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Computer-Mediated Discussion in the University English Classroom: A Content Analysis of Participation

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This study examines the nature of interaction in computer-mediated discussions in the university English classroom. The analytical framework is a content-focused interaction analysis approach with five dimensions: participative, social, interactive, cognitive, and metacognitive. Two questions guide the study: (1) How do the most active participants contribute to different dimensions in the analytical framework? (2) What are the most common dimensions in text produced by the most active participants? The analysis shows that the texts of the most active participants take up over one-third (35.4%) of the discussion. The content analysis of the texts suggests that most of these participants' texts fit the interactive and social dimensions, and that the participants construct their discussions as a series of statements through which they continuously exchange information on the same topic. The results of the study are discussed in terms of the importance of finding common patterns and helping teachers reconceptualize the curricula of computer-mediated classes. The study provides educators a better understanding of the learning process and of the rich potential of this new form of education to improve the effectiveness of interaction among students.

[computer-mediated discussion/interaction/participation/content analysis/cognitive]

I. INTRODUCTION

Many educational institutions, especially universities, are interested in improving the learning capacity of their students. For this reason, many diverse learning approaches are applied in academia. Regardless of approach, however, in the processes of teaching and learning, the ultimate goal of teachers is to foster and teach what the learners need to

learn and to accomplish the objectives of the course in the given time, with an emphasis on cooperative endeavor. Learning is a product of groups of individuals working together interactively and collaboratively. One of the key components of good teaching is the intellectually stimulating exchange of ideas in meaningful interactions that occur between teachers and students, and among students themselves.

With the increased availability of computer and internet technologies, many universities have adopted computer-mediated learning environments as well as working to increase the awareness among educators of the importance of diverse platforms of education, in order to foster well-designed learning environments that enable such interactions. Technologies such as computer conferencing software and electronic mail have been around for quite awhile, but such systems have only been adopted for use in the classroom in the last decade or so. As more attention is being paid to the educational uses of computer-mediated communication, it is often assumed that this new medium should be an effective pedagogical tool; however, better understanding is needed to take full advantage of this new tool. Online discussions should help more students learn better by placing them in an intellectual environment that encourages active, thoughtful, and equal participation from all students.

Many studies on computer mediated communication in second language acquisition have identified determinants of student learning and satisfaction with the computer based communication. Jung and Jo (2008) examined the effects of using e-mail and chatting in order to achieve English communication skills. As a result, a computer mediated learning method was more effective for improving English speaking, reading and writing skills than using the face-to face learning method. Yoon and Han (2004) also investigated the effect of the use of two synchronous text-based computer mediated communication tools: chatterbot and messenger. Chatting activities using both tools improved the learners' productive skills, writing and speaking. Heins, Duensing, Stickler and Batstone (2007) supported computer mediated learning by mentioning more interaction and involvement among learners through computer mediated communication than face-to-face communication.

This paper analyzes online discussions among students and identifies indicators that enable the recognition of different patterns in the texts produced in the setting of computer-mediated discussion (hereafter, CMD). The paper elucidates the characteristics of CMD and then dicusses the concepts of interaction and interaction analysis, before introducing its analytical framework. The findings and conclusions are discussed in the last section of the paper.

II. LITERATURE REVIEW

1. Characteristics of Computer-Mediated Discussion (CMD)

CMD can create a unique environment for open discussion that avoids many of the traditional classroom limitations (McComb, 1994). CMD is surely the new educational paradigm or a new domain of education. It also has idiosyncratic characteristics and advantages. The major characteristics of CMD referred to by many educators (Eastmond, 1995; Graddol, 1989; Harasim, 1989; Hiltz, 1986; Kaye, 1989) are discussed in this section.

The most profound difference between face-to-face discussions and CMD is that the former requires people to be in close physical proximity, while the latter does not. CMD thus connects learners who are physically apart, offering them freedom from the constraints and disadvantages of meeting at a single place, and giving them access to learning resources that exist in diverse places as well. This characteristic fits in with the concept of a global learning community, in which shared learning can take place just as easily across continents as across the table.

The second characteristic is that CMD relies on written communication, which involves text-based interaction. All participants can communicate with each other by sending and receiving typed messages, and all the messages are stored in a computer. Cumulative messages and ongoing interaction help develop a learner's critical reflections and at the same time, stored messages can be retrieved from a database. The use of text-based interaction also benefits those with disabilities (Coombs, 1989). People with disabilities can take advantage of the aid of a computer as well as sharing the benefits of text-based communication shared by all users. Harasim (1990) points out that text-based communicators often become more reflective than verbal communicators, and more attentive to the messages of others as they are on equal social footing with one another.

The next characteristic of CMD is its structure of communication. Most classroom interactions, if any in the traditional classroom setting, are limited. Research has shown that anywhere between 40 to 80% of class time in face-to-face discussions is taken up by the teacher (Dunkin & Biddle, 1974; Krupnick, 1985; McDonald & Elias, 1976). In the classroom setting, the way an instructor moderates discussions can often keep students from interacting with one another. However, online discussion is naturally interactive and collaborative, partly because it lends itself quite easily to many-to-many communication. Individuals can exchange information, resources, and thoughts with other participants. Thus, group discussions are possible within this setting, which helps to facilitate interactions and collaborative learning (Harasim, 1989; Hiltz, 1990; Turoff,

1990), in turn naturally leading to the next characteristic of CMD, which is interactivity.

The greatest characteristic of CMD is, in fact, that it is highly interactive, making frequent and continuous interactions possible. CMD's interactivity contributes to facilitating collaborative learning (Berge, 1997; Henri & Rigault, 1996). In collaborative learning, the learner is regarded as an active participant, and knowledge is created through interactions with peers or instructors (Harasim, 1989). CMD yields collaborative learning because it requires group interactions and the learners' active participation in the interweaving of diverse ideas as they contribute, through their interactions, to collective knowledge (Gunawardena, Lowe, & Anderson, 1997). In addition, learners experience critical reflection by responding to and explaining comments or questions raised by others, which connects current messages with previous messages (Henri, 1992).

2. Interaction

Beginning with an examination of different definitions of interaction, Simpson and Galbo (1986) defined interaction as all types of behavior in which individuals and groups act upon each other. Cookson and Chang (1995) stated that "instructional interaction is interpersonal transactions associated with the process of teaching and learning that occur within an instructional setting" (p. 19). Wagner (1994) stated that "instructional interaction is an event that takes place between a learner and the learner's environment" (p. 8). Summing up these definitions, interaction consists of communication and reaction among participants. As mentioned in the previous section, interaction has long been considered an important factor in successful pedagogy in the traditional classroom. It is a known fact that many educators insist that interactions in a class contribute to more positive attitudes toward the experience, higher levels of motivation, greater student satisfaction, and furthermore, higher levels of achievement (Garrison, 1990; Gorham, 1988; Hackman & Walker, 1990).

CMD offers and even requires qualitatively new and different forms of educational interaction, whose patterns can be compared with those observed in traditional educational contexts. Typical classroom interaction follows a discourse sequence of initiation-reply-evaluation (cited in Everett & Ahern, 1994). In other words, the teacher controls who talks about what to whom, and the students usually respond to direct questions posed by a teacher, who also evaluates these responses' correctness. Thus, the teacher's participation takes up a high percentage of classroom talk, and students have limited opportunities to interact with their peers in a traditional classroom. In contrast, in CMD, Faigley reports that student-initiated comments take up 70 to 80 percent of the time (cited in Ruberg, Moore, & Taylor, 1996). Other studies also support the claim of high rates of student-initiated comments in online classes (Berge, 1997; Riedl, 1989).

This implies that classes based on CMD are more student-centered and give learners more control over their learning.

In sum, interaction is very important in the teaching and learning process. It directly relates to the participation of students taking an active role in their own learning. CMD, with its high interactivity, can be effectively used as an important instrument for achieving good academic performance, and is also an invaluable way of learning in this globalized era.

3. Interaction Analysis and Content Analysis

Interaction analysis contributes to understanding how learners use a medium to work out and transmit their ideas and the interaction patterns that occur as they do so, thus showing dynamic interaction processes. Interaction analysis should consider the characteristics of the educational medium used. For example, content analysis should be used in studying the interactions in CMD, as written messages are the major source of the interaction data. However, originally, interaction analysis was used to improve teaching behavior in face-to-face classes. Therefore, most studies taking an interaction analysis approach are based on observation in traditional face-to-face classes. In addition, previous studies on interaction tend to be overdependent on quantitative methods that simply measure, for example, the number of messages transmitted, the number of servers accessed, and the duration of consultation.

The first developed and most widely used type of interaction analysis is Flanders' system of Interaction Analysis (Amidon & Flanders, 1967a, 1967b; Flanders, 1970). This particular interaction analysis method includes "teacher talk" and "student talk." Teacher talk is categorized as indirect or direct influence. Student talk includes responses and initiations. Other behavior includes silence and confusion. This interaction analysis method is based on traditional face-to-face classrooms, and its applicability to CMD is therefore limited.

Other interaction analysis methods were developed in distance education in the 1990s. Saba and Shearer (1994) reported findings regarding interactions in desktop video conferencing to verify the concepts of transactional distance, dialogue, and structure. This analysis is based on a system dynamics model (Saba, 1998) and discourse analysis. The system dynamics model shows relationships between Moore's three theoretical concepts of distance education: transactional distance, dialogue, and diagram. Saba and Shearer classified interaction as direct, indirect, active, and passive influence (Moore, 1989). They defined these variables and measured the rate of all variables based on discourse analysis, noting speech acts between the teachers and students in classrooms. They concluded that (1) a learner's active responses increase when the interaction

between the instructor and the learner increases, and (2) when direct responses by the instructor increase, structure and transactional distance increase. This analysis method focuses on learner-instructor interaction, and is of limited use for analyzing learner-learner interaction.

Third, Cookson and Chang (1995) developed an instrument called the Multidimensional Audioconferencing Classification System (MACS) to interpret audioconferencing instructional interactions. This multidimensional model consists of instructional interpersonal interactions, source and target of communication, instructor/participant response to distance, and instructional procedure. Instructional interpersonal interactions are linked by source and target communication. Instructor/participant response to distance and instructional procedures influence instructional interpersonal interactions. The source and target of communication are structural elements.

This brief review of interaction analysis methods helps us understand which variables must be considered in interaction analysis. However, all of these methods have limits for CMD, considering the unique characteristics of CMD. Therefore, for this paper, the analytical framework developed by Henri (1992) was used for the analysis.

Henri (1992) pointed out that previous studies related to the interaction analysis of computer conferencing have limited ability to explain interactions that happen in online classes, as they only focus on quantitative data related to participation, such as the number of messages, the number of participants, and the number of servers accessed. In contrast, Henri focused on the transcripts of CMD, emphasizing content analysis rather than interaction analysis. Considering that the participants interact with written messages, the contents of transcripts provide direct evidence of what students learn and experience in an online course. Moreover, Henri's content analysis can assess the quality of interaction, and explain how learners adjust to a new medium to represent their ideas and communicate with each other. His content analysis is based on cognitive psychology and it explains different levels of meaning in messages. It includes five dimensions: participative, social, interactive, cognitive, and metacognitive. Definitions and indicators are provided in Table 1.

Henri divides the interactive dimension into explicit response, implicit response, and independent statement. The cognitive dimension has to do with levels of reasoning skills (elementary clarification, in-depth clarification, inference judgement, and strategies) and processing information (surface and in-depth). The metacognitive dimension includes skill evaluation, planning, regulation, and self-awareness. The participative dimension is related to quantitative data of participation, while the other dimensions are related to qualitative data of interaction. McDonald's (1998) recent study, which analyzes group interaction based on content analysis, is a good example of a qualitative study of

interaction analysis. For the current study, Henri's framework enables us to concretely delineate the roles and meanings of the interaction of the participants.

TABLE 1

Henri's (1992) Five-Dimensional Analytical Framework

Dimension	Definition	Indicators/Examples
Participative	Compilation of the number of messages or statements transmitted by one person or group	Number of messages Number of statements
Social	Statement or part of statement not related to formal content of subject matter	Self-introduction Verbal support "I'm feeling great…"
Interactive	Chain of connected messages	"In response to Celine…" "As we said earlier…"
Cognitive	Statement exhibiting knowledge and skills related to the learning process	Asking questions Making inferences Formulating hypotheses
Metacognitive	Statement related to general knowledge and skills and showing awareness, self-control, and self-regulation of learning	"I understand…" "I wonder…"

III. METHODOLOGY

This study was designed to examine texts produced in CMD by Korean and Japanese students of English by using Henri's (1992) approach to content analysis. The content analysis is used to find out (1) how the most active participants contribute to different dimensions in the analytical framework (see Table 1) and (2) the most common dimensions in text produced by the most active participants. The findings are then considered in terms of how CMD can best be incorporated into an English language curriculum.

1. Participants

This study was conducted in an English class, "English Reading and Discussion II" at a university in Seoul. Two face-to-face classes per week took place. However, this CMD took place outside of class time. The students enrolled in this class had to sign up for extra online chatting sessions with students majoring in various fields from a university in Japan, throughout the semester. They could sign up for as many as five sessions over a period of eight weeks. Thirty-one students took this course, while altogether 299

students from two universities participated in the CMD, and 56 different sessions were analyzed for this study.

2. Data Collection and Analysis

The participants engaged in 40-minute CMD sessions with four to eight members. Each of the 56 sessions differed in terms of factors such as numbers of participants and topics. Specific topics were chosen by instructors from both universities for each session. Topics were pre-announced, which meant that the participants were aware of them before joining a CMD session. They were allowed to discuss the topics freely, without any format to follow.

The transcripts of these discussions are this study's main data. First, each participant's statements were counted to identify the most active participants in each CMD session. The transcripts of only the most active participants were analyzed. All statements in the selected transcripts were then categorized according to the five dimensions of the study's analytical framework (Table 1). The rates of the dimensions for the comments of the most active person in each session became the target data for the study. Finally, all of the texts of all of the selected (i.e., most active) participants for each of the five dimensions were counted, and the ratio was calculated to see the frequency with which each dimension occurred in the messages produced in the CMD.

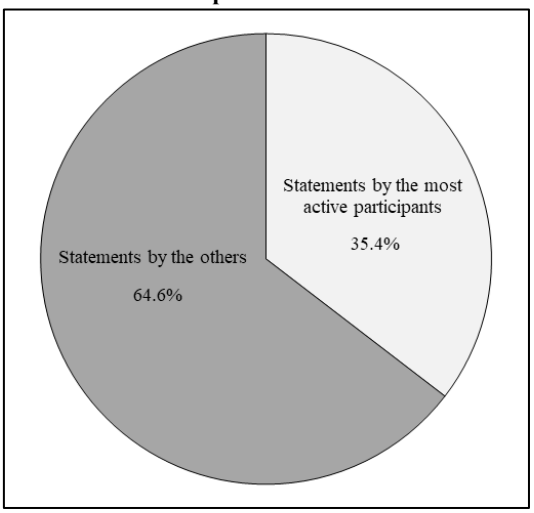
IV. FINDINGS AND DISCUSSION

This study seeks to better understand the specific benefits of CMD by scrutinizing the content of the texts exchanged by participants from a strictly pedagogical perspective. As discussed above, previous studies generally have used quantitative analysis or indirect indicators, such as the level of satisfaction or attitudes. Obviously, the volume of messages is an implicit measure of the success of the exchanges. This study examines quantitative data comprising all messages produced by all participants to understand the participative dimension, but focuses on qualitative data concerning the messages' actual content to examine the other four dimensions. Individual participation rates are presented below (Figure 1).

The most active participants in the discussions produced 35.4% of the total text, that is, more than one-third of the discussion. These participants took charge of leading the discussions, showing the most initiative in the interactions. They tended to display an enthusiastic attitude and have a positive influence on others, acting as facilitators in the CMD sessions.

FIGURE 1

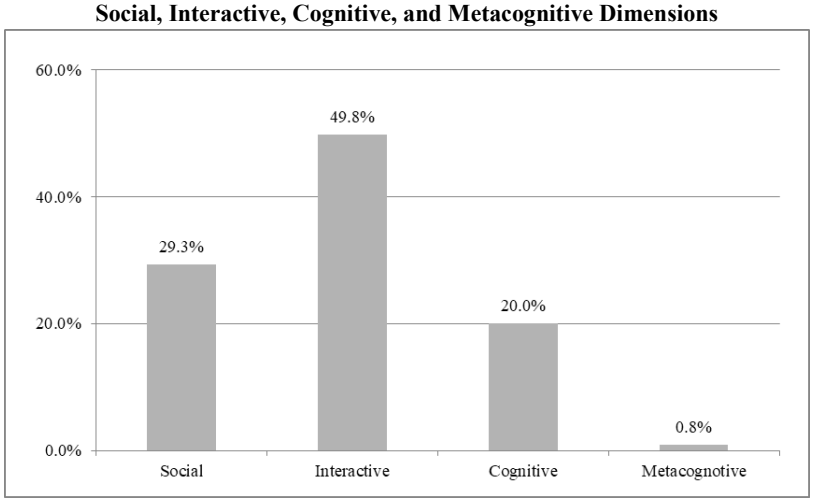
Participative Dimension



Counting numbers of messages does not provide a full and accurate picture of participation. However, such quantitative data can be useful in content analysis if it is not the only factor considered. Therefore, the texts' content is also analyzed in terms of the other four dimensions, the distributions of which are presented in Figure 2.

FIGURE 2

Social, Interactive, Cognitive, and Metacognitive Dimensions



The social dimension is the second highest in texts produced by the most active

participants. This finding suggests the importance of this aspect of communication for participants, and may be interpreted as prioritizing the social cohesion of the group and the feeling of belonging over exclusively dealing with given topics and formal goals. Getting to know each other and sharing small talk enhances the atmosphere of a class environment, and a component of socializing is important in learning. Enthusiastic participants in CMD show a good level of social cohesiveness, and their affective support plays a role in the learning process.

Next, the interactive dimension shows the highest rate in this study. According to Bretz (1983), interaction is a three-step process:

Step 1: communication of information;
Step 2: a first response to this information; and
Step 3: a second answer relating to the first.

As mentioned, the most active participants produced a series of statements linked only by the subject under discussion, which meant that they were devoted to the flow of interaction; thus, they played an important role in the actual structuring of the content. On average, half of the messages produced by the most active participants fit into the interactive dimension. It can thus be said that these participants value other learners' messages and constantly react to the responses of others. They maintain the flow of the discussion by responding to the interests of others, while staying within certain boundaries. This finding also shows a good level of collaboration among the participants, of active participation in the accumulation of knowledge, and of skill in structuring the information shared in CMD.

The cognitive dimension comes third, at 20%. This dimension is connected with understanding, reasoning, the development of critical skills, and problem resolution. The most active participants show curiosity and a willingness to find out necessary information. They are able to evaluate information, organize it conceptually, and compare it to previously held information. It can be said that they have the skills to go beyond the surface in order to deal with information in greater depth.

The lowest percentage of the most active participants' content fits the fifth dimension, the metacognitive. Only a few of the active participants used task evaluation and strategy planning in their CMD sessions. A cautious speculation could be made here that this particular CMD setting elicited casual discussion, where no academic or serious issues were taken up. Such casual talk seems less likely to lead to metacognitive activity, which may be more perceptible when the task at hand is to understand ideas or remember past learning.

V. CONCLUSION

In this study, texts produced by the most active participants in CMD were analyzed according to a five-dimension analytical framework for characterizing interaction. Almost half of the texts produced by the most enthusiastic participants were categorized into the interactive dimension, with their texts forming chains of connected messages relating to the subject under discussion, which leads to the conclusion that they value collaboration and active participation. This finding can be incorporated into an English language curriculum by including activities that let learners respond and react to the formal content of the given lesson. It also suggests the importance of teamwork and collaborative activities, which can prepare learners to engage in constructing such chains of reactions.

One-third of all the messages fit the social dimension, which also holds considerable significance. The active participants tended to dedicate their time to getting to know the other members and interacting with a high level of social orientation. Their messages for socializing did not necessarily relate to the subject matter. From the pedagogical perspective, this finding suggests the importance of incorporating practices of small talk, self-introduction, and various uses of verbal affiliation and interpersonal support into a curriculum.

The active participants' messages also showed the use of cognitive skills such as questioning, reasoning, in-depth clarification, and inference, although their messages that fit the cognitive dimension were fewer than those that fit the social or interactive dimensions. Most of the messages in this particular dimension were questions and clarifications. However, as discussed above, active learners may tend to prefer talking and telling over seeking information. This finding indicates the need to encourage learners to practice inquiring, seeking out information, making inferences, and deciding on actions to be taken, which involve more advanced skills compared to social and interactive talk.

A very low percentage of these active learners displayed metacognition, which involves evaluation, planning, regulation, and self-awareness. Very few participants in the CMD sessions used such skills in their communications with other people. One might speculate that this finding could be due to the characteristics of the course itself. It was not an academic content class, but a casual English discussion class, which hardly involved any metacognitive activities. Therefore, this dimension may have been affected by the class environment and the given topics. It is also worth noting, however, that engaging this dimension in CMD settings may be more challenging in that it requires students to be able to reflect on and connect their understanding, reasoning, critical skills, and problem resolution, while interacting with others. In fact, engaging students at this

level is not only an issue with language-learning, but education in general. Nevertheless, this fnding suggests the need to provide learners appropriate cognitive support with activities that encourage them to use the whole range of skills.

This study has some limitations. In particular, as mentioned, the conditions of each CMD session were different; the interactions may have been affected by various factors that this study does not consider, such as the number of participants, topics, and genders.

This study examined how active participants contribute to interaction through written communication. Its ultimate goal is to understand the traits of active learners as CMD participants, in order to enable educators to focus on such traits when teaching. As Hwang (2008) argued, with advances in computer-mediated communication, CMD needs to be properly incorporated into an English language curriculum according to its pedagogical goals. Online classes, which can be expected to become the dominant form of education, should help more students learn better by placing them in an intellectual environment that encourages active, thoughtful, and equal participation. For this to happen, the problems and benefits of such systems need to be investigated to inform the development of optimal environments for learning.

The study has several implications for English teaching and learning. First, the most shared dimensions by the most active participants were the social and interactive dimensions, suggesting that teachers can focus on these dimensions in CMD settings. Lesson plans for CMD can be based on the skills that are needed to perform these highly used dimensions. At the same time, it is crucial to recognize the neglected dimensions and consider possible reasons behind their neglected status.

Second, computer-mediated classes are likely to include introductory sessions, regardless of the field of study. Especially in a language class, however, it is important to be aware that interaction between learners is the key to learning. The best learning will happen through verbal interactions, as individuals learn through actively appropriating the practices of the thought community with which they are interacting. Hence, ensuring that students know one another and have ample opportunities for student-to-student interaction is crucial.

Third, to adopt and make the best use of the new forms of education, it is the teachers' responsibility to observe and investigate the characteristics of good participants, and to encourage these characteristics in all their learners. Teachers themselves also should be willing to enrich their practices by learning from the different views they gain of the students' experiences of a course when they include CMD in their instruction.

In order to reach these goals, more systematic efforts to gather data on students' performance are required, as well as more focused studies of content analysis, in the future. Rather than stopping at superficial descriptions, qualitative analysis is required.

With sufficient understanding, teachers can become both participants and researchers through the use of CMD in their teaching, leading them to make the best use of CMD as a tool for their students' success as well as a springboard to improve their own learning and cognitive processes.

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Examples in: English
Applicable Language: English
Applicable Levels: All levels

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