given class or discourse topics; directives are related to asking questions or requesting information; and expressives are used for supporting and acknowledging other's idea or expressing one's uncertainty. The

examples of commisives such as promising were rare in the context. Sometimes students asked the instructor to recommend an article for a topic, and the instructor promised to post the bibliography on the Internet site of the class. The ending calls at the end of the sessions might be example of declaratives in the SCMD. In average, more than half of the exchanges were constatives (56.0 %); expressives were 27.6 %; directives were 15.3 %; and commisives and declaratives were both less than 1 % of the total frequency of speech acts.

Kaylin and Joyce's initiation-oriented patterns could be also found in the speech act profile. A greater proportion of their speech acts belonged to directives. They seem to have asked more questions or invited others to their topical spaces than others. Henry and Raymond produced more constatives, which may imply that they posted opinions, stated propositions, and provided information more than asked questions or expressed their feelings. In Salena, Mario, and Yoonjin's cases, they exchanged more expressives with others than other types of speech acts. Their participation may be more affective than cognitive, and they might be said to contribute to the establishment of safe socio-emotional ground of the collective activity.

Subject

Engeström (n.d.) defines an activity system's *subject* as "the individual or subgroup whose agency is chosen as the point of view in the analysis (para. 4)." Because this study was to trace the discourse activity in SCMD, the instructor and the nine students who participated in the online chat sessions were the subjects of the activity

system in question. This section will describe what kinds of subject needs were found in the activity of SCMD.

Leont'ev's (2009) concept of object-oriented activity is based on subject's needs as the driving force. Each subject brings his or her own needs, derived from past experiences and oriented to an imagined future life, into a given activity system. It is the needs that have a subject work on a communal object, collaborate with other community members, and comply with conventions and rules. In this way, the agent's subjective needs drive the objective activity and form the overall direction of it.

Activity Theory, however, provides no detailed explanation on what kinds of subject needs are involved in human activity and how to identify them. Hence, I used Alderfer's ERG theory of human needs as a theoretical lens to analyze the needs that urged the subjects to participate in the activity. Developing and truncating Maslow's theory of the need hierarchy, Alderfer (1972) postulated that individuals have three core needs: to satisfy their material existence needs, to maintain their interpersonal relatedness with significant other people, and to seek opportunities for their unique personal development and growth. His theory is called ERG theory taking the initials of Existence, Relatedness, and Growth.

Existence needs include all forms of material and physiological desires. Hunger and thirst are examples of deficiencies in physiological needs, whereas tuition and fees, cost for living, credits, grades, and the conditions of the physical environment may be examples of existence needs in the context of educational institutions. All the needs concerning relationships with significant others are termed *relatedness* needs. Supervisor, instructor, classmates, friends, and family members are examples of significant other

people and the satisfaction of the needs involves sharing, supporting, and/or negotiating thoughts and feelings, positive as well as negative. *Growth* needs include all the needs to make creative and productive effects on the self. Broadening and deepening one's disciplinary knowledge will be a major example of graduate students' growth needs in the context of learning.

There are three basic principles in needs hierarchy (Alderfer, 1972). First, if a person fails to satisfy a given need, it is hypothesized that he or she will become more concerned about satisfying that particular need. To the person, that need will gain importance, and dominate and direct efforts and capabilities. This is the '*deprivation/domination principle*.' Second, when a person is satisfied with a need, its importance to him or her will diminish and, at the same time, the higher need will emerge to dominate and control his capabilities, which is '*gratification/activation principle*.' Third, it is acknowledged that if a higher need remains unfulfilled, the person may regress to lower level needs that appear easier to satisfy, which is '*frustration/regression principle*.' The first two principles are inherited from Maslow's theory, and the third principle is unique to ERG theory.

As EGR theory postulates, there were different levels of subjects' needs that were woven together, interacted with each other, and made an individual's practice dynamically advance forward and regress backward. The following example may illustrate the co-existing and interwoven needs in an utterance.

After greetings and small talk with each other, Donna, the instructor, asked students to 'post a long message:'

```
20. Donna:
  So let's try to write at least one very long message. so
```

```
what questions did you have about that whole thing about
the schools of thought on the psychology of human
learning?
```

(From Session 1, August 27, 2009)

It was the first class of the semester, in which the instructor introduced the course and delivered a lecture on the brief history of the psychology of human learning. The first online session, after the in-class activity, was a sort of exercise for the students to be accustomed to the SCMC technology that they would use in the following classes. Now, she was inviting students to experience an online topical discussion as an exercise. Raymond replied to Donna.

```
28. Raymond:
  Not so much a question, as a curiosity about how, in
  fifty years (or thereabouts) historians of psychology
  will classify the decades beyond 2010 . . .
```

(From Session 1, August 27, 2009)

As a response to Donna's request, he raised an issue of how the current disciplinary practice of psychology would be classified in the future. Having discussed the past history of educational psychology in the preceding class, he must have wanted to know what the state-of-the-art in the field would be. He wanted to broaden his understanding on the given issue, which may be seen as a growth need in the context, and he was trying to satisfy the need by inviting the instructor and others to collaborate in a collective knowledge construction.

From a different perspective, Raymond's utterance is also a social reaction to Donna's speech act. Even though the comment was out of his intellectual "curiosity" and derived from his growth need, the request of the instructor, who might probably be a

significant other for him in the context, could have provided a motive for him to post a response to it. The message would help Donna avoid the situation that she might be disappointed when there would be no follow-up to her initiation, and, by doing that, he might be able to present himself as an active, productive, and supportive student to the instructor. The relatedness need of his wanting to manage good relationship with significant others might drive Raymond to interact with Donna using the utterance.

In addition to his growth and relatedness needs, his participation may be considered as an effort to satisfy his existence need as well. As a third year doctoral student, Raymond's ultimate goal for taking the course was to attain a Ph.D. degree by fulfilling the requirements for the graduation. If he would fail in attaining the degree, it might be an issue for his social and economic life in the future. To avoid such threatening possibility, he should show acceptable performances to the instructor. His participation in the discussion was one of the performances that might satisfy his existence need.

Raymond's case illustrates that the three general needs of existence, relatedness, and growth are working together in an activity, and that, in other words, an activity functions in three different ways simultaneously to satisfy the different needs. In the example, his utterance carried out three functions at the same time: he participated in the discussion to fulfill the minimum requirement of the class (*participation*); interacted with Donna to have a good social relationship with her (*interaction*); and contributed to constructing new knowledge to broaden his understanding on the history of the field (*construction*).

Although those different needs co-exist in every exchange, and an exchange carries out different functions simultaneously, the importance of each need is different

per subject, and the configuration of the priority of the functions is continuously changing even for an individual. These different and changing needs of the subjects give dynamic rhythms to collective discourse activity.

The chat room software used for the class was designed to auto-scroll down to the latest comment when the new entry being posted. It was relevant for a casual and fast conversation between two or some more users. However, in the context of academic discussion among ten users, it was challenging for the users to cope with the speed of discussion. At the second online session, Donna asked the system administrator to turn off the auto-scrolling function, and the following thread occurred in the third online session from which the users should scroll-down manually to read the latest comment.

```
18. Mario:
  i dislike that it is not auto-scrolling

25. Amy:
  i miss auto-scrolling too, i thought the conversation
  hadn't started yet! oops... i'm scrolling

86. Amy:
  i still miss the cognitive "problem-solving" challenge of
  writing really fast to keep up with the scrolling
  conversation... a motivating challenge for a writer!

(From Session 3, September 10, 2009)
```

Contrary to Donna, Mario and Amy preferred the ‘auto-scrolling’ system. They were more familiar with the fast pace of online conversations, and, inferring from the lack of upper cases in their posts, seemed to be accustomed to the culture of Internet chat users. When the auto-scrolling function was turned off, the scrolling was neither the way they had been used to, nor what they had expected. The new system would be more relevant to slower and deeper discussion with longer messages, which was quite different

from their expectations and preferences. The unexpected change of the system might lead the whole discussion to something that they were not comfortable with, and might be a potential threat for the successful presentation of their performances in SCMD. Of course, the non-auto-scrolling issue would not have caused any serious frustration to them, but when Mario and Amy decided to post the complaints, the driving forces might have been derived from their existence needs.

Raymond and Henry continued the conversation.

```
90. Raymond:
  "Curse my metal body, I wasn't fast enough!" -C-3PO

91. Henry:
  beep-beep-doop

(From Session 2, September 3, 2009)
```

Raymond is one of the participants who wrote long and serious comments. For him, the auto-scrolling might be distracting his focus, and probably could have wanted to raise an objection to Mario and Amy's complaints. However, taking a stand against someone else's opinion in public space may always have a potential risk of causing 'face-threatening' situation (Brown & Levinson, 1987). According to politeness theorists, people use various kinds of politeness strategies to manage their 'faces,' and, in this case, it was 'joking.' Although Mario and Amy focused more on the issues of the technological environment, which was related to their existence needs, in Raymond's utterance, we could find the gradual movement of the focus to the needs of social relatedness. Even though the main focus of message #90 was still on his preference for the non-auto-scrolling system, his consideration of his social relationships with Mario and Amy gained more importance at that moment. Henry, who was the most prompt and vivid participant

in the group, seemed to be fine with either way, so his focus might be on turning the conversation to a more pleasant mood. At message #91, the social relatedness needs seemed to be the prime concern of Henry and the dominating force of his discourse activity.

Mario and Amy initiated the thread based on their concerns about the ways of participation. Raymond and Henry continued the discussion but the driving force was changed to more socially oriented needs, and Donna's intervention made another change in the thread.

```
95. Donna:
  You guys are so fun! I do love to think of the robots in
  Star Trek and Star Wars and what their creators make us
  think about what it means to be human. And then, moving
  on to our model of "real" (what's real?) people, I can't
  help but like this idea of the BIOLOGY of the writer.
  Like Amy a second ago ruing the fact that she no longer
  has to juggle between reading and writing quite as
  quickly just to keep up with the scrolling system of this
  program. I think the biology of humans adds an
  interesting dimension to what we think of when we
  describe writing

113. Mario:
  Donna, when you said about the "biology" of the writer, I
  honestly couldn't really help but think of perhaps the
  "imperfection" of the writer - that is, that we are
  unique and imperfect (from one another) in our means of
  communication

(From session 3: September 10, 2009)
```

In the face-to-face class of the week, they had discussed "big frameworks" in writing research including traditional process and cognitive models, socio-cultural frameworks, and ecological approaches. They had spent a little, but not enough, time on

ecological frameworks. As the course designer and the person who decided on the weekly readings, Donna was always concerned with covering all the topics and readings of the week in each class activity. Reading the thread started from Mario's comment, she might have considered it as an opportunity to bring the topic of an ecological approach onto the stage, and she raised the issue. In addition, as a participant in the discussion and a researcher who had been interested in socio-cultural and ecological approaches to human psychology, she might appreciate their conversation as intriguing instances to develop. From the viewpoint of subject's needs, the existence need of Donna as the instructor, and the growth need of her as a learner interacted together and resulted in the utterance. By either case, the focus of the topical thread moved in another direction, and Mario, who had initiated the thread with the concern of his participation, followed her exchange to deepen or broaden his knowledge by which he would satisfy his growth needs.

In brief, the subjects including the instructor and the nine students participated in the online discourse activity to satisfy their needs. Based on Alderfer's ERG theory, I could identify three basic human needs, which were also the driving needs in SCMD. The different needs co-existed in an activity, influencing each other simultaneously; made an utterance producing action have its unique direction and focus; and, consequently, had the whole collective activity develop dynamically.

Object

The activity driven by the subject's needs is oriented to the object of the system. In Activity Theory, the object is the key element that realizes subject's needs and distinguishes an activity from the other. Leont'ev (2009) writes:

> Separate concrete types of activity may differ among themselves according to various characteristics: according to their form, according to the methods of carrying them out, … etc. The main thing that distinguishes one activity from another, however, is the difference of their objects. It is exactly the object of an activity that gives it a determined direction. (p.98)

Although subject's need is the driving force of activity, it exists only in the form of potential before it is realized in a concrete activity. It is only when the need meets a corresponding object in practice that the subject may have an opportunity to achieve her goal. For example, a student who wants to have a deeper understanding of a certain theoretical construct may have several choices of the ways she will be able to satisfy the need such as reading related articles, attending a lecture, or discussing some theoretical issues with peers. The need of learning pushes her forward to an activity, but it cannot accomplish its realization without the actual engagement in an activity. In other words, the object enables needs to be realized; the subject's needs are oriented to it; and, therefore, the object gives "a determined direction" to an activity. Leont'ev (2009) continues to write:

> According to the terminology I have proposed, the object of an activity is its true motive. It is understood that the motive may be either material or ideal, either present in perception or exclusively in the imagination or in thought. The main thing is that behind activity there should always be a need, that it should always answer one need or another. (Leont'ev, 2009, p.98)

Now, being combined with the object, the subject's need becomes a concrete, true motive of an activity. That means the activity transforms not only the subject's need, but also the object, once having existed in the objective world independent to the subject's needs, into a subjective motive. Leont'ev (2009) named this process of reciprocal

transformation as "the subjectification of the object" and "the objectification of the subject" in activity. Through these processes of transformation, the subject can enter the objective practice, and the object can be involved in psychological activity.

TOPIC AS THE OBJECT OF THE ACTIVITY SYSTEM IN SCMD

This study contends that the topic of discourse is the object of the activity system in the context of online classroom discussion. Even in a casual and instant conversation, there is a topic shared by both the speaker and the hearer. Interlocutors make efforts to fit their utterances into the topic or to change it with their speech acts. In either case, they produce and understand an utterance by working on a given topic as the object of their discourse activity.

In the context of this study, it is more obvious. The instructor had designed the course to help students have deeper understanding on theory and practice of writing by having them grapple with the class topics. She organized all of the reading materials, offline and online activities, and several writing assignments to achieve this end. In other words, generally speaking, students' participation in the discourse activity of SCMD is, as the instructor had designed, that they work on the class topics, as objects, to construct individual and communal knowledge.

Topic was not only given from the instructor's syllabus, but also emerging from the discourse process. Discussion of class topics raised other issues related to the given topic, and they became new topics for the following utterances. A class topic was the outcome of the instructor's design activity; it became an object of the student's classroom discussion, which produced another topic; and the following utterances were the outcome of other activity systems in which other members had worked on those emerging topics

as objects. Students' academic conversations in SCMD developed through those kinds of object-outcome chains that started from the class topic and expanded through emerging discourse topics. Therefore, the topic, in this study, includes both class topics that were raised by the teacher and the discourse topics that emerged out of students' exchanges.

The following example may explicate how a topic emerges and develops through the activities in SCMD.

```
9. Donna:
   Ok. So first of all, I want to say that you are all so
   wonderful to have tackled each of these readings and
   stayed with them all the way through! I appreciate it the
   work it represents. I do want to know whether you see
   yourself more as a postmodern anthropologist or as an
   anthropological scientist, but I also want to continue
   discussing Bracewell. So let's see what we make of these.
   And then there's Sternglass...

(From Session 5, September 24, 2009)
```

As usual, Donna initiated a topical thread after short greetings with the students. Her exchange consisted of two parts. In the first part, as an introductory move, she reviewed the F2F classroom discussion and expressed her appreciation of the students' contributions. In the second part, as the move that included her major purpose, she brought up topics that other members would dwell upon. Following her initiation, students made efforts to develop the topics, and, as a result, they produced utterances: 115 exchanges followed the thread, which was 76% of the total exchanges (152) and 90% of the topical discussion (129) that excluded the greetings (23) at the beginning and the end of the session. This can be restated, in terms of Activity Theory, as the topics initiated by Donna became the object of the following activity systems of other members.

If so, what would be the topic of the very first message that initiated the thread? What was the object that Donna had worked on to produce the initiation? The first part of the utterance has the implications for the answer. At the beginning of the exchange, she said, "OK," which notified the students that the session would begin. We may assume that the move was abbreviated version of a whole sentence such as "OK, we spent enough time to warm-up, and let's get started!" The next part was the actual starting point of her topical initiation, which started with "So." It is a coordinating conjunction ("Grammatical conjunction," 2010) that connects "two or more items of equal syntactic importance, such as words, main clauses, or sentences," which "presents a consequence" of the preceding items. In this case, the preceding item of the "so" was the whole classroom discussion of the week. The following part of the utterance was the consequence of her reflection on the classroom discussion about the weekly readings. Thus, the topic of the classroom discussion, using the terms of Activity Theory, was her object, and the exchange was the outcome of the utterance producing activity.

```
28. Hyosun:
  Everytime I read or hear about the debates between the
  two camps, I feel that looking at the principles, I am
  inclined to 'postmodern anthropologist' side. However,
  when I actually read the research works done in that
  method, I am not sure if I can fully credit their work...
  I suppose that it has to do with the researchers not
  being able to show all their work and only a portion of
  it...
```

(From Session 5, September 24, 2009)

Hyosun replied to Donna saying that although she regarded herself as a 'postmodern anthropologist' in principle, she had not been satisfied with their works. In that comment, explaining her position to the approaches to writing research, she

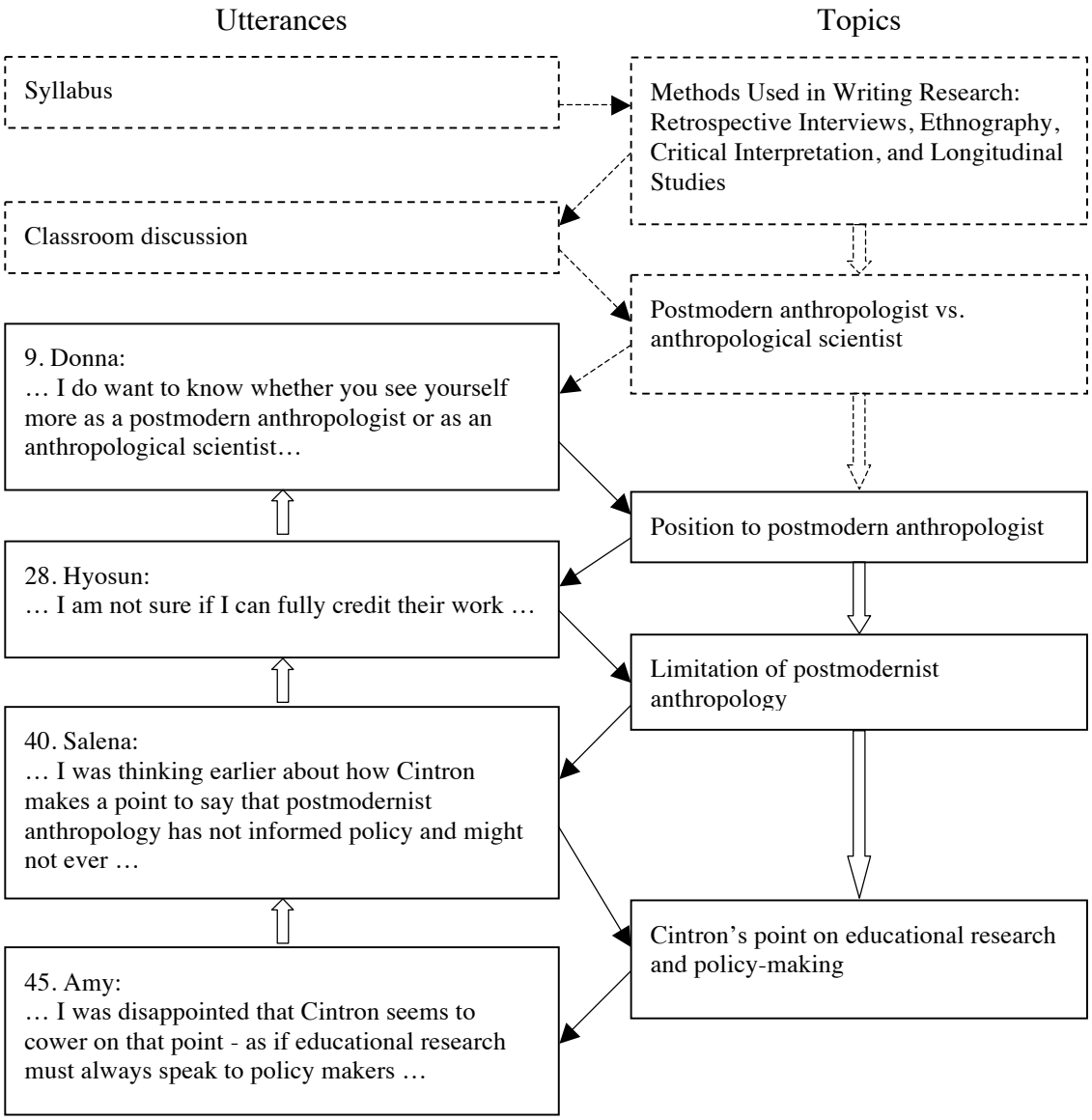
answered Donna's question, "I do want to know whether you see yourself more as a postmodern anthropologist or as an anthropological scientist" (#9). While the topic that Donna reflected on was the class topic overarching the F2F classroom discussion, the object of Hyosun's was derived from a part of Donna's utterance that was the outcome of her activity on another topic. Salena continued the thread.

```
40. Salena:
  Hyosun - I'm glad you said that. I was thinking earlier
  about how Cintron makes a point to say that postmodernist
  anthropology has not informed policy and might not ever.
  I think there's so much that can be gained from
  qualitative research, but the problem with policy is that
  it wants to fit everyone in a box. The idea of
  qualitative research (I feel) is to say that there is so
  much more out there than what fits in the box. (Sorry I
  had to use the box)

(From Session 5, September 24, 2009)
```

Salena took the point that Hyosun could not credit postmodernists' works, and connected it to Cintron's comment on the limited applicability of their works to policy making. The topic of Hyosun's comment that had been her position to the postmodernist approach turned into the limitation of the framework, which was changed again into Cintron's comment on the educational research and policy-making in the following Amy's exchange.

```
45. Amy:
  On this issue of policy, I was disappointed that Cintron
  seems to cower on that point - as if educational research
  must always speak to policy makers. Must always be
  "Applied ethnography."

(From Session 5, September 24, 2009)
```

As described so far, an utterance in SCMD is the result of their intellectual labor on a topic as an object that is embedded in the responded utterance. A topic emerges from the pair of the responding and the responded utterances, and develops through the chain of the pairs forming a topical thread. It is depicted in Figure 4.1.



——— Items that emerged during the SCMD

--------- Items that were given from the outside of the SCMD

Figure 4.1 Formation of a Topical Thread through the Chains of Topical Pairs

The chart illustrates that a topic precedes an utterance. It is given before or from the outside of an utterance, and is embedded in the responded utterance. In the example, Donna's topic was from the classroom discussion, Hyosun's from Donna's initiation, Salena's from Hyosun's comment, and so forth. Hyosun raised the issue of the limitation of the postmodernist approach, because Donna asked her position; Hyosun's comment reminded Salena of her thought about Cintron; and Amy expressed her disappointment with Cintron's view following Salena's critique. Although, as discussed earlier, it is the subject's need that drives her into the topical discussion, she can only satisfy the need by participating in a topical space set by others, because the dialogical situation in SCMD entails responding to others' utterances. Even the first message may be regarded as a response to the instructor's course design or a follow-up of the classroom discussion. In a sense, if so, we may consider that it is the topic that draws the subjects into the discourse activity.

Another point observed from the chart is that the subject, the responder, selects or determines a topic. If Donna had not asked the question about the students' positioning, the topic, having been discussed in the classroom discussion, might not be animated in the online session. It was Hyosun who picked up the positioning issue out of three possible topics, including discussions about Bracewell and Sternglass other than Cintron, which Donna had mentioned. Even though Hyosun's point about the limitations of postmodernist works was related to the researchers' "not being able to show all their work and only a portion of it," it was Salena who changed the direction of the topical discussion to consider Cintron's comment on policy-making.

A student's discourse activity is the outcome of the labor on a discourse topic; and, through the interactions of the individual discourse practices, the topical discussion developed dynamically.

Tool

The connection between subject and object in human activity, however, is realized through tool-mediation. As was discussed earlier, the tool in Activity Theory is not an additional auxiliary means to make an action easier, but the only path, from the participant's perspectives, that a subject can follow in an objective activity. From the object's side, on the other hand, it is the tool that enables an object to enter the private and psychological sphere. The subject employs auxiliary means to satisfy his or her own needs, and, at the same time, he or she should follow the affordances of the tools to achieve the goal. In other words, the subject is subordinated to the mediational means, while the tools are subordinated to the subject's needs in the tool-mediated activity system. Therefore, it is critical to identify and analyze the kinds and the role of mediating tools in an activity to comprehend it as a whole.

Activity Theory contends that there are two kinds of tools: material and symbolic tools (Engeström, 1987). Material tools, in the context of the study, included the computer lab as the material environment, computer hardware and software for SCMC, and other supplementary tools such as printed journal articles as reference, while written texts were used as the symbolic means. The following pages will describe the tools utilized in SCMD in detail.

SCMC TECHNOLOGY

Although various kinds of material tools were employed to support the activity, SCMC technology was most critical in the situation. After every classroom discussion, the instructor and the students moved to a computer lab. It was equipped with 24 Intel-processor-based Core 2 Duo iMacs, with 24-inch screens, running in Windows OS. The computers in the lab were all networked and managed through a network administrating software. For people to log into the computers, the electronic authentication for the user's id of the University was required. The lab also included an Instructor Console and projection system, which were used to inform them of the URL for the Web-based chat room and their login information. Because the lab was reserved for the class every week, there were no other people than the instructor and the students of the class, and the researcher as the observer during each online session.

Figure 4.2 Picture of the Computer Lab

Twelve of them were positioned in three rows of four, being oriented toward the Instructor Console, and the other twelve computers were arranged along the walls in both sides of the room. Arriving at the lab, individuals took the seats as they wanted. People usually seemed to avoid sitting adjacently except Henry, Mario, and Raymond who tended to sit together in the back row. In this way, even being together in the same physical space, their positions were scattered around the room, and they accessed the virtual chatting room individually. Before being accustomed to the situation, they expressed their feelings about the environment.

```
15. Kaylin:
  I hope I can keep up with the conversation and my
  thoughts.

17. Salena:
  Yes, this is difficult

(From Session 1, August 27, 2009)
```

This kind of conversational mode seemed to be new to them, and they were concerned about their successful performance in the environment. One of the aspects of the mode that made them uncomfortable could be that, contrary to the F2F classroom discussion, they were supposed to converse with each other only through the local client terminals using written texts. No verbal interaction was allowed in principle.

```
16. Amy:
  it's so quiet in the room...

22. Salena:
  It is quiet; can we listen to music or something.

24. Salena:
  Are we not supposed to talk to each other?
```

```
25. Mario:
  I think we're talking (kinda)...

27. Donna:
  Amy -- you are so right! It IS so quiet. But what will
  happen I just know is that someone will write something
  funny that will make us all laugh! There will be a ripple
  effect as each person reads the message....

32. Donna:
  Salena -- we ARE supposed to talk to each other -- only
  it has to be through the keyboard.

(From Session 1, August 27, 2009)
```

It was interesting to observe their physical behavior when they were engaged in the activity in the virtual space. All of them were looking at their monitors; no one talked to each other; there were continuous clicking sounds of typing and occasional chuckling caused by a written comment; and some of them were reading printed articles while some others opening another window to read a PDF version of the weekly readings or look up a Wikipedia entry. They were being together physically, but acting separately virtually.

Drupal chat: Web-based software for multiuser chat

The chat software was a plug-in for Drupal, an open source Content Management System (CMS) based on PHP and MySQL. It followed copyright of General Public License (GPL), so it could be freely installed, administered, and modified without any copyright violation. The Drupal system supports a variety of functions such as asynchronous discussion forum, user and group management system, and file sharing among the users by default. The system administrator can also install various plug-ins

that other programmers already have developed, and Drupal Chat Room v. 6.1 (Drupal Chat in short), the chatting software used for the class, is one of them.

Drupal Chat is built on the Web development techniques of Ajax (an acronym for Asynchronous Javascript and XML) and jQuery so that multiple users can participate in a conversational event through a Web page simultaneously. With them, the chat software enables the local computer to communicate with the server in the background without interfering with the display and behavior of the existing page. In other words, only a part of a Web page can be updated or modified with the information from the server while the other part remains the same. When the students conversed with each other through Drupal Chat, the list pane was updated every second with the new comments sent from other local computers and retrieved from the server, but the other parts stayed the same; and the participants could write their comments in the writing pane without any interference even during the list being updated.

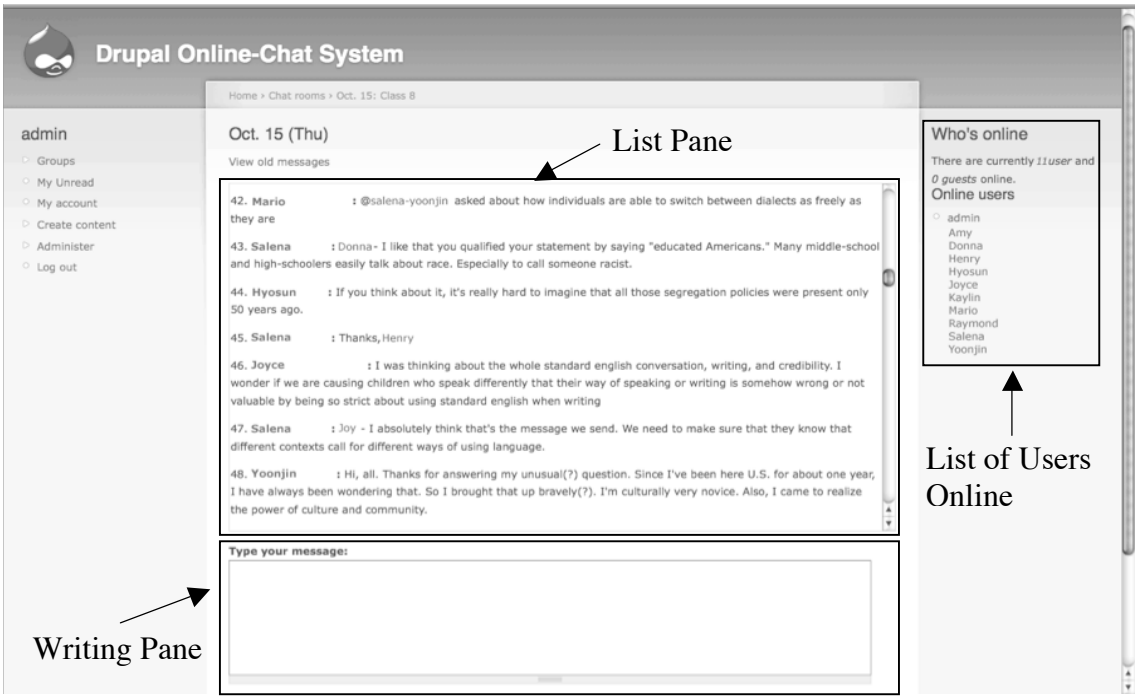


Figure 4.3 Screen Capture of Drupal Chat

The layout of the chat software consists of two panes: list and writing. In the list pane of comments, users can read others' messages and, using the scroll bar on the right side, explore the comments that are not shown in the pane due to their length. The writing pane is the place in which the users type their messages. The list on the right side indicates the class members currently logged in.

Functions of Material Tools

Physically mediating the communication

```
1. Salena:
   Hi everyone. Donna, It's 4:11 and I haven't heard back
   from you. I sent you an email and left you a voice mail
   earlier. I have a fever, so I'm staying home today. I
   really wish I could be there with all of you, but I'll be
   sure to listen to the audio later. I tried different url
   combinations until I got the right one, so I'll be here
   when you start chatting.
```

(From Session 8, October 15, 2009)

SCMC technology mediates substantially the communications among the subjects. Without any physical medium, neither oral nor written communication is possible. Oral communication is possible with voice transmission through the sound waves. In electronic written communications including SCMC, remote users can converse with each other, because they are connected through computer and electronic networks. The substantial connection between interlocutors is the prime function of the technology in SCMD.

The way that the SCMC technology transmits the written communication is different from that of oral communication. Text-based SCMC technology delivers digital signals converted from the original analogous ones, whereas the oral communication does not transform the sound from the speaker's mouth. The physical movement of the writer's fingers on a keyboard is encoded into digital signals of 0's and 1's at the one end, and it is decoded into analogous signal displayed on a computer screen at the other end.

The digitalized information can be transmitted to a receiver who can access the wired or wireless Internet connection. It contrasts with the F2F oral communication that is limited to the area that the sound can be heard. Overlapped interactions between multiple participants also become possible in electronic written communication. If two or more people are speaking at the same time in an oral communication, it will be annoying or incomprehensible. To avoid that, the people in a conversational situation comply with the rule of turn-taking in general. In contrast, the users in a chat room do not concern themselves about the overlapped participation, because their inputs will be converted into digital signals and decoded into linguistic symbols in the order they have been submitted to the server. In this way, the technology not only makes the discourse practice possible by connecting two different interlocutors physically, but also provides unique features of SCMD by removing spatial limitations and the barriers to multiple user simultaneous participation.

Setting up working spaces

The SCMC technology, including both software and hardware, created unique working spaces for the activity, and represented a hybrid form of real and virtual spaces. The conversations occurred online. Even though the communication might not be

possible without the physical and electronic connections among the computers, it was enough for the subject to feel that the session was administered in a virtual world, because they were hidden behind the scene.

However, the classroom context of the SCMD set up a unique environment for the activity system. Except for two occasions, in which Mario and Salena participated remotely, all of the participants were gathered and worked together in the same physical space, the computer lab. From the number of students who had arrived at the lab and started operating one of the computers, they could notice that it was time to begin the online session. Even before they read the ending message that Donna had posted in general, they could perceive that it was time to leave from other students' moves of wrapping up their stuff. In addition, the subjects in the same physical space were all affected by the sounds of others' actions such as typing, chuckling, coughing, and so forth. Occasionally, this actual world intervened in the virtual space.

```
38. Joyce:
  we are all going to get soaked!

40. Donna:
  Joyce -- do you really think that was thunder? Oh yes!!
  YIKES!

(From Session 1, August 27, 2009)
```

In this way, the actual and virtual worlds were fused together and formed a hybrid space.

The working space was also a hybrid form of public and private planes. The topical discussion was held in the public space displayed in the list pane. All of the members could read the messages in the pane, and also were able to contribute to the development of the public discussion. On the other hand, the process at the micro level of

producing each utterance, in the writing pane, was only open to the writer, and, therefore, was accomplished in the private space. The final products were open to public, but the processes of the production were hidden behind the private layers. Despite the fact that, with the current research design, it is not possible to investigate what the dynamic process would look like in the users' private spaces, we may assume that complicated multi-tasking, such as searching for Wikipedia, going over the weekly reading, exploring previous messages, or continuously writing and revising own comments, is occurring.

```
38. Salena:
  Henry, Amy - but what have we learned? Were you guys able
  to understand anything about the girl in the study and
  her writing patterns. How does it inform writing
  research? Help me!

48. Raymond:
  From van Wijk and Sanders: "The PISA structure informs us
  about the weak and strong points of the textual
  organization. But it also reveals the plan underlying the
  production of text" (1999, p. 58)

59. Salena:
  Raymond- Thanks for the info. I don't know if I buy it.

(From Session 4, September 17, 2009)
```

When Salena asked a question related to an article of the weekly readings, Raymond provided an excerpt with a citation. In the transcript, and also on the list pane, Raymond's action of looking up the printed copy of the article or the pdf version of it in another window on the screen was not reflected. However, the technology allowed the subjects to execute multiple tasks simultaneously, and, in accordance with that, the production of a single exchange was the result of their continuous switching between public and private spaces while implementing multiple tasks.

WRITTEN TEXT

Through the communicational activity in SCMD, participants exchange information, ideas, thoughts, and emotions with each other. In contrast with F2F situation in which verbal language is the main tool to converse with other participants, the main medium through which the interlocutors can share the information with each other in SCMD is the written text displayed on each computer screen. In the context of this study, students' participation in the activity, interactions with other members, and collaborative construction of communal knowledge, driven by different needs, were all accomplished through the mediation of written texts. In other words, the linguistic symbols functioned as participatory, interactive, and constructive means according to the subjects' different needs. In the following pages, I will present the functions of written texts in SCMD with the help of Halliday's (2004) Systemic Functional Linguistics.

Meta-functions of Written Text

According to the metafunctional hypothesis, language is structured to simultaneously make three kinds of meanings (Eggins, 1994). These meanings are expressed by the ideational (divided into the experiential and logical components), interpersonal, and textual metafunctions of language. The *ideational metafunction* concerns the happenings in the world, and our thoughts about and reactions to these happenings. The *interpersonal metafunction* is concerned with how language enables us to communicatively interact with others, such as when we express our feelings, or interpret or confirm those of others. The *textual metafunction* is concerned with how language is used in order to organize language itself, and in order to relate occurrences of language to the real world – in other words, to link instances of language use to other

instances of language use, and to link any instance of language use to its context of use. Although the participants used various kinds of words or grammatical elements and rules to organize each utterance, dealing with them in detail may make the description too detailed to fit into the purpose of the study. Thus, I focused on how subjects utilized the textual metafunction to connect their exchange to a preceding utterance or the situational context of the activity.

The following excerpts may exhibit how these different functions of written texts were enacted in the discourse activity in SCMD.

```
13. Kaylin:
  When you think of yourself as a writer or a reasearcher,
  how would you describe (metaphor) the reading writing
  relationship?

(From Session 6, October 1, 2009)
```

Kaylin at #13 was curious about others' description, using metaphor, of the reading writing relationship. Her text functioned as an ideational tool by representing her emotional or cognitive experience of curiosity, and the text in the form of a question also invited others to respond to her inquiry. In addition, the question was safely located in the boundary of the class topic, "Reciprocal influence of reading and writing," to which the part of "the reading-writing relationship" of her text was clearly pointing. The repetition of the whole or a part of previous texts was one of the strategies to connect the current texts to another one or broader context.

```
21. Henry:
  Well, Kaylin, I don't know if I can do that well, but I
  do think that reading affects how I write far more than
  writing affects how I read.
```

(From Session 6, October 1, 2009)

Answering her question, Henry (#21) asserted his thought, "reading affects how I write far more than writing affects how I read." However, he started his text by softening his argument: "Well… I don't know if I can do that well, but I do think…" Of course, this move was also indicating a part of his emotion or experience, but the interpersonal motive seems to have been the major concern. In his exchange, we may also identify various devices to indicate the direction of the text. The vocative of "Kaylin" presented that the exchange was a response to her inquiry. The use of the pronoun, "that," or the repetition of the words "reading" and "writing" that had been in Kaylin's text may be the elements implementing the textual metafunctions in his comment.

According to the findings in the previous sections, the subjects participated in the activity of SCMD to satisfy their needs of existence, relatedness, and growth; and the class and discourse topics became the motives of their participation, interaction, and construction. Material tools established the physical foundations of the activity by connecting different interlocutors and setting up hybrid spaces. Written texts mediated the subjects' needs and the discourse topics functioning ideationally, interpersonally, and textually.

Community

An individual action, which is object-oriented and tool-mediated, is situated in a community of practice (Lave & Wenger, 1991, Leont'ev, 2009). The production of an utterance in SCMD is the participation in the practice of a community; the topic as the

object is rooted in utterances of other community members; and the tools of the activity originate from the current or the broader communities of practices. From a phylogenetic account, people would have formed a community and collaborated with other members of it to conquer nature and survive from the very beginning of its history. Ontogenetically, an individual was nurtured in a community usually by the parents from the birth, and thereafter has learned to become a member of various kinds of communities. Therefore, to grasp the overall image of an activity system, it would be critical to understand its communal base.

According to Engestrom (n.d.), a *community* is comprised of "multiple individuals and/or sub-groups who share the same general object (para. 4)." In the previous section of object, I postulated class and discourse topics as the objects of the activity systems in SCMD. Therefore, Engeström's definition of community, in the situation of SCMD, may be restated as "multiple individuals and/or sub-groups who share" the class or discourse topics.

A topic is shared through communicational networks. As I have argued so far, every utterance in SCMD constitutes dialogical chains. Students reply to existing utterances, either implicit or explicit, to participate in SCMD; and the responses involve in the development of the topics initiated by the authors of the responded utterances. In other words, the participation in communicational events entails the sharing of a class or discourse topic, which is defined as the formation of a community or sub-communities in the above. This section will describe the whole class community and emerging sub-communities based on the analysis of students' communicational networks.

COMMUNICATIONAL NETWORK IN THE SCMD

Table 4.5 Communicational Network Matrix of the Whole SCMD Sessions

From\To	Amy	Hyo	Hen	Joy	Kay	Mar	Ray	Sal	Don	Yoo	Res.[b]	Ini.[c]	Total
Amy	-[a]	5	32	21	18	13	14	16	34	6	159	7	166
Hyosun	7	-	14	8	7	7	11	14	20	4	92	2	94
Henry	33	15	-	25	13	21	16	20	39	3	185	12	197
Joyce	20	10	19	-	14	6	13	19	32	6	139	11	150
Kaylin	26	6	13	16	-	11	12	13	27	3	127	15	142
Mario	12	7	23	13	10	-	13	32	26	4	140	10	150
Raymond	22	15	15	23	21	9	-	26	22	6	159	6	165
Salena	31	13	20	28	20	26	28	-	35	6	207	9	216
Donna	24	11	41	14	20	17	13	19	-	6	165	32	197
Yoonjin	7	7	6	12	10	5	5	7	10	-	69	2	71
Total[d]	182	89	183	160	133	115	125	166	245	44	1,442	106	1,548

[a] The exchanges that continue or respond to the author's own utterance are excluded.
[b] The total number of exchanges that respond to other utterances.
[c] The total number of exchanges that initiate a conversational thread.
[d] The total number of exchanges that each subject received from others.

A total of 1,442 utterances were posted as responses to others. 106 threads were initiated during 13 SCMD sessions even though some of them were not developed. Because the purpose of the analysis is to identify the emerging communities by outlining the sharing of topics among the subjects, the exchanges that followed or responded to one's own utterances were excluded from the summary. Salena (207), Henry (185), Donna (165) responded to others most frequently, while Hyosun (92) and Yoonjin (69)'s responses were relatively rare. Donna (245), Henry (183), and Amy (182) received the most responses, and Mario (115), Hyosun (89), and Yoonjin (44) obtained the least.

Donna (32) and Kaylin (15) initiated more threads than others, and Raymond (6), Hyosun (2), and Yoonjin (2) started fewer threads.

The following diagram illustrates the overall outline of the community and the sub-communities of the communication network. In the illustration, each node represents the subject, of which the size and level of darkness denotes the number of exchanges the subject produced, the arrows are directed to the people to whom the subject responded most frequently, and the thickness of the arrows stands for the number of responses sent to the designated person. To make the illustration brief and clear, instead of including all of the exchanges between the subjects, the illustration only displays the arrows that are ranked in the upper 33 percentiles of the total utterances of each subject. For instance, although Salena conversed with all of the other members (see Table 4.5), only the arrows to Donna and Amy who were ranked higher than upper 33 percentile are presented in the diagram.

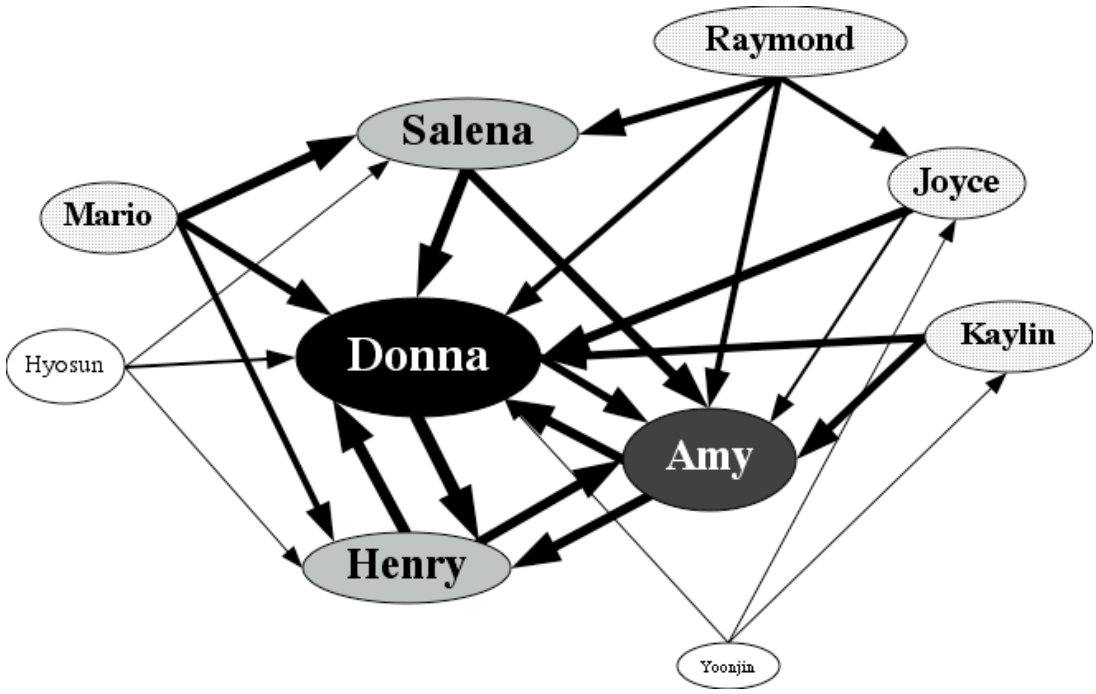


Figure 4.4 The Communicational Network of the Whole Class Community

The communication network shows that the class members as a whole constituted a community. As presented in Table 4.5 there was no pair that did not have any exchanges. "From Kaylin to Yoonjin" and "from Henry to Yoonjin" were the weakest ties with three exchanges. If we calculate the density coefficient of Social Network Analysis, it will be 1.00, which is the highest score that the scale may have, because all of the nodes are interconnected.

The communication network also indicates that the degree of the subject's participation and popularity varies. For example, Donna, as the instructor, was the most popular member in the network, to whom every other member responded frequently, while Yoonjin was located in the farthest area of the network. Based on the frequencies that other members responded to the person, I could locate the key players: Donna, Amy, Henry, and Salena. They, as a group, formed a center of the whole class community, and each of them became a center of each sub-community. In the following pages, I will describe the sub-communities that emerged during the SCMD.

SUB-COMMUNITIES

Donna-centered sub-community

The most prominent sub-community was the Donna-centered community. Actually, as we have seen (Figure 4.5), the whole class was organized around the central node of Donna. She was the most active and popular player, who provided lots of comments and received messages from others more than she gave to them, in the network. All other members, except Raymond and Yoonjin, responded to her most frequently. In the sub-community, Henry (39), Salena (35), Amy (34), and Joyce (32)

sent messages more often to Donna, while she responded to Henry (41) and Amy (24) more frequently.

	To Donna	From Donna
Amy	34	24
Hyosun	20	11
Henry	39	41
Joyce	32	14
Kaylin	27	20
Mario	26	17
Raymond	22	13
Salena	35	19
Yoonjin	10	6
Total	245	165

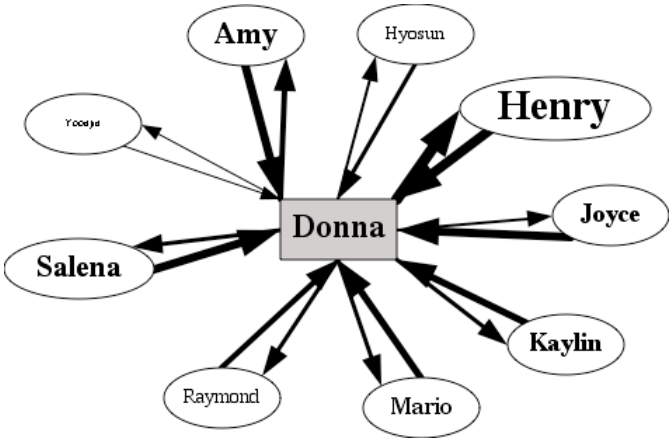


Figure 4.5 Social Network of Donna-centered Sub-community

Amy-centered sub-community

	To Amy	From Amy
Hyosun	7	5
Henry	33	32
Joyce	20	21
Kaylin	26	18
Mario	12	13
Raymond	22	14
Salena	31	16
Dona	24	34
Yoonjin	7	6
Total	182	159

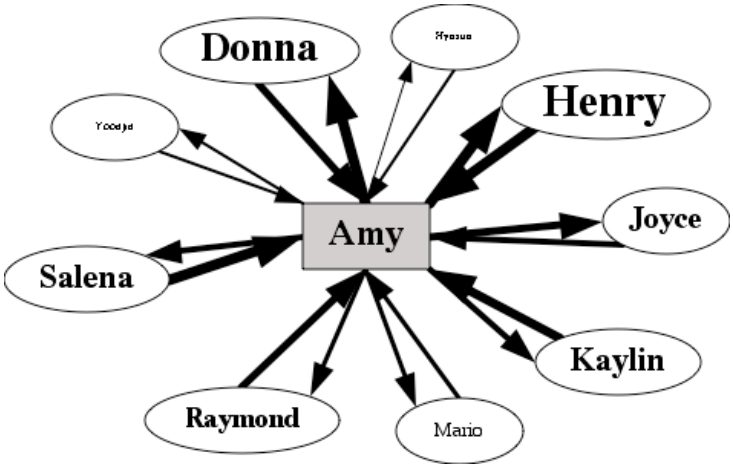


Figure 4.6 Social Network of Amy-centered Sub-community

Amy was another key player in the network, and a sub-community also emerged around her. The interaction pattern in her network was much similar to Donna's in

several aspects. The responses to her were balanced among most of the members with more exchanges from Henry (33), Salena (31), and Kaylin (26). She also interacted with Donna (34) and Henry (32) more frequently as Donna did, but Mario, Yoonjin, and Hyosun were not deeply involved in the Amy-centered sub-community.

Henry-centered sub-community

	To Henry	From Henry
Amy	32	33
Hyosun	14	15
Joyce	19	25
Kaylin	13	13
Mario	23	21
Raymond	15	16
Salena	20	20
Dona	41	39
Yoonjin	6	3
Total	183	185

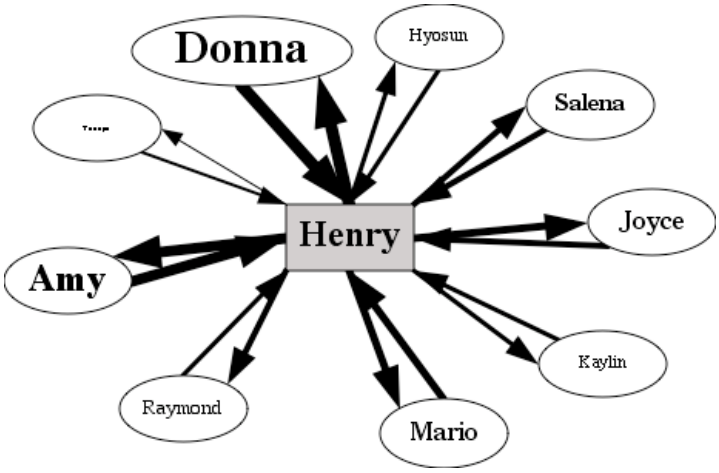


Figure 4.7 Social Network of Henry-centered Sub-community

Henry was the person with whom Donna and Amy interacted most. He was the main player of both sub-communities. The sub-community centered on him, however, was more dependent on Donna and Amy, and other interactions were relatively inactive compared to Donna's and Amy's. Considered Salena's active participation in the system, her centrality in Henry's network seems to be relatively low, while Mario's was higher than his participation in other clusters.

Salena-centered sub-community

	To Salena	From Salena
Amy	16	31
Hyosun	14	13
Henry	20	20
Joyce	19	28
Kaylin	13	20
Mario	32	26
Raymond	26	28
Dona	19	35
Yoonjin	7	6
Total	166	207

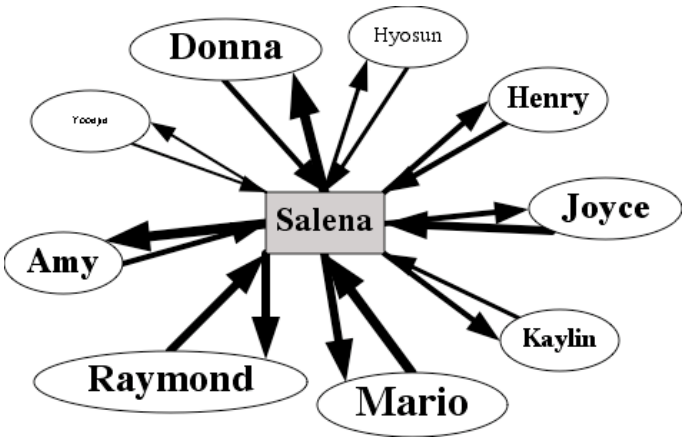


Figure 4.8 Social Network of Salena-centered Sub-community

Salena-centered sub-community was somewhat different from those of Donna, Amy, or Henry. She also conversed with Donna and Amy actively, but did occasionally with Henry. Raymond, Mario, and Joyce, who were not key players in other networks, participated in her community more frequently. Mario (32) and Raymond (26) posted more comments on Salena's than on others', and Joyce (28) and Raymond (28), as well as Donna (35) and Amy (31), received more messages from her.

Rule

Simply stated, rules describe how the subjects do things in a given activity system, which include the explicit and implicit regulations, norms, and conventions that shape and constrain actions and interactions within the system. There were various kinds of rules embedded in the context, and this section categorizes them into tool uses, institutional norms, and the genres typified in the rhetorical situation.

TOOL USES

A subject should follow the rules embedded in each tool to use it for his or her purposes. In SCMD, the major tools were the SCMC technology and written texts. To use the material tools, the subjects should be subordinated to the affordances and limitations of the tool, and also in the case of written texts, the subjects should follow the linguistic rules, norms, and conventions. In the following pages, I will describe how the rules were embedded in the tools by presenting the cases related to the computer hardware and software uses.

In the fifth class, Mario was absent due to his illness, and he had left a notice to Donna that he would access the online session remotely.

```
3. Henry:
  Hey Mario - how are you?

5. Donna:
  Mario, are you there?

8. Hyosun:
  It looks like Mario's not in.

11. Mario:
  Hey all

17. Amy:
  hi Mario, hope you're feeling better soon...

19. Mario:
  Amy - thanks much

(From Session 5, September 24, 2009)
```

Because Mario's name was shown on the "Who's Online" list, Henry assumed he was present and greeted him, and, not receiving a response, Donna called him again. After a short while, Mario said hello to all, and now it became obvious that he was present. This

short episode exhibits how the technological affordances of a tool control the subjects' actions. Although SCMC technology enables people to interact with each other remotely, the users still need to be present on their local computers at the same time. Furthermore, since the software tool used for the study was not equipped with functionality to show each user's current activity, such as typing or being idle, people were unable to know if someone was actually present or not unless they posted a message. For a subject to participate in SCMD, it is a rule to be physically present in front of the hardware, and to notify others of his or her social presence by posting a message, which is usually the greetings at the beginning of each session.

The formatting option that the software tool, Drupal Chat, afforded is another example of the rules embedded in the tool use. In the fifth session, Raymond tested the formatting options that would work for other Web-based applications.

```
6. Raymond:
  Testing a line break

7. Raymond:
  hypothesis that proved false . . .

8. Mario:
  trying to put a line

9. Mario:
  nevermind

10. Raymond:
  Maybe html tags . . . .? will work . . . ?

12. Raymond:
  That's a negative

14. Henry:
  Do any tags work?
```

```
15. Henry:
  Apparently not, but it knows not to reproduce them.

16. Raymond:
  Is this in bold?

(From Session 6, October 1, 2009)
```

And none of them was successful. Drupal Chat does not support any formatting options or html tags, even a line break. At message #6, Raymond seems to have tried 'Shift + Enter' to put a line break, but it posted the message instead of starting new paragraph. Others tried to use HTML tags such as <hr />, <I>, and <Strong>, and they found the software did not support them, which meant they had to do the conversation without those options, and, if the functions were needed, they had to find other ways. In other words, the condition or design of the tool formed the pattern of the subject's action, which became a rule of the activity. These rules were embedded in the tools.

There were many instances displaying such kinds of rules. The participants moved to the computer lab, where the local client terminals were located, after every class discussion. If the student was absent from the F2F class, he or she waited for others' arrival in the chat room by sitting in front of the home computer as was done by Mario at session five and Salena at session eight. The users in the lab logged on to the computers with their University issued identification code. Because the SCMC software was Web-based, they needed to use a Web-browser to access the site. There was another id and password authentication page so that only the class members could enter the chat room. The greeting, "Hello," was the notification of their having completed all of the requirements and made a successful entrance into the working space.

INSTITUTIONAL AND PEDAGOGICAL RULES

The activity systems in SCMD were situated in the institutional contexts of the university, the college, and the department as well as the technological environment. It was also the implementation of the instructor's course design that embodied her pedagogical intentions. Hence, the institutional and the pedagogical rules, norms, and conventions governed the students' activity.

```
51. Mario:
  I guess the question that I would have for this topic
  right now would be: how different would this conversation
  be if this was more anonymous - that is, if our user
  names were unrelated to our real names. With any type of
  internet based setting, I think that anonymnity changes
  the whole field of conversation.

57. Donna:
  That's a great point - Mario, about the anonymity. That
  is why I say this isn't like a chat room. It's still
  class and still a class discussion.

(From Session 1, August 27, 2009)
```

At the first online session, Mario raised the issue of anonymity. He indicated that using pseudonyms that hid their "real names" would give the participants more of a sense of distance from the context of the class. To Mario, Donna responded pointing out, "`it's still class and still a class discussion`," which implied the activity would be governed by class rules. Even though the activity was held in virtual space, it was still situated in the institutional and the pedagogical context.

The instructor's pedagogical rules also controlled the students' tool uses.

```
8. Donna:
  Mario! Raymond!! Please IM each other! No talking when
  we're in here. /

10. Mario:
  ok - I'll be good

11. Raymond:
  I won't!

(From Session 2, September 3, 2009)

9. Donna:
  Hi Amy. Hi Joyce. Write your comments. We all want to
  share ... ;-)

19. Donna:
  (Did you like my little teacher-ly sanctioning there, Amy
  and Salena? Meant totally out of love.....)

23. Amy:
  sorry to be late! we were still stuck on thinking about
  'thinking aloud'. now we'll think silently! ;)

25. Salena:
  Donna - I didn't even realize everyone had started!
  Sorry!

(From Session 4, September 17, 2009)
```

Donna, who wanted more active participation in the online activity and more productive discussion there, recognized that those verbal interactions might distract other students' focus on the online activity, and result in less contributions by those engaged in the outside activity. She repeatedly asked "no talking, but writing," which became a rule of the class activity.

Of course, Donna's rule of "no talking, but writing" in SCMD may be regarded as necessary or natural, but, in a sense, it is not. It was convenient for the users to interact

with other members through both verbal and written communications, as they wanted, especially in a context in which they were physically located in the same place and conversing with each other in virtual space. If the physical environment, including the technological tools, determines human activity, it would be natural for the subjects to adapt to the affordances, in this case, that they could use both modes of communication flexibly. However, in the activity system rooted in the socio-cultural foundation, the rules embedded in the tools, which is the condition of the operation using Leont'ev's term, are filtered through the institutional and cultural layers.

PATTERNS IN THE DEVELOPMENT OF SCMD

Although there was no explicit rule stating how an SCMD should be developed, I could find that the participants developed patterns of actions according to the developmental phases of SCMD, which were opening, developing, and closing. SCMD started with greetings and small talk that opened each online session, and which typically averaged 18 exchanges. Toward the end of the opening comments, the developing phase began and lasted for about 103 exchanges, followed by the ending call and greetings.

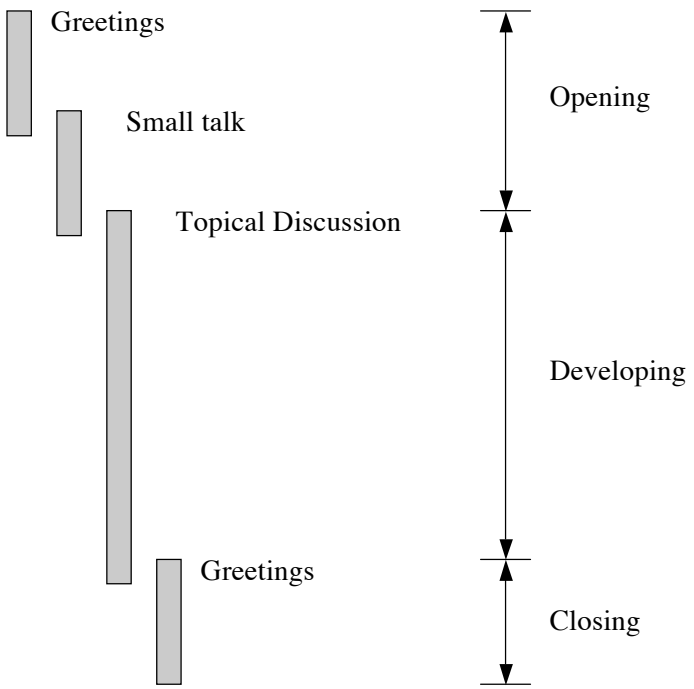


Figure 4.9 Developmental Phases of an SCMD Session

Table 4.6 Average of Starting Point and Number of Exchanges per Developmental Phase

		Averages of the starting message	Averages of exchanges in the category
Opening	Greetings	1	6
	Small talk	6	12
Developing		13	103
Closing		115	9

Opening

```
1. Raymond: Evenin'

2. Kaylin: Hi

3. Henry: It's six o'clock and all's well.
```

5. Mario: morning all

8. Yoonjin: Hi.

(From Session 4, September 17, 2009)

One of the most evident patterns in the development of SCMD was that it started with the members' greetings. Without exception, the first message in each session was "Hello" or the equivalent to other members. Although they had been physically together a few minutes before and had already shared these same greetings, it is interesting that most of them started the online discussion by repeating the same protocol. My assumption is that the main function of the greetings at the beginning of each SCMD session would be different, to some extent, from their use in everyday lives. As discussed earlier, to be in virtual space, the subjects had to go through the steps physically and technologically required, and the greetings might be regarded as a report or notification of being ready to participate in the collective activity. When receiving someone else's greetings, others might know that the person was in front of a computer, had opened a Web-browser, succeeded in logging in to the site, and so forth, which indicated that the biological and physical prerequisites for his or her participation had been accomplished.

7. Henry:
So, PISA..... nice city, loved the tower, but it closed when I visited.

12. Raymond:
Was not my experience in Pisa. Only reason to visit is the tower: stop at the train station, walk to tower, take photo, walk back to station, board next train, depart Pisa.

13. Donna:
Hi Henry. I loved it too. when I visited we actually

```
  could go all over it and it was VERY leaning and there
  was NO railing!!

15. Henry:
  Ok, Raymond, you're right, but Florence was pretty neat.

18. Raymond:
  Indeed, Florence was spectacular.

(From Session 4, September 17, 2009)
```

PISA was the name of an analytical method that had been introduced in one of the weekly readings. Henry playfully changed the meaning and used it as the name of the Italian city. Raymond and Donna continued the thread until other topical threads settled down. This was a very familiar scene in SCMD sessions. In the beginning period of each session, people usually talked about personal or seasonal issues and told jokes. There was only one exception and, in all other sessions, some small talk followed the opening greetings.

The purpose of these social chats seems to be the establishment of a safe socio-emotional ground, while the opening salutes are related to the preparation of the physical grounds of participation. According to the hierarchical models of human needs such as Maslow's or Alderfer's, as discussed in the previous section, seeking the satisfaction of higher level needs entails the lower level needs' satisfaction. After ensuring their physical basis of the participation, which is related to the existence needs, the subjects attempted to extend the ground to the socio-emotional dimension.

Topical Development

Approximately around message #13 of each session, people started to develop topical threads. Donna initiated the first topical thread most frequently (six times), and

Kaylin also started the first topical threads in four sessions. There were 103 utterances on average exchanged during the developing phase in each session. Compared to the amount of messages in other phases (27 on average), the activity of this group was clearly focused on the topical discussion.

The analysis of the data showed that the topical threads developed through the chains of dialogical pairs that consists of thematic and rhematic exchanges; there were linear and parallel progression of topical development; and the topical threads expanded through the phases of exploration and development. To present the findings I will start from the theme-rheme structure of an utterance.

Theme-rheme structure of an exchange

The term "theme" was first put forward by Mathesius, a linguist of the Prague school, and developed by Halliday and others. According to Mathesius' Functional Sentence perspective, any sentence can be semantically divided into two parts: theme and rheme. Halliday (2004) argued that the theme is the starting point of the message chosen by the speaker/writer, whereas the rheme is the remaining part that develops the theme. There are three components of themes: textual, interpersonal, and ideational. The distinction is based on the meta-functions of texts, which we have already discussed in the section on object. There may be a theme that has only one component in it, or it may have multiple components as well.

A. <u>Amy</u> brings up a very good point. (Mario, 29)

B. <u>Speaking of defintions I</u> am curious to know how others defined writing. (Kaylin, 46)

C. <u>Amy - we</u> even use an actual stylus. (Henry, 42)

(From Session 2, September 3, 2009)

The theme extends from the beginning of the clause up to (and including) the first topical element of participant, circumstance, or process, so if there is only a single component in the theme, then it will be an ideational component. In example A, Amy is the theme of the sentence, and the remaining part is the rheme. The theme of example A consists of a single ideational component that indicates the participant of the sentence. The theme of sentence B is "Speaking of definitions I," in which the part of "Speaking of definition" is a textual component that connects the sentence to a preceding statement, and "I" is the ideational component of the theme. The last example shows the instance of an interpersonal component. The vocative, "Amy," indicates that the following sentence is directed to her, while "we" is the ideational or topical theme of the sentence.

Table 4.7 Theme/Rheme Structure of a Sentence

	Theme			Rheme
	Textual	Interpersonal	Ideational	
A.			Amy	brings up a very good point.
B.	Speaking of definition		I	am curious to know how others defined writing.
C.		Amy	we	even use an actual stylus.

The theme/rheme structure is manifested not only at the sentence level, but also at the paragraph and whole text level. Halliday (2004) argued, "the topic sentence of a paragraph is nothing other than its theme" (p. 54). Theme, in the sense of a textual topic, represents what the text is concerned with or what the text is about. An exchange in

SCMD consists of one or more sentences or the equivalents, so it is more similar to a paragraph than a single sentence. The next example may present how the theme/rheme structure can be applied to an exchange in SCMD.

```
43. Hyosun:
  In the Hull Katz article there is a mention that for the
  members of oppressed and disadvantaged groups, the
  constraints of social cultural and historical context can
  be overpowering in making self-determination. (p.47
  bottom). Does this mean that these groups feel or have
  less sense of agency in their self-determination? If so
  why would that be?

(From Session 12, November 12, 2009)
```

Table 4.8 Theme/Rheme Structure in an Exchange

	Theme		Rheme
T1	In the Hull Katz article	R1	there is a mention that for the members of oppressed and disadvantaged groups, the constraints of social cultural and historical context can be overpowering in making self-determination. (p.47 bottom).
T2	Does this	R2	mean that these groups feel or have less sense of agency in their self-determination?
T3	If so why would that	R3	be?

Hyosun's comment may be divided into three sentences, and each of them has thematic and rhematic parts. The first sentence is about the "Hull Katz article." The rheme part of the first sentence (R1) becomes the theme of the second move (T2), and the theme of the third move (T3) repeats the rheme of the second move (R2). In other words, T2 and T3 are derived from R1 that is about T1. Therefore, the overarching theme of the

utterance was T1, and the first sentence to which T1 belonged was the thematic sentence or move of the exchange of which the other two sentences are the rhematic part.

Emerging pair of thematic and rhematic exchanges

In SCMD, an utterance is dialogically connected to a previous utterance. Hyosun's exchange, excerpted above, was also a response to another message that Donna had initiated.

```
19. Donna:
  So we didn't talk much about Rankar and Hull&Katz. I
  loved that last one, by the way, and was thinking we
  might have read it two weeks ago when we were into voice,
  self, and identity. Did you have a similart thought? What
  did you think?

(From Session 12, November 12, 2009)
```

The thematic sentence of the exchange was "`So we didn't talk much about Rankar and Hull&Katz`," while the other parts were the rheme. From Hyosun's perspective, the function of her utterance was adding new meaning to Donna's initiation or request, which had already been given and was reflected in her thematic move in brief form, "`Hull Katz article`." The point I want to make here is that, when dialogically connected, the responding and the responded utterances become a pair of thematic and rhematic exchanges. When Hyosun responded to Donna, the responded message became a thematic exchange, and the other a rhematic exchange.

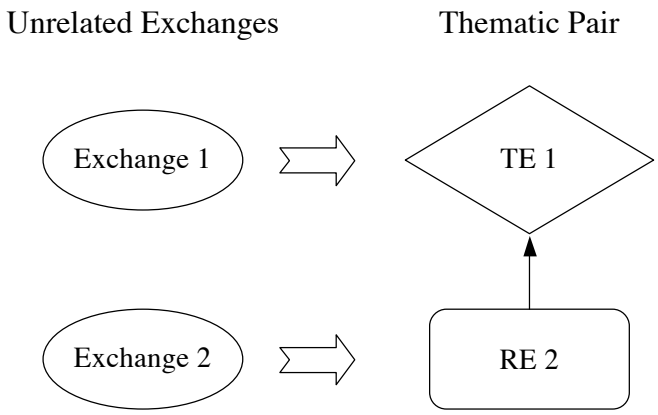


Figure 4.10 Emergence of Thematic Pair

Emergence of a topical thread: Linear and parallel formations

It is the third exchange following a given thematic pair that makes a topical thread emerge. The new exchange that is connected to one of the pair also forms another theme-rheme pair, which will have the original pair ramified into two connected pairs. A topical thread, in this study, is defined as the two or more thematic pairs being connected through communicational links.

There are two ways of forming a topical thread in accordance with to which part the third exchange is attached: linear and parallel formations. The *linear formation* occurs when the rhematic part of the pair is responded to. The rheme of the original pair will become a theme of the new pair in which the responding exchange turns into the rhematic part. In this way, the emerging pair is subordinated to the existing one, and the topical discussion is linearly developed. The linear formation of a thread may be seen as a way of deepening the topical discussion by producing discourse topics nested under an existing topic.

If the third exchange is connected to the thematic part of the pair, then the existing rheme will stay the same, and the new exchange will become another rheme of the given pair. Because this process does not produce any deeper level theme derived from the given one, but only adds another rheme at the same level with the other, we may name it *parallel formation* of a topical thread. Contrary to the linear formation, this type of thread progression may help the discussion be broadened by providing discussants with more issues, ideas, and information related to the given topic. This linear/parallel formation is depicted in Figure 4.11.

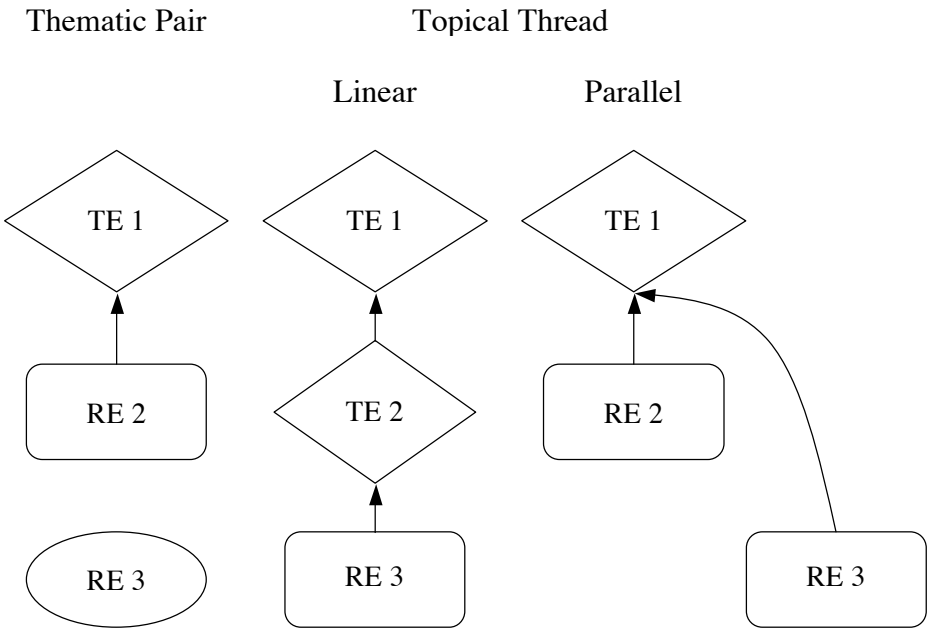


Figure 4.11 Linear and Parallel Development of Topical Threads

Development of a topical thread: Exploration and development

There were also two patterns through which a topical thread evolved: exploration and development. After the conventional greetings and social chats, through which they established physical and socio-emotional safe ground, Donna, Kaylin, or Joyce usually

initiated the first discussion topic of each session. These first initiations were in the form of questions without any exception. In the boundary of the class topic of each session, they opened a topical space based on their needs or interests, and invited others to participate in it. People who had been waiting for an initiation that they could respond to partook in the space. Receiving multiple responses, the initiating utterance became the thematic exchange of the emerging thread and the responses were transformed into different rhematic parts of the thread, which broadened the topical space. In this stage, which I call as the *exploration phase* of the development of a topical thread, the initiated space was expanded to provide more opportunities for participants who were looking for an intriguing topic. The parallel formation was the typical type of forming a thread in this phase.

Once the topical space had been broadened, another exchange would often take one of the rhematic utterances as its topical theme forming a new thematic pair nested under the initiating thread. This linear formation of sub-thread created sub-spaces of topical discussion, and this is the second stage of the life cycle of a thread, the *development phase*. In this phase, the topical thread evolves through dynamical appearance and disappearance of sub-threads until another thread at the same level is initiated and no more responses are added.

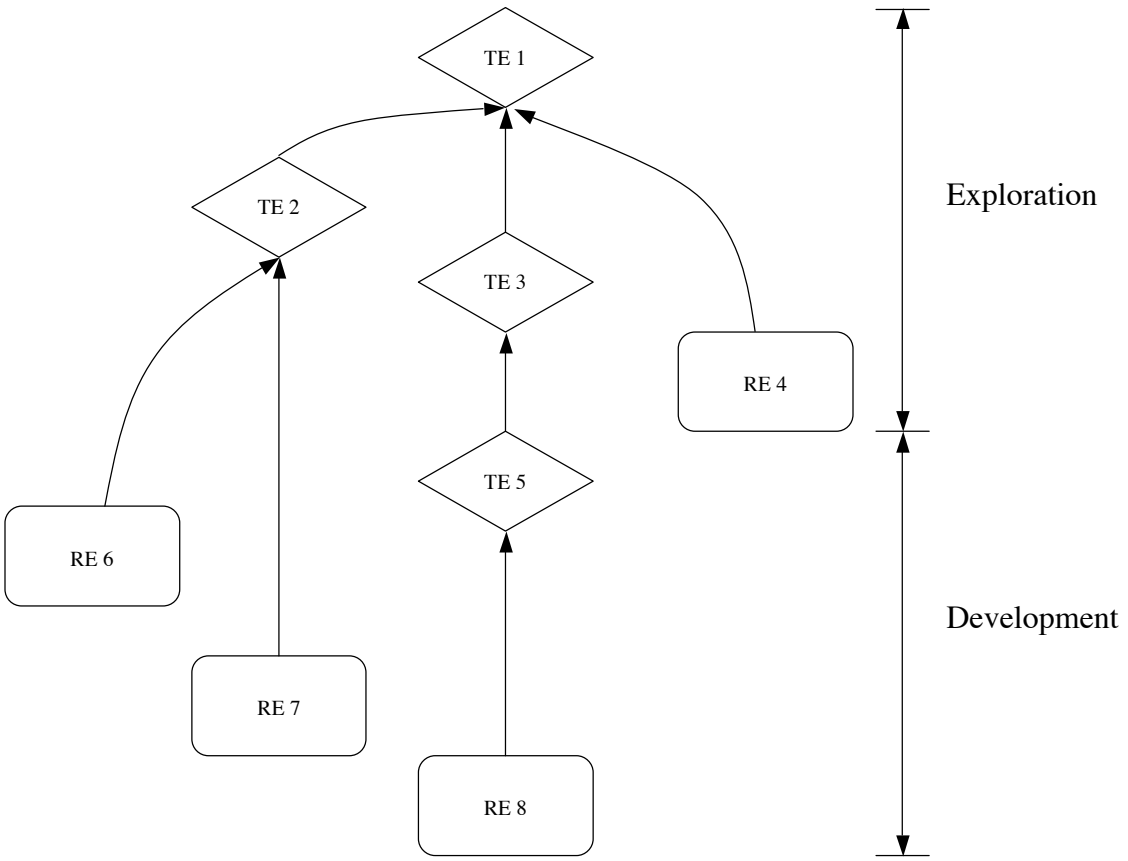


Figure 4.12 Developmental Phases of Topical Threads

Although I described the whole process of topical development in a linear and simplified manner for the purpose of clarification, it would be worth noting that the actual process was not so simple and linear. Occasionally, a single utterance had multiple themes producing both linear and parallel formations with another single response that answered the multiple themes at the same time; a topical thread began to progress linearly through the exchanges between two interlocutors, and expanded later, which is the reverse of the process described above. However, the illustration may provide an outline of the overall and dominating pattern of topical development.

Closing

Each session ended with some conventions: the instructor's ending call, the announcement of assignments, and greetings to each other. It was a kind of rule to finish the session around 6:30 pm. Reaching the ending point, Mario reminded the class of the time, and Donna officially confirmed that it was finished.

```
116. Mario:
  Ding?

132. Donna:
  So Ok. Cool. We may begin to separate. Salena -- get
  well. Henry, you may go. Amy, it's ok -- talking Southern
  is a useful linguistic resource, Yoonjin -- we'll talk
  more about differences in dialect, Joyce -- thanks for
  sharing your understanding, Raymond -- I always love your
  thoughts and expressions, Mario -- we'll have to test
  your dialect and you'll have to report how that feels.
  And Kaylin -- bonsoir and may all code-switchings be fun
  and productive!

(From Session 8, October 15, 2009)
```

Upon Donna's ending call and the greetings to all of the members, which was unusually detailed compared to her practice for other classes of the semester, all other members shared the conventional salutations preparing to leave.

```
134. Amy:
  my 'linguistic reservoir' is growing, y'all!

135. Mario:
  it was great guys - feel better Salena and Henry - see
  you all next week

137. Henry:
  Adios, mein Ami(e)s.
```

```
139. Joyce:
  Have a good evening! See you Thursday!

140. Raymond:
  Salena, hope you feel better soon. Thanks for the
  discussion, everyone.

141. Salena:
  This was a very short conversation. Maybe because I
  missed the first part of class. Thanks, everyone. I'll
  overdose on vitamin C

142. Donna:
  So the assignment: Read today's transcript. Pick out one
  comment that connects with one of the readings for NEXT
  week which will all be on affect and writing. COme in
  with a one-page (no more) paragraph laying out your
  ideas.

143. Salena:
  Bye

144. Hyosun:
  Have a good weekend!

145. Salena:
  Donna - Thanks for the assignment clarification.

146. Yoonjin:
  bye I want to have more time to discuss the Flower's
  Donahue's one. too

(From Session 8, October 15, 2009)
```

As presented in the example of message #142, another normal exchange being shared during this phase of closing was the reminder or announcement of the assignment for the next week. The ending calls and announcements were the instructor's role.

Division of Labor

The last element of Engestrom's (n.d.) model is division of labor, which he described as "both the horizontal division of tasks between the members of the community and to the vertical division of power and status (para. 4)."

INSTITUTIONAL CONTEXT

One of the most prominent examples of the "vertical division of power and status" was Donna's role: the session manager, the course designer, and the grader. First she was the manager who opened, operated, and wrapped up the SCMD sessions. Although she never posted the first message, usually a greeting to all, of any session, we need to take into account that her last comment in the preceding off-line class was to wrap up the oral discussion and to invite the students to the virtual space. If some of the members needed to leave without participating in the online discussion, they asked Donna permission for being absent from the activity.

Once a session had started with greetings and small talk to set up a sound socio-emotional ground, Donna normally initiated a topical thread related to the given class topic or weekly readings. As was discussed, Kaylin and Joyce were also the people who posted such initiations in the earlier period of each session. Many times, their messages appeared before Donna's, but, with few exceptions, the instructor's thread became the main and dominating discussion of the session, not the students'. The instructor's intervention to establish a new topical thread also occurred in the middle of the activity or later. Typically, it happened when a topic seemed to have been dealt with enough, or there were still important topics to be covered.

```
93. Donna:
  Ok. so now I'm feeling a little bit bad about our Flower
  article. we haven't said a WORD about that one.

101. Donna:
  I always think of these artciles as dishes I've made for
  our party and if I see one of them being ignored, I feel
  bad...like wasted food somehow. Or like a guest at a
  dinner party that's being ignored!!

(From Session 8, October 15, 2009)
```

Donna suggested a new topical thread about the "Flower article" for the second half of the eighth SCMD session. In message #101, she described her feelings when the topic she had planned to bring up was not covered in the discussion. From her explanation of her "feeling bad," we may assume that she brings her plan to the session, expects to deal with most of the planned topics, and, when they are not being covered, raises the topic to the class. The example presents that Donna managed the session by intervening in the activity intentionally.

Even without her explicit interventions, the activity was, more profoundly, managed by the underlying course design that Donna had developed. The students conversed with each other through electronic written texts, because the instructor selected it as the communicational channel of the activity. Most of the topical threads developed within the boundary of the class topics and weekly readings that were listed in the syllabus. The instructor was the host of a "dinner party" with the topics and the readings as its "dishes", and invited the students as "guests" of the party. Furthermore, contrary to a social gathering, the students' responses to the instructor's invitation were not up to their own initiatives, because the instructor was the official agent of the University who could determine their final grades that might ultimately affect their future life in society.

The instructor's role in the class was the most salient example of the vertical division of power and authority status. Even though Donna was very flexible and open to sharing her power with the students, for example having students decide the class topics for the second half of the semester, the power relationship in the class activities was still obvious.

TECHNOLOGY-BASED ENVIRONMENT

The subjects interacted with others through the exchanges of linguistic symbols on the surface level of the discourse activity. However, it was rooted in the physical environment and material tools of SCMC technology. Unless the technology had been set up and operated soundly, the activity might not even be possible. The exigencies of the environment necessitated the role of technological operator or supporter.

```
44. Donna:
  Hi Yangjoo. You are so good at solving all my problems
  with this new program. Now the one I hate is that you
  can't get the screen to stay in one place when you want
  to go back and read earlier messages that are off the
  screen. can that be fixed?
```

(From Session 2, September 3, 2009)

I played the role of both a silent observer and the system operator of the site. I was observing the discussion sitting in the lab with the class members' consent, so, although it is unusual to speak to someone else not participating in the discussion, Donna asked me if the auto-scrolling issue could be fixed. Donna was uncomfortable with the automatically moving list, but could not make it static by herself. She did not have

sufficient knowledge of programming language nor the privilege to access the server; hence she needed to ask someone who was able and supposed to resolve the issue.

From the next following week, the auto-scrolling function was turned off, and the users needed to scroll down to the end manually to read the latest post. However, this was rather an unusual circumstance. It was possible only because the system operator, me, who had privileges to access the server and to modify the files, was involved in the class as a researcher, so I was willing to look up the script and find a solution. Because the software was an open source following GPL (General Public License), it could be modified without any copyright issues; and the program was based on PHP and MySQL language that I could manipulate. In more usual cases, users, including the instructor, may not be able to change such technological aspects. All they can do is to adapt to the functions that the technology tool affords, because the roles, competencies, and duties in which a given activity system is situated are divided societally. The expected role of the users was to become accustomed to the technological affordances, while the development and management of them might be the duties of other groups in the institution or the society. In other words, to participate in an activity using technology, the users, in some sense, were subordinated to the intentions of the technology designer, which were the outcomes of another activity of a community that is broader or higher than the given one.

The involvement of the broader community in the current activity system does not occur only through the official stricture or rules of the organization, but also through each member's individual and informal expertise. Although the participants in the SCMD activity were there as students and users, in other contexts, they might be a system

operator, a software developer, and so forth. When the technological issues arose, the situational exigency enforced the role of technological experts to emerge.

```
53. Henry:
  Donna- you can hit view old messages and that pulls up a
  static list. But it's kind of ugly.

55. Henry:
  Donna- You can also open two windows and have one of them
  be the dynamic chat and the other be the static
  transcript.

58. Henry:
  Then you refresh the transcript window when you want it
  to change.

127. Donna:
  Henry -- ok I have the two windows but for some weird
  reason I can't figure out how to make them sit side by
  side

129. Henry:
  Use ctrl + T for the new window.

134. Mario:
  Donna - hit the center button (between the X and the
  minimize one on both windows and you can resize and put
  them next to each other if you want

137. Donna:
  Thanks so much Henry. Thanks so much Mario.

144. Kaylin:
  I think I would like an explicit lesson on how to keep to
  windows up next time please.

146. Henry:
  Not a problem, Kaylin- I'd be happy to show you how to
  track the old comments at the same as the new (it's not
  pretty but it works).
```

```
147. Amy:
  me too, i'm still trying to figure out how to look at old
  messages... feeling slow
```

(From Session 2, September 3, 2009)

Donna's request to me elicited Henry and Mario's involvements. Although Henry, not having privileges to access the server, was not able to solve the problem as Donna asked, he had been using the program creatively and could provide another solution to her without going beyond the boundary of the role that the activity system provided him. Henry and Mario presented themselves as technologically advanced members in the episode, and other members such as Kaylin and Amy acknowledged them as experts thereafter.

SOCIO-EMOTIONAL INTERACTION

There are always risks for the people to fall into a face-threatening situation in any argumentative event (Brown & Levinson, 1987). Hence, the role of managing social relationships and moods is necessary for a collective activity. Henry and Salena, as well as Donna, were the main players in the SCMD sessions. In this section, I will present Henry's case, the most active player in the role of managing social relationship.

Henry was one of the subjects who posted most frequently. His comments were short, fast, clear, and succinct. The following examples may provide a general sense of his utterances.

```
21. Henry:
  I lived in Germany for two years, spoke fluently, read
  competently, and wrote abominably.
```

(From Session 2, September 3, 2009)

```
104. Henry:
  Or that creativity's impossible since no one ever says
  anything original anyway?

105. Henry:
  slumps sullenly in his chair.

(From Session 3, September 10, 2009)

80. Henry:
  Devaluing - fine, but not necessarily "unvaluing."

98. Henry:
  Right = more (most?) useful for your given audience,
  wrong = less (least?) useful.

(From Session 8, October 15, 2009)
```

Although he was engaged in lots of topical threads and his comments revealed his sound understanding of the topics, his main contributions to the activity were rather related to socio-emotional dimensions. Some frequencies may give us the contour of his participation patterns. He responded to others 185 times (the second highest responder), initiated 12 threads (in third place), of which only one initiation was related to a topical discussion (in eighth place) while his other initiations started greetings and social chats. In addition to that, many instances of his participation in topical threads were also relayed humorously.

```
67. Amy:
  Kaylin, I read him on p. 406 as giving us permission to
  play with the standard form of research - playing between
  "convention and innovation." I made a heart in the margin
  by that :)

71. Henry:
  You use hearts in annotating postmodernist ethnography
  articles? Interesting bracketing :)
```

```
73. Amy:
  lol... bracketing [I approach my reading with hearts and
  smile faces and grumpy xs and question marks in the
  margins]

75. Henry:
  Sounds like you might be a concisionist, too.

80. Amy:
  I am a concisionist. (not)

81. Henry:
  Donna's definitely not :)

83. Henry:
  She enjoy words too much.

(From Session 5, September 24, 2009)
```

Amy's utterance of #67 was a response to Kaylin's comment about belonging to one camp of a theoretical community. But, with Henry's comment, the direction of the thread changed.

```
107. Henry:
  Kaylin, it's definitely happening to me. my comments
  would be much, much funnier (I think) if they came
  immediately after their antecedent instead of several
  comments later :)

119. Donna:
  Henry! You are so so fun. Incorrigible but fun!

120. Amy:
  you're all so playful... i'm going to think you all
  belong in the postmodern camp

(From Session 5, September 24, 2009)
```

In such ways, Henry facilitated the emotional mood of the group, changed the rhythm of the discussion, and contributed to establishing safer and more intimate socio-emotional grounds.

RHETORICAL SITUATION OF TOPICAL DISCUSSION

As discussed earlier in this chapter, a topical discussion develops through the chains of initiations and responses. The first initiation of a thread is also a response to a preexisting utterance external to SCMD such as the syllabus, the classroom discussion, or the weekly readings. A response to an existing utterance becomes another initiation for a following exchange. Therefore, any exchange in SCMD is both an initiation and a response, which is a node in the unfolding dialogical chain. However, I could find that some comments were more intended to set up and invite others to his or her own topical space, while others focused more on supporting someone else's ideas or experiences emotionally and cognitively. Amy and Salena may exemplify such roles.

Donna, Kaylin, and Joyce were the people who most frequently initiated topical threads. Amy's way of initiating a topical thread was different from theirs. Although occasionally posting the first message of a thread, in usual cases, she initiated a new topical thread by responding to an existing message.

```
7. Donna:
  so one thing I wanted to ask as we were all talking is
  whether any of you had had a chance to learn to write in
  a different language. What did that feel like?

25. Amy:
  would you count HTML as another language? if so, learning
  that was pretty simple to get the basics.... and with
```

better software I found I didn't "need to know" that language so i stopped trying to learn it...

(From Session 2, September 3, 2009)

In the second session, Donna raised the issue of the writing in a different language. It was the extension of the topic that had been dealt with at the end of F2F classroom discussion, which mainly related to the origin of Chinese and Korean characters. Following Donna's initiation, students shared their experiences of learning to write in Spanish, Germany, and French. After nine comments on the foreign language learning experience had been posted, Amy replied to Donna bringing up a new issue of the definition of a foreign language or, simply, a language. This type of initiation was common in Amy's comments.

62. Yoonjin:
Kaylin, that's good point. but to help the sdtudents be better writer should go beyond helping them understand their writing process.

73. Amy:
Yoonjin, I think that you hit on what is a big debate in comp studies over what to teach: Process? Tie it to academic content? Rhetorical strategies? I think the field still is arguing over what exactly they mean to teach... Reminds me of the Berkenkotter article with the turf wars!

(From Session 3, September 10, 2009)

Yoonjin replied to Kaylin who had insisted that "Part of helping kids be better writers is helping them to undetstand their process (Kaylin, #54)." What Yoonjin added to Kaylin's comment was only "go beyond," and the other part was a repetition of the original comment. It was Amy who

acknowledged Yoonjin's contribution and unpacked her point so that other members could notice its value and become interested in it. As a result, her re-initiation opened a new phase of the topical thread and 36 comments participated in it.

Contrary to those whose main contributions were the initiation of a topical thread, Salena's role was more centered on socio-emotionally and cognitively supporting others' assertions. She was a diligent responder and an encouraging supporter. With only a few exceptions, she replied to questions or requests that other members posted, usually in the form of agreement or acknowledgement.

```
46. Joyce:
  I was thinking about the whole standard english
  conversation, writing, and credibility. I wonder if we
  are causing children who speak differently that their way
  of speaking or writing is somehow wrong or not valuable
  by being so strict about using standard english when
  writing

47. Salena:
  Joyce - I absolutely think that's the message we send. We
  need to make sure that they know that different contexts
  call for different ways of using language.

(From Session 8, October 15, 2009)
```

An initiation will never be realized as that of an actual topical thread without a response. It is the responder who determines an utterance as the starting point of a new topical space. Without Salena's role as a participant or a supporter, the initiators' efforts would have failed to form a thread. Of course, providing that every utterance is both a response and an initiation simultaneously, there is no one who was designated to a single role of a responder or an initiator in SCMD. All of the members played both roles interchangeably, and one of the members took all kinds of roles in different situations. I

want to note that the patterns described here exist only in the form of tendency, not any kind of fixed or unchanging identity.

ACADEMIC DISCIPLINES

This activity was also situated in a disciplinary context. The instructor played the role of an introducer or a guide to the community of the academic discipline. As the agent of the thought community, Donna provided various reading materials, lectures, and answers to related questions. Although she always tried to share her power with the students, the authority derived from her disciplinary knowledge prevailed throughout the whole classes. Whenever needed, students asked Donna about the background of the weekly readings.

```
27. Amy:
  Donna, was Flower maligned for being cognitivist? or did
  she do something shocking?!

35. Donna:
  Amy -- that makes me laugh. She was maligned ONLY because
  she was associated with that "cognitive" model, nothing
  juicy.

(From Session 2, September 3, 2009)
```

While Donna's role was a representative of the given thought community, other members also played similar roles occasionally. Usually, those were related to some other disciplines introduced to expand the current discussion thread.

```
102. Mario:
  Raymond - I was thinking the same thing but with music -
  like no matter if you want to be a rocker or operatic
  person, learning classic style is pretty much necessary
```

```
112. Raymond:
  Mario, exactly, music is a great example of that, from
  punk to jazz to reggae to classical to folk, to forms
  that we haven't heard yet, there are components that help
  build, and that help builders tear down.

116. Kaylin:
  Raymond and Mario, what if your love of music starts from
  something untraditional and leads you to explore the
  tradition. Can you go both ways?

131. Donna:
  I love the music example. Great way to think of genres.

(From Session 6, October 1, 2009)
```

As an amateur musician, Mario often connected the implications of the writing theory and practice to the area of music. Because no other members were more knowledgeable about the practice of music than Mario, he could have the authority as an expert. Through his expertise in music, the discussion was enriched, and all of the participants could build on his extended knowledge. The localized expertise was not limited only to Mario. Every person brought their own expertise to the class in fact. Raymond, a former novelist, presented himself as an expert of the field of literature; the former or present school teachers such as Kaylin, Amy, Joyce, Salena, and Yoonjin frequently raised issues of the literacy practices in school teaching; and the last session, of which the topic was about proof reading, was almost a Q&A session with Henry who was working at the University Writing Center. Students identified Donna as the expert of the domain knowledge, but each of them also had their own unique expertise and played the role of an authoritative person.

CHAPTER V.

DISCUSSION

In this dissertation, I have described the six elements of Engeström's activity system model in order to identify the kinds and the characteristics of the discourse activity enacted in the context of synchronous online classroom discussion. The major theme emerging from the investigation is that these elements form an irreducible whole determining each other reciprocally, which is situated in the intersection of various broader communities and based on different layers of physical/biological, cultural/institutional, social/emotional, and cognitive/intellectual dimensions. In this chapter, I will first summarize the findings of this study; state main themes emerging from the findings; suggest a modified model of the activity system in SCMD based on the emerging themes; and conclude with the limitations and the implications of the study.

Summary of the Findings

The following were the guiding research questions of this study. I will summarize the findings by answering each question.

1. Subject: Who were the subjects of the activity systems in SCMD, and what were their needs that had driven them into the SCMD?
2. Object: What were the objects of the activity systems in the SCMD?
3. Tool: What were the mediating tools utilized in the SCMD?
4. Community: What kinds of sub-communities of the class community did emerge through the SCMD?

5. Rule: What kinds of rules, norms, or conventions were found in the SCMD?
6. Division of labor: What kinds of roles or divisions of labor were identified in the SCMD?

There were 14 class meetings in the semester, of which 13 classes had online discussion sessions. The first online session lasted about ten minutes, because it was a kind of introduction to the new environment and communicational mode. Thus, actually, 12 sessions were devoted to discussion on class topics. The participants produced total 1,682 utterances during 13 SCMD sessions, which was 129.4 per each.

Question 1. Who were the subjects of the activity systems in SCMD, and what were their needs that had driven them into the SCMD?

Subject of an activity system is defined as "the individual or subgroup whose agency is chosen as the point of view in the analysis" (Engeström, n.d., para. 4). Because the purpose of this study was to trace the discourse activity in SCMD in a graduate course, the instructor and the nine students who participated in the online chat sessions were the subjects of the activity system in question.

Following Leont'ev's (2009) emphasis, I investigated the kinds and the roles of the subjects' needs that had driven them into the activity. Due to the Activity Theory's lack of language and theoretical framework designated to the analysis of human needs, Alderfer's (1972) ERG theory of human needs was employed as a lens to look at the participants' driving needs through.

EGR theory argues that there are three basic human needs of existence, relatedness, and growth. Based on discourse analysis of this study, I could also discern those needs in the dialogical practices of graduate students in SCMD. A couple of points

need to be emphasized. First, those needs co-existed and were woven together shaping and directing the activity dynamically. Even a single utterance has all of the aspects related to the satisfaction of the three needs. For example, a greeting posted as the first message of an SCMD session is a notice of the person's presence, which is to establish a sound basement to satisfy his existence needs; an expression of one's intention to maintain a good social relationship; and also a preparation for topical discussion that will deepen and broaden one's knowledge on the topic.

However, the importance of each need was different for each subject, and the configuration of the priority was continuously changing even for an individual. These different and changing needs of the subjects gave dynamic rhythms to the collective discourse activity.

Question 2. What were the objects of the activities in the SCMD?

A discourse topic is posited as the object of individual activity in this report, which will be transformed into an utterance, as the outcome, of its author as the subject. In any conversational situation, the interlocutors make efforts to fit their utterances into the topic or to change it with their speech acts. They produce their own utterances by pondering or reflecting on the given topic to satisfy the existence needs by participating in the class activity, the relatedness needs by interacting with others, and the growth need by constructing new knowledge. It was the topic to which the subject's activities were oriented to achieve their goals, which is the role of the object in terms of Activity Theory.

A topic can either be imposed from the outside of the current system or emerge from the inside. Usually, the syllabus of a course has its list of *class topics* that will be the starting or major topic of each class. On the other hand, there are *discourse topics*

unfolding in the middle of the discourse practices. For the most part, these emerging topics are nested under the given class topics.

Question 3. What were the mediating tools utilized in the SCMD?

An utterance should be in the forms of "electronic" and "written text" in SCMD. The interlocutors utilize written texts to express their idea or to interpret others' thought, and operate SCMC technology to deliver their own message and to receive others'. As Activity Theorists contend, there are two categories of material and semiotic tools in any activity. The *SCMC technology* such as computer hardware and software may be regarded as the example of material tools, while the *written text* is a semiotic means. Material tools connected even remotely located users, and set up both public and private working spaces at the same time. The researcher could also identify three different meta-functions of written texts: textual, interpersonal, and ideational meta-functions.

Question 4. What kinds of sub-communities did emerge through the SCMD?

Because this project regarded the topic as the object of the system, community was made up of the class members who shared the general class topics. However, although some class topics were given to all the members, discourse topics also dynamically emerged and disappeared with the interlocutors' continuous gathering and dispersing. The people who shared a discourse topic also formed a community, which I called as a *sub-community* of the whole *class community*. In general, a community or sub-community has its central or key player. The instructor was one such person in the class community, and other active players of the collective discourse practice became central points of other sub-communities.

Question 5. What kinds of rules, norms, or conventions were found in the SCMD?

This study identified three categories of rules in the activity system. Those were related to the tool use, institutional context, and rhetorical situation of topical discussion.

First, the functionalities and affordances of technology controlled students' activity. It was critical to follow the rules to operate the tools, for the SCMC connected the interlocutors' communication physically. Second, the University's institutional rules and the instructor's pedagogical practice governed the system. Even though the instructor, Donna, was very flexible to students' autonomous decisions and tried to avoid being an authoritative figure, the activity was managed and, in a sense, controlled by her design of the course.

Finally, the analysis found some patternized rhetorical practices in SCMD. Of course, there was no explicit rule or norm of how to develop topical discussions, the subjects showed repeated patterns of participation. Each SCMD session consisted of three parts: opening, topical discussion, and closing. The participants started the session with greetings and small talk as opening part, developed topical discussion, and closed the online activity with an ending call by the instructor and greetings. During the topical discussion part, they formed a thematic or topical pair between an initiation and a response. On forming a pair, the initiation became a thematic exchange, while the response a rhematic one. A topical pair developed into a topical thread when the third utterance was attached to one of the pair. According to the role of the responded part in the pair, linear and parallel types of topical development were distinguished. Once a topical thread had emerged, it also unfolded following exploration and development phases.

Question 6. What kinds of roles or divisions of labor were identified in the SCMD?

Four types of key roles emerged from the SCMD. They were instructor, technological leader, socio-emotional facilitator, topical initiator and follower, and experts in different domains of knowledge.

Each role was related to being in compliance with the underlying context or environment. The instructor role derived from the institutional context; the technological leader reflected that the system was rooted in a technology-based environment; socio-emotional facilitator's role was important in establishing an affectively safe environment, managing and promoting social interactions; the rhetorical situation of topical discussion or argumentation precipitated the role of topical initiator and followers; and, finally, as an agent of the thought community, the roles of experts and novices of the domain knowledge emerged.

The description of Engeström's six elements in SCMD is summarized in Figure 5.1. In the next section, I will discuss the major themes emerging from the findings.

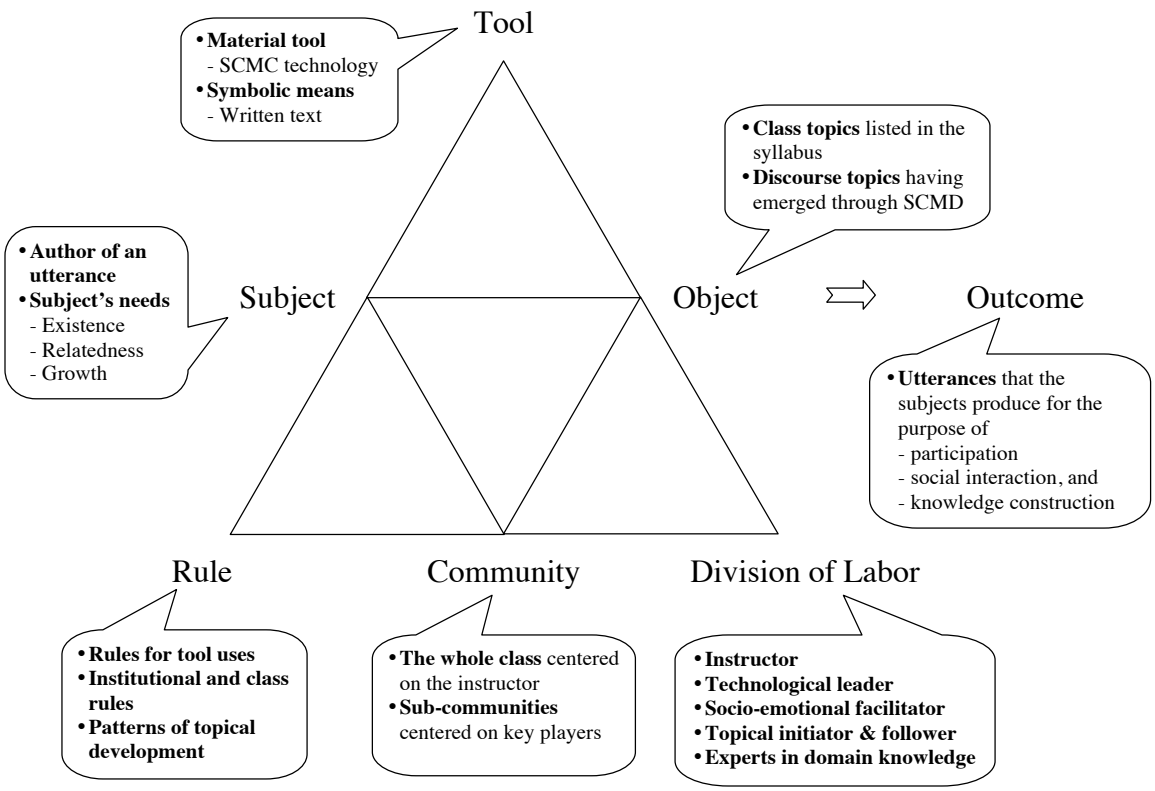


Figure 5.1 Activity System in SCMD: Summary of the Findings

Main Themes Emerging from the Findings

Based on these findings, four themes emerged. Firstly, an activity system has four different dimensions: physical/biological, cultural/institutional, social/emotional, and cognitive/intellectual. These exist in an activity system simultaneously and co-influentially. Secondly, the pair of dialogical utterances may be investigated as the minimum unit of analysis in SCMD research. Thirdly, even though temporary and fragile, there is the moment that a collective unit of subjects emerges. Fourthly, both within and beyond the current system, the discourse activity with SCMC technology may

be explained as an ecology of activity systems. In the following pages, I will state the details of the themes.

FOUR DIMENSIONS OF THE ACTIVITY SYSTEM IN SCMD

Leont'ev argued (2009) that activities can be categorized into three hierarchical levels: "activity – need," "action – goal," and "operation – condition." A conscious action is directed to an observable goal, which is driven from unobservable, and usually unconscious, needs. The condition of material tools or physical environment also form and influence the individual action.

However, according to the findings of this study, the subject's need itself is multi-layered, simultaneously defining the direction and the texture of an individual action. For example, based on the subject's different needs, the goals of actions were also differentiated. Some of the subjects seemed to focus on successful performance, while others made efforts to master the theoretical concepts. There were also instances of exchanges whose main purpose was rather to entertain others with social chats. Each kind of needs plays its unique role in an activity system; interacts with other kinds of needs dynamically forming an action as a whole; and, consequently, provides the system different dimensions corresponding to each need.

I could identify the cognitive/intellectual and the social/emotional dimensions of an activity system, parallel to the growth and the relatedness needs of subjects' in the order. However, in the case of the existence need in SCMD, the activity to satisfy the need seemed to entail two different dimensions. The online discourse activity is situated in the physical environment and the institutional context. Participation in the practice, in relation to the existence need, is to fulfill the requirement of the class or the graduate

program as the institutional context, and, ultimately, to make their future life more prosperous or to survive in the societal competition in the future. That being the case, both the physical/biological and the cultural/institutional dimensions are also involved in the activity system in SCMD.

Physical and Biological Dimension

At this level, the discourse activity of the subject is producing electronic signals that will be saved on the server and displayed on the screens of the local computers. The subject is the biological self who operates its body and other materials to continue its being in the physical world; the main tool is the SCMC technology in the context; and the object is the chunk of visual signals displayed on each screen, to which he or she will respond.

The community at this dimension consists of the users who share the electronic signals as their communal object. The community members should comply with the functionalities and affordances of the technology, which become the rule of the activity at the level. In most occasions, the actions in the dimension correspond to the operation of Leont'ev's hierarchy, and, therefore, it lies unnoticed below consciousness. However, when physical or technological issues were raised, the subjects who have advanced knowledge in that area played a central role in establishing a more stable baseline of the physical and biological participation.

Cultural and Institutional Dimension

An activity system has a cultural and institutional dimension as well. It is critical for the agents of an institution to implement what they are expected to do, for the purpose

of the success in their social lives. An instructor should design and administer class activities, and evaluate students' performances as her institutional duty, while students are supposed to participate in the activity and exhibit their performances in the institutionally imposed roles. In other words, the subjects in this dimension are perceived as the agents of the institutional identities.

The action at this level is an agent's participation in an activity, which the instructor has designed, by responding to a topic as an assignment or a requirement of the class. The goal of the participation is manifesting their successful performances to the evaluator, and the minimally required, and the easiest, way of presenting their performances is to post texts more frequently in the form of, at least, syntactically legible. Hence, the main tool that guarantees their institutional participation in the online classroom discussion is the linguistic symbols posted on the screen, which is the locutionary force in terms of Speech Act Theory (Searle, 1969).

The community of an activity system at this dimension is institutionally defined as the people who are listed in the official class roaster. The instructor should design the class following the rules of the university and the department, and the students should abide by the class topics, the weekly readings, and the assignments set by the teacher. For that reason, the instructor's role is critical in this dimension of the activity system in the context of the study.

Social and Emotional Dimension

At the social and emotional dimension, the action in SCMD is that a subject responds to an utterance as the result of the perlocutionary force of the responded speech act. In other words, the exchange of speech acts is the action of this dimension. People

want to make a good relationship with others, especially in the occasions that existence needs are satisfied (principle of gratification) or they have failed to satisfy growth needs (principle of regression). In online discussion, exchanging speech acts is the only way to manage social relationships and to express the participants' emotional feelings. Hence, the driving need of the exchange of speech acts in SCMD is relatedness needs.

The subject may be defined as the person in the communication network of the discourse practice; he or she employs illocutionary or perlocutionary forces to make good relationships with others, and/or to have an entertaining time during a given session; and the topic as the object in the system is a tool to interact with the other members. In this dimension, the main community is the group of participants who converse with each other, thus, the interlocutors. Their verbal interaction follows the pragmatic rules relevant to the rhetorical situation and various conventions of politeness strategies. Socio-emotional facilitator such as socio-emotional supporter and humorous chatter plays important role at the dimension.

Cognitive and Intellectual Dimension

An instructor designs class activity to enhance students' understanding of theoretical constructs and to help them become accustomed to the practice of the academic community. Students participate in the discourse practice to construct their own knowledge through collaborative effort with other members. It is obvious that, at the core of the activity in SCMD, there is a cognitive and intellectual dimension, of which the underlying need is the growth need.

The subject is the cognitive self who learns, constructs, or builds new knowledge through the discourse activity, whose action can be characterized as knowledge

construction. The goal of the action in this dimension is mastery-oriented. The cognitive self utilizes its own experiences, prior knowledge, and information and constructs from weekly readings and classroom lectures in order to develop the current discourse topic, which, in turn, will result in learning or construction of new knowledge.

The main community of the activity system at the cognitive and intellectual dimension is the group of people who collaborate to build communal knowledge. To participate in practice of this community, the members should raise issues, assert their opinions, provide evidence, and defend their statement against counter-arguments in logical and academic manner that is acceptable to the community of theoretical practice. The expert of the domain knowledge is the important role at this level, and, in the context of class activity, the instructor usually takes the role.

Table 5.1 Four Dimensions of an Activity System

	Physical / Biological	Cultural / Institutional	Social / Emotional	Cognitive / Intellectual
Driving needs	Existence		Relatedness	Growth
Types of action	Participation		Interaction	Construction
Individual subject	Biological self	Institutional self: Instructor, student	Social self: Participant in the communication network	Cognitive self: Learner, knowledge builder, etc.
Goals of action	Survival	Success	Good relation, entertainment	Mastery
Objects	Topic as physical signs on a screen	Topic as a class assignment	Topic as a motive for interaction	Topic as a motive for knowledge construction
Mediating tools	SCMC technology	Locutionary forces	Illocutionary and perlocutionary forces	Experiences, information, concepts
Main communities	Users of the same technology	Class members	Interlocutors	Collaborators of knowledge construction
Rules	Technological affordances	Institutional rules, syntactic rules, rhetorical genres	Pragmatic rules, politeness strategies	Semantic and logical rules, rules of academic disciplines
Main roles	Technological supporter, user	Instructor, grader, student	Socio-emotional facilitator or supporter	Experts and novices of domain knowledge

TOPICAL PAIR AS THE MINIMUM UNIT OF ANALYSIS IN SCMD RESEARCH

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10. Joyce:
  Has anyone experienced flow when writing? What about
  during other activities?

21. Henry:
  @Joyce (#10)- I think sports is the immediate context for
  me, although watching sports and losing track of time
  probably doesn't count as flow.

(From Session 9, October 22, 2009)
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An utterance is a response to a preceding speech act in a dialogical context. It is, in terms of Speech Act Theory, the perlocutionary effect as a rejoinder of the illocutionary intention of the responded utterance. Henry's comment (#21) answered Joyce's illocutionary forces of questioning. The part of "`the immediate context`" in Henry's exchange cannot be comprehended unless the content of Joyce's question is taken into account. Considering the class topic of the session, "Influence of Emotions on the Writing Process," and the fact that one of the weekly readings was related to the experience of psychological flow, we may conjecture what Joyce would have had in her mind when raising the issue of flow as a response to a preceding utterance of the class topic or the course reading. To understand the current utterance, it is necessary to apprehend the utterance to which it responds. Without the consideration of the preceding utterance as a part of the whole, it is not possible to understand the meaning and the intention of the current speech act in a given situation.

On the other hand, a subject initiates an utterance to have a rejoinder in the future. In the example, Joyce posted the comment to invite others to the topical space about the experience of flow in writing or other activities. The illocutionary intention of her inquiry may only be achieved with the help of others. With Henry's cooperation as a perlocutionary effect, her speech act could be completed. A question is to elicit answers, and an argument is to prompt acknowledgement, agreement, or counter-argument. To conceive of an utterance as a unit of analysis, as Bakhtin argues, the dialogical chain, as a whole, needs to be taken into account, not a speech act isolated from it. This point raises an issue of the unit of analysis in a dialogical situation such as SCMD.

For Vygotsky (1986), the unit of analysis is "a product of analysis," which "retains all the basic properties of the whole," and "cannot be further divided without losing them" (p. 5). It is not "the chemical composition of water," but "its molecules and their behavior" as the unit of analysis to understand the properties of water. Continuing the argument, he insists that the unit of human intellect be the "word meaning."

> What is the unit of verbal thought that meets these requirements? We believe that it can be found in the internal aspect of the word, in *word meaning*. Few investigations of this internal aspect of speech have been undertaken so far, and psychology can tell us little about word meaning that would not apply in equal measure to all other images and acts of thought (Vygotsky, 1986, p. 5).

Language is not a device that an individual has created through his or her ontogenetic history. It is the property of a society, and the person can only appropriate it. The "internal aspect of the word" is the "word meaning," which indicates, in terms of Vygotsky, the auxiliary means that has been internalized through the social interactions in the individual's life. His approach is investigating human psychology as the internalized means that has once belonged to the objective world. Therefore, the argument underlying the "word meaning" as the unit of analysis is that both the internal consciousness and the external object should be conceived as a whole that cannot be reduced to isolated elements. Leont'ev (2009) points out:

> Thus activity that is internal in its form, originating from external practical activity, is not separated from it and does not stand above it but continues to preserve an essential, two-fold connection with it. (p. 97)

Leont'ev (2009), extending Vygotsky's approach, contends that the object-oriented activity be the unit of analysis for psychological studies. For him, human activity is not only tool-mediated, as Vygotsky asserts, but also object-oriented, which is situated

in a community of practice. The unit of word meaning is too narrow to include the various aspects of an activity, and it needs to be extended to a more overarching system. Explaining Leont'ev's concept of activity, Kuutti (1991) writes:

> The solution offered by Activity Theory is that there is a need for an intermediate concept - a minimal meaningful context for individual actions - which must form the basic unit of analysis. This unit - better defined and more stable than just an arbitrarily selected context, but also more manageable than a social system – is called an activity. Because the context is included in the unit of analysis, the object of our research is always essentially collective, even if our main interest lies in individual actions. (p. 254)

Engeström's systemic model represents this object-oriented, tool-mediated, and community-based activity as the unit. However, it has been acknowledged that the activity system model does not capture the dynamic interactions between different traditions, perspectives, and cultures in a dialogical situation (Daniels, 2004; Engeström, 2001; Cole, 1988; Griffin & Cole, 1984). Although the historical and dynamic aspects of human activity are frequently emphasized in activity theorists' works, the systemic model of activity does not afford any analytical framework for dialogical interactions between different systems.

In terms of the unit of analysis, the problem may stem from its failure to apprehend the dialogical pair as the unit, not a single isolated outcome of utterance. As was discussed earlier in this section, an utterance in a conversational situation is located in the flow of dialogical chains forming dialogical pairs that are not reducible to their constituents. Without the wholeness of the responding and the responded parts of a pair taken into account, we may not comprehend an utterance situated in the dialogical

context relevantly. Therefore, I argue that the minimum unit of analysis for the CMC research needs to be the dialogical pair of the responding and the responded utterances.

EMERGENCE OF COLLECTIVE ACTION

The pair unit in dialogue involves at least two utterances: an initiation and a response. In the unit, two different systems of utterance production share the key elements of an activity system, become fused together, and form a collective action in which the initiator and the responder function as an agency of the system. The subjects in the pair may be regarded as a unit, because their needs, objects, tools, and communal contexts are shared in the practice of dialogue.

First, the topic as the object of activity system is shared. Two utterances become a pair when the second utterance is connected, as a response, to the first one. According to the previous discussion in this report, the initiation is transformed into a thematic exchange while the response being a rhematic one. During this formation of a dialogical pair, a discourse topic emerges. It is embedded in the initiation, and activated by the response. The topic is in the initiator's possession, for it derives from his or her utterance, and, at the same time, it is the responder who determines the discourse topic because the initiation will remain as an unrealized attempt to be a topical pair until it has a rejoinder. Topic is produced through the collaboration of the pair, which is the shared object of the collective action of the interlocutors.

Second, the subjects' needs are shared in the pair of dialogical exchanges. Production and publication of the second utterance entails participation in the topical space that the initiator has established. The initiator's intention or driving need is

embedded in the space, and, to participate in the space, the responder should accept and be subordinated to it.

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17. Henry:
  So, was anyone else trying to figure out how much the
  various pay rates in the proofreading article would work
  out to in current dollars?

31. Amy:
  i wondered if there were any guidelines about
  proofreading here at ut

(From Session 13, November 19, 2009)
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Henry raised the issue of the various pay rates in proofreading. Amy told, in her response, that she had also wondered about such guidelines, which indicated that she had the same, or at least similar, kind of interest as Henry. To participate in the topical space that Henry had set up, a responder should exhibit some kind of relations with the existing illocutionary force. For instance, another member could show agreement; raise a related question; provide supplementary information; or tell a joke about the pay rates of proofreading. In any cases, the participants share the Henry's original needs to know the proofreading pay rates, and collaborate to satisfy the needs and to achieve the goal.

Third, the tools are shared. The interlocutors utilize the same SCMC technology as the communicational medium and the same language that is comprehensible for all of the participants. Furthermore, the second utterance of the pair reuses or paraphrases the words, concepts, phrases, or sentences in the first utterance to show the relation to it. In the example, Amy repeated Henry's word, "proofreading" originated from the class topic and one of the articles of the week. Even though there were no vocatives or orientational markers indicating to which message Amy's comment was directed, the participants, and

the researcher as well, could notice that her message is a continuation of Henry's comment due to the use of *proofreading*. Having been a tool that had served Henry's purpose, the word, *proofreading* was employed to express Amy's similar curiosity and to exhibit the connection of her comment to Henry's. The constitution of a dialogical pair implies the exhibition of any kinds of relations between them. The whole or a part of the written texts as a symbolic means of the initiating utterance are repeated, paraphrased, revoiced, and, therefore, shared in the collective action of the pair.

Finally, the paired activity systems are situated in a shared context. They are based on the same physical environment and institutional context; by responding and being responded to, they co-participate in the current social interactions; and both of them collaborate to develop a shared topic at the cognitive and intellectual dimension. Because of that, they form a sub-community, follow the same institutional rule or rhetorical genre as typified social action (Miller, 1984; Bazerman, 1994; Swales, 1990), and partake in a role divided and expected socially.

In sum, the two activity systems in a dialogical or topical pair share the needs, the topic as an object, material tools and symbolic means, and physical, institutional, socio-emotional, and intellectual contexts. This may satisfy the necessary and sufficient conditions for the formation of an activity system, in which multiple subjects function as one unit. In other words, when the second utterance responds to the first one, both exchanges form a dialogical pair, the outcome of the collective action of the initiator and the responder as a subject of the system.

ECOLOGY OF ACTIVITY SYSTEMS

An activity system is not only situated in multiple overlapping dimensions, but is also embedded in various practices of communities that differ in kind, scope, direction, and history. To describe and understand an activity system comprehensively, it needs to be delineated as a sub-system or an agent of the whole ecology of activity systems.

As discussed so far, an activity cannot exist isolated from the relations to other systems or the multi-dimensioned situation. Within SCMD, every utterance is, directly or indirectly, connected to other utterances. Both an initiation and a response shape and are shaped by each other reciprocally in the process of dialogical activity. A student may initiate a topical thread in consideration of other members' interests, and they may respond to it intrigued by the initiation. The initiation is affected by the imagined future utterances from others, while it prompts the responder to enter into the topical space. In the activity system of a dialogical pair, the future response is presumed before the initiation, and the past initiation is realized in the current response. The current activity system of utterance production is located in the network of dynamic interactions between different systems within the SCMD, which, as a whole, may be conceived as ecology of activity systems.

Activity systems beyond the current site of SCMD also intervened in the activity systems within it. The instructor's activity of course design dominated the SCMD. The outcome of her activity system had determined most of critical components of the SCMD such as class topics, weekly readings, communication tools, times and places, and so forth. Her design activity had initiated the SCMD, to which the class members responded with their participations. The institutional activity system of the University was the

context of both the instructor's and the students' activity systems. The university defined the different divisions of labor between the instructor and the students, and the participants as members of the institution followed the rules set by the university.

The activity systems of technology designers, developers, and managers played critical roles in the SCMD. Not only the students' discourse practice might be possible due to the activity of the technology groups, but also their activity had predetermined the patterns and the ways that the subjects participated in the activity. The instructor and the students should be subordinated to the functionalities and the affordances of the technology, in which the designers' and the developers' purposes or intentions were embedded. The users responded to the designers or the developers by following their prescriptions, and the latter achieved their goals by serving the formers' purposes.

The SCMD was also embedded in the activity systems of the academic discipline of writing research. The authors of the weekly readings were invited to the discourse activity; they spoke in the subjects' voices, and the subjects wrote using their voices; and the SCMD continued the dialogical practices in the thought community. The rules how to participate in and develop the theoretical topics dominated the activity, and more knowledgeable agents played key roles in the activity system.

An activity system in SCMD is located in a complicated and intertwined dialogical network, in which different systems emerge, interact, and disappear continuously and dynamically. Furthermore, the system itself is a dialogical response to external or broader systems of activity. These activity systems, co-present within and beyond the current activity, form the ecology of activity systems as a whole.

A Systemic Model of Joint Activity in SCMD

Based on the emerging themes, I propose an alternative representation (Figure 5.4), which is reproduced in a somewhat revised form of Engeström's (1999) model for a third generation of activity theory (Figure 5.2) and as an extension of Wells' (2007) model of discourse in an activity system (Figure 5.3).

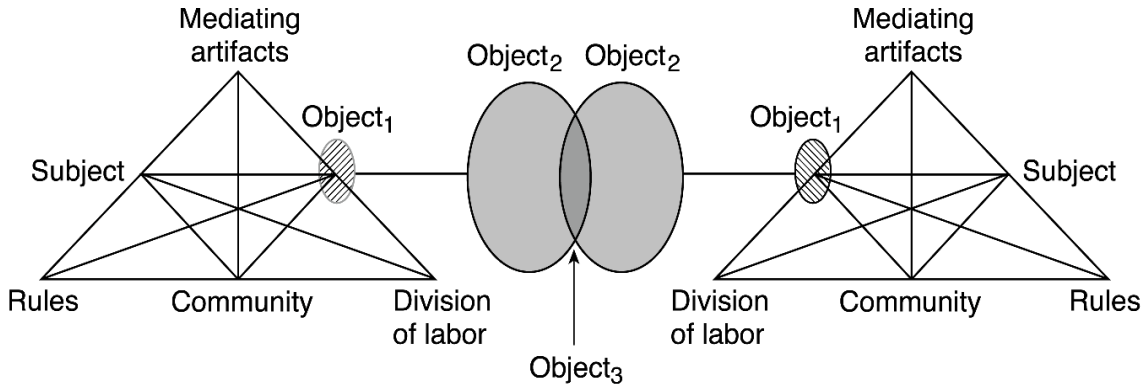

Figure 5.2 Third Generation of Activity Theory (Engeström, 1999)

It has been acknowledged that the Leont'ev and Engeström's version of Activity Theory needs to develop conceptual tools to understand dialogue, multiple perspectives, and networks of interacting activity systems (Wells, 2007; Daniels, 2004; Engeström, 2001; Engeström, 1999; Cole, 1988). Engeström proposed a model for the third generation of Activity Theory (Figure 5.2). As the theme I discussed earlier, he expanded the original model to include minimally two interacting activity systems. By separating the object 1s and 2s, he distinguished between a direct, unreflected, material object (Object 1) and a collectively meaningful object constructed by the activity system (Object

2) (Engeström, 2001). The Object 3 denotes a potentially shared and jointly constructed object.

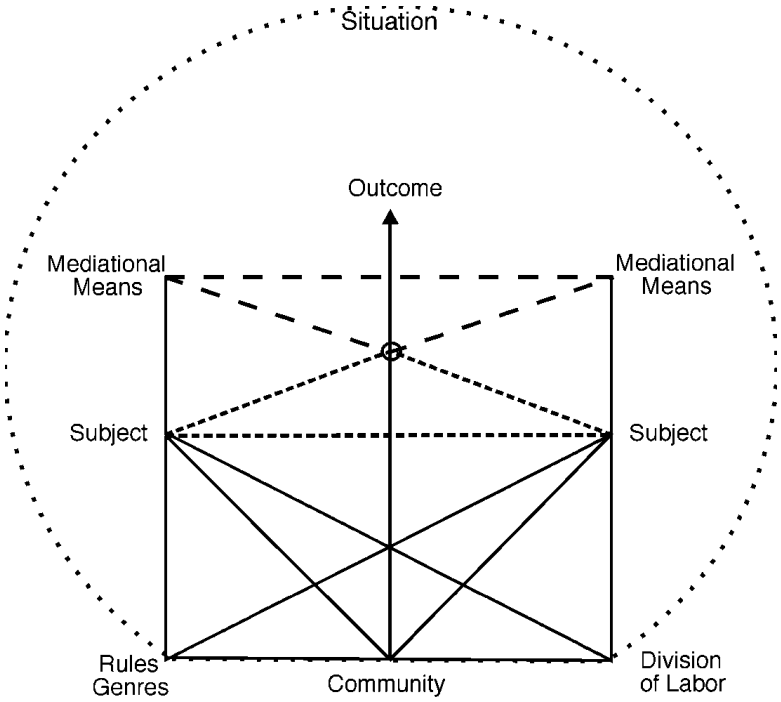

Figure 5.3 Wells' (2007) Illustration for a Dialogically Transacting Activity (p. 175)

Wells (2007) developed a third generation model into a representation of the activity of dialogical transactions. Although he added several features to the original model, I will discuss three of them closely related to the themes emerging from this study. Firstly, contrary to the third generation model, the two interacting systems are based upon the same elements of community, rules, and division of labor in Wells' illustration. In addition to that, he connected the elements at the upper part of each activity systems such as subject, mediational means, and object with dotted or dashed lines. The shared bottom parts with solid lines and the separate upper parts with dotted lines represent both their interdependent aspects as a unit and the relative independencies as different units.

Secondly, the model presents the community as the subject of the transactional activity, and the outcome is the result of the collaboration between the individual subjects. Finally, the dotted line surrounding the paired activity systems indicates that the activity is situated in the broader context of the discoursing activity system.

Developing Wells' model, I propose an alternative representation of dialogically paired activity in topical discussion. The major themes having emerged from this study are illustrated in the proposed model.

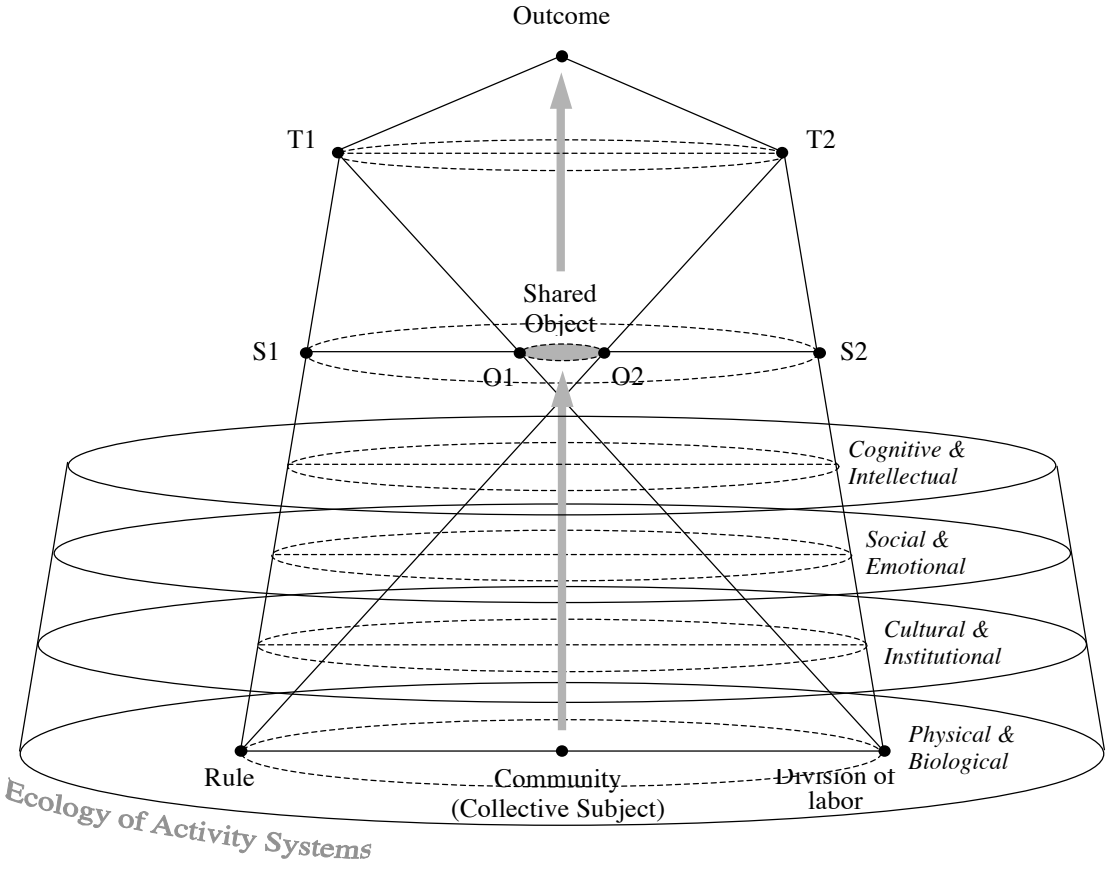

Figure 5.4 A Systemic Model of Joint Activity in SCMD

First, like the models of Engeström and Wells, this model regards the joint unit of a paired interacting activity systems as the minimum unit of analysis in the situation of

dialogical activity. In addition to that, the model is represented with cylindrical and conical shapes, instead of 2D based triangles, to indicate that the pair is the minimal unit not the only unit of a joint activity. There may be three or more interacting systems forming a single joint activity. The proposed model depicts only the minimally simplified example with two systems, but, along the dashed line on the cylindrical surface between corresponding elements, there may be more systems interacting through the shared general object.

Second, the corresponding points of the upper triangles of each systems, S1 – S2, T1 – T2, and O1 – O2, are connected with the dashed oval to demonstrate that they share the joint activity. Third, following Engeström's third generation model, I distinguish the direct object and shared and reflected communal object depicted as the small grey oval between O1 and O2. Fourth, the block arrow from community via shared object to outcome represents the emerging collective subject unit of the joint activity and describes the outcome as the result of collaboration of the community. Fifth, the representation includes the four dimensions of an activity system as the cylindrical base to show that the joint activity is situated in a multi-layered context. Finally, the base is larger than the focal joint activity, which implies the current interacting activities are embedded in a broader ecology of various kinds of activity systems.

Conclusion

LIMITATIONS OF THE STUDY

One of the key limitations of the study relates to the methodological nature of this project. The investigation started from the theoretical framework of Activity Theory,

which guided the direction of the whole research process. The pre-equipped lens has enabled the researcher to decide what to explore, whom to focus on, how to further proceed, and so forth. With the help of the framework, I could identify and unveil the hidden aspects of the phenomenon and synthesize the emerging findings. However, the framework has also devalued some other aspects of the site, recommended to exclude some cases explicitly or implicitly, and made the investigation stop at some point even with unanswered and unexplored areas remaining. This may, in turn, lead to misrepresentation of some aspects of the data.

Another limitation relates to the research particulars. While I made every effort to ensure the transferability of the study (Guba & Lincoln, 1985), it is important to note several possible limitations in the research design. This study was conducted in a particular graduate course at a major research university in the United States. The nature of the course was one in which "theory and practice of writing" was an important theme and the students were explicitly asked to reflect on their writing in the SCMC environment as part of the course assignments. The composition of the student body (e.g., most of them were from a Language & Literacy or Department of Educational Psychology program) should also be considered in the transfer of any interpretation from this study. Moreover, it cannot be emphasized too strongly that the participants in general were highly motivated students who came to the class with interests in its focus on theories and practices of writing.

The narrow variety of data sources and data collection strategies is another limitation of the study. The findings of the research relied heavily upon the transcripts of SCMD even though the classroom oral discussions were also referred to occasionally. Of

course, this is common in the practice of discourse analysis due to the overwhelming labor required for a researcher to include various sources of data other than the record of discourse. However, because Engeström's systemic model consists of such elements, it was difficult to identify only with the information from the transcripts. For instance, to analyze the kinds and roles of subjects' needs or motives in the system, it would be much more valid to back up the related arguments with the data from interviews or self-reflective journals. Although the decision of narrowing down the set of data sources may be justifiable considering the enormous labor involved, it is also clear that the validity of the arguments based on the insufficient sources of data becomes limited as the consequence of this practical decision.

IMPLICATIONS OF THE STUDY

Theory and Future Research

Findings from this study may yield productive implications for the future research. First, the focus of educational research on SCMD needs to move from the surface to the deep structure of the activity. Based on this report, an activity system stems from multiple dimensions of contexts, which interact together and co-determine the individual actions simultaneously. Nonetheless, the practice of CMC research does not proceed far beyond the surface level. For example, the long-lasting and still on-going discussion about the unit of analysis in CMC research is mostly about determining the starting and the ending points of data from transcripts. In general, sentences, messages, paragraphs, and threads are used as examples. Clear rules for the identification and the distinction of units will increase, using statistical terms, the reliability of the research.

However, the validity of the study remains questionable as questions such as why a unit is more valid than another has not found sound theoretical rationales as of yet. Because the observable facade of a unit is deeply situated in physical/biological, cultural/institutional, social/emotional, and cognitive/intellectual layers, the discussion on unit of analysis should take not only the rules to identify a unit at the surface level, but also the hidden, more substantially determining, and deeply structured factors into account.

Second, the study suggests that the focus of the future research on SCMD be moved from the isolated elements to the interconnected system as a whole. According to Activity Theory, an activity system forms an irreducible whole, which cannot be divided into its elements without losing its unique features (Wertsch, 1998). Subjects' driving needs should be understood in relation to the objects to which they are oriented; an object should be conceived as a true motive when being combined with subjective needs; and, in an activity system, tools have dual statuses of both an objective entity belonging to the external world and a part of the extended body of a subject. Failing to grasp the whole system and focusing only on the parts isolated from the whole may lead a researcher to more confusing or conflicting conclusions. A researcher whose purpose is to prove the effectiveness of technology use in a classroom discussion should take into consideration its relations to the users' intentions, the characteristics of tasks, the institutional culture and rules, the divisions of labor in the community, and various kinds of intervening sub- and meta-systems of activity as a whole. The different configurations of the related elements of a system may produce contrasting consequences for the same technology use, which may confuse the researcher or mislead the conclusions of the study.

The third implication of the study derives from the emergence of collective subjects unit. Educational researchers have been interested in the phenomenon of learning as the process in which an individual is engaged and the product that remains in the individual's mind or behavior as a result of the process. The traditional interpretation of Activity Theory is consistent with this framework. When a subject employs an objective, either material or semiotic, tool to participate in an activity, the meaning of the tool as a symbolic means emerges. The objective tool use is directed toward the object, and the symbolic means emerging from it is oriented toward the subject. The objective tool is employed to change the external world, while the meaning alters the internal mind. Vygotsky's concept of internalization corresponds to the transformation of the material or social entity into a symbolic and psychological one, which is one of his main concepts related to the process of learning. Here, again, the focus is on the individual who participates in the social interaction with more knowledgeable others and becomes equipped with psychological residuals as a consequence of the social practice. However, the findings of this study suggest the possibility of a collective unit of subjects emerging from their dialogical transactions. They share a general object, material tools, repository of symbolic means, and physical, institutional, and academic contexts, and, consequently, perform as an agent of the system. They participate in the process of learning as a unit, which implies that there will be some kinds of residuals somewhere in their minds or in the community. Although this study does not provide any clear evidence or argument about collective learning in contrast to individual learning, which was not the purpose of the study and is beyond its scope, the findings intimate the emergence of a collective unit of learners. This suggests that future research answer such questions as what exactly the

product of collective learning would be; where it would be located; whether it is an aggregated sum of each psychological residual or a communal residual qualitatively different from the individual learning; how we may identify them; and so forth.

Educational Practice

The findings of the study postulate that an activity system is based on multiple dimensions related to different levels of subjects' needs: existence, relatedness, and growth needs. Classroom discussion in a graduate course is designed to improve students' understanding of theoretical concepts and professional practices, which is directly related to their growth needs. According to ERG theory (Alderfer, 1972), to satisfy a higher level need, a lower need should be satisfied first, and the frustration of the higher level need will result in the regression to a lower level need. This implies that, to secure students' activity of collaborative knowledge construction in the cognitive/intellectual dimension, the other dimensions such as physical/biological, cultural/institutional, and social/emotional environments need to be safely established.

In the context of SCMD, the technology should work properly, and the users need to be accustomed to the ways of communication through the medium including the operation of the technology, strategies to cope with the pace of discussion, and so forth. As Donna did in her class, a session for checking the technology and having students experience the activity before the main online activity starts is recommended. Students may feel uneasy if it is not clear how their performances will be evaluated and reflected in their final grades. Although this study does not yield any detailed implications about the assessment criteria of their performances, it does suggest that an instructor should make it clear and lessen the ambiguity in the institutional dimension. Establishment of

safe environment in socio-emotional dimension is critical. One who is emotionally frustrated with other members or the task itself may not be willing to join the collective activity. In a situation in which the socio-emotional environment is not secure, the participants may spend more time and effort to repair and secure the environment, which will result in less productivity in the cognitive and intellectual activity. Therefore, an instructor or course designer needs to consider some activity or strategies to promote positive socio-emotional relationships among the members to facilitate their collaborative activity of knowledge construction.

This study also suggests that an instructor and students understand the nature of joint activity and be prepared for the management of the centripetal and centrifugal forces of topical development. In a joint activity, of which a dialogical pair is the minimal unit, multiple needs, objects, tools, and intervening communities are interacting and competing together. The emergence of joint activity by sharing the elements of each system is not a result of a natural and spontaneous process but an achievement of an intentional endeavor to overcome conflicts and tensions between two or more systems. Especially, an initiator intends to invite others to participate in his or her point of view, whereas other participants attempt to direct the whole topical thread into their topical spaces by appropriating the initiated topic. This tension between two or more interacting systems produces both centripetal and centrifugal forces, and results in dynamic patterns of topical development, such as deepening and broadening, according to the balances between the forces. If an initiator's intention dominates a topical thread, the discussants may share more information and ideas within a limited range of topics. On the other hand, if the responders' interests are more influential, the topical thread may cover more

topics but may be individually less deep. Of course, one may not argue that one of them is better or more desirable in general. It depends on the purpose of the tasks and the goal of the activity, which means the designer and manager of the activity need to understand the dynamics in the joint activity and know when and how to intervene in the thread to change or facilitate the current flow of discussion.

According to the findings, through the joint activity, collective action emerges, in which the elements of different systems are shared together. Especially, the collective subjects collaborate together by co-contemplating the same topic as a shared object. However, as discussed above, the tensions between centripetal and centrifugal forces induce unpredictable and volatile progression of topical threads. It is more obvious in the context of SCMD where the local asynchronicity and multiple users' simultaneous participation may prevent people from controlling turn-takings and maintaining a topical thread. Consequently, when multiple threads take place simultaneously, shared objects change or disappear rapidly; the collective subjects having gathered to develop the topical thread disperse when it ceases to be; and they reassemble in a newly initiated or another on-going topical space forming new collective systems. A joint activity by a collective unit of subjects in SCMD is ephemeral and fragile. In many cases, it is too short for a joint activity to serve as the foundation for collaborative knowledge construction. This report encourages instructors or course designers who plan to incorporate SCMD into their classes to be prepared to cope with somewhat chaotic situations, and approach it more strategically. From Amy's practices, one can have some ideas how to continue, change the direction of, and expand the shared topic from the inside and within the boundary of the joint activity. As Donna did, an instructor may consider offering a

separate activity for students to reflect on their performance or on the content they have discussed in the SCMD.

Finally, based on the emerging theme of the ecology of activity systems, I recommend that instructors intending to employ SCMD for their classes locate students' discourse activity beyond the classroom. Preparing students for their future lives in society is regarded as one of the main purposes of educational practices. It assumes that the students belong to the institutional community participating in the practices of the institution now, but will become the members of various communities in the society implementing their practices in the future. Schools provide students with environments that are limited in their ability to embody the real practices of the communities they will belong to after the school years. Students practice the provided exercises, which are not real, during the school years to prepare to become a member of those communities in the future.

However, what this study postulates is that those communities are not only in the future but also in the present. Especially in the context of classroom discussion in a graduate course, students are participating in the practices of academic community as well as institutional community. The instructor is involved in the class activity as a representative of the thought community; students continue the dialogue with the authors of weekly readings, who are the central members of the field; the theoretical concepts, main tools of the community, are appropriated in the current activity; and the students share the general topic relevant to their discipline. The various underlying communities are neither metaphorical nor abstract. They have substantial influences on the current class activity. Therefore, students need to be encouraged to acknowledge that their

practices are not only about implementing the course requirements but also about becoming a member of the broader communities. From the pedagogical perspectives, it will make the activity more authentic and help students build community knowledge (Scardamalia & Bereiter, 1993), and move from peripheral participation to full or active participation in the community of practice (Lave & Wenger, 1991).

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