

The Effects of Task Type and Group Structure on Meaning Negotiation in Synchronous Computer-Mediated Communication

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1. Introduction

As the focus of second language learning and teaching has shifted to promoting communicative ability and creative self-expression in a social context, there has been increasing interest in interaction and meaning negotiation, which are thought to be among the most essential factors in successful second language acquisition. The concept of interaction has evolved to become more clearly defined as meaning negotiation and its context has been expanded from face to face classroom interaction to possibly more feasible computer-supported interaction and network-based communication.

Researchers have identified a number of variables affecting negotiation of meaning including task type (Doughty & Pica, 1986; Gass & Varonis, 1985; Pica, 1987; Pica & Doughty, 1985) and participant structure (Oliver, 2002; Pica et al., 1996; Varonis & Gass, 1985). However, most studies have examined negotiation of meaning in English as a second language (ESL) classroom context but not in English as a foreign language (EFL) context where participants speak same native languages. Smith (2005) investigated the relationship between individual learners' uptake of lexical items and negotiated interaction in task-based synchronous computer-mediated communication (SCMC) environment. The result showed that successful uptake did not occur in ESL SCMC context. Therefore, it is necessary to expand the scope of research to include EFL SCMC context when examining the effect of task type and group structure on interactive negotiation, which is not only crucial to second language acquisition (SLA), but also foster learner language development (Long, 1985). In addition, social psychological perspective focusing on group structure and group processes has been a core concept to understand classroom dynamics. In order to find considerable implications for education, this study seeks to determine the effect of task type and participant group structure on meaning negotiation in a synchronous text chatting context. There is still lack of studies on what task characteristics and features contribute to learners' meaning negotiation and group structure in the area of CALL. The specificity of computer-based tasks for collaborative activity and the development of tasks for computer-mediated interaction need further development in an EFL context due to the comparative lack of opportunities for language interaction compared to ESL contexts.

Blake (1998) and Pellettieri (2000) argued that task-based synchronous text-chat can trigger negotiation of meaning and form-focused interaction. Better designed interactive computer-mediated tasks could provide more opportunities for negotiation of meaning than face to face communication. Chun's (1994) research indicated that chatting can foster the development of socio-linguistic and interactive competence. Foster (1998) showed that the dyad format was the most successful in encouraging students to talk. Building on this finding, this study focuses on peer interaction and collaborative group work in task-based SCMC in dyads using a chat program. Park (2006) claimed that few SCMC studies have addressed the relevant issues of how to group or pair participants and there is a lack of information on exactly how the participants were paired. In addition, most SCMC studies have looked primarily at form-focused interaction, discourse strategies and corrective feedback shown in student output (Chun, 1994; Han, 2005; Kern, 1995; Pellettieri, 2000; Warschauer, 1996). Research on meaning negotiation would therefore be greatly enriched by including more careful attention to task-based studies with an analysis of participant group structure.

The purpose of the current study is to compare the effects of proficiency level on how much

negotiation of meaning was produced in the different pairs, and how three different task types affected negotiation (jigsaw, decision-making, and free discussion) by analyzing text-chat quantitatively and qualitatively.

2. Literature review

2.1. Interactionist Approaches and Meaning Negotiation

Negotiation of meaning, a particular type of interaction, is specified along the lines of interactionism. It refers to interactional work executed by interlocutors to achieve mutual understanding when a communication problem occurs. Pica (1994) explored a specific type of interaction known as "negotiation of meaning" has been used to characterize the modification and restructuring of interaction that occurs when learners and their interlocutors perceive difficulties in message comprehensibility (p.494).

Negotiation sequences have been identified by Ellis (2005) as clarification requests, confirmation checks, recasts, or other types of repetition and they were defined by Long (1985) as a type of interactional modifications. Whatever labels are used, these features of negotiation portray a process in which a listener requests message clarification and confirmation and the speaker follows up these requests through repeating, elaborating or simplifying the original message. All these studies support the position that interaction embodied into meaning negotiation helps learners to comprehend non-understanding when a problem occurs so that comprehension ultimately contributes to successful SLA.

Varonis and Gass (1985) found that negotiation of meaning is an essential component in successful language acquisition, especially among NNS/NNS dyads, compared to NS/NS and NS/NNS pairs. The result showed that NNS/NNS pairs produced the greatest non-understanding sequences when they were in heterogeneous groups in terms of L1 background and L2 proficiency. Most studies on negotiation of meaning have been founded on Varonis and Gass's (1985) model of negotiation, which extended Long's model of modified interaction. The current study follows Varonis and Gass's (1985) model by focusing on NNS-NNS interaction and more dynamic interaction sequences. Their model consists of two parts: trigger and resolution (Table 1).

TABLE 1 Varonis and Gass's (1985) Model of Negotiation Sequence

Trigger	Resolution
T→	I →R→RR

(p. 74)

The first part of the model consists of a trigger denoted by T. The second part of the model is referred to as the resolution. It consists of an indicator (I), a response (R), and a reaction to the response (RR). The trigger is that utterance or portion of an utterance on the part of the speaker that results in some indication of non-understanding on the part of the hearer. Indicators signal that an utterance has triggered a non-understanding. Gass and Varonis (1985) focused on sequences of negotiation of meaning rather than modification strategies. Their model focuses more on the dynamics of the interaction itself, while Long's modified interaction model focuses on simplification or adjustment of the level of input. Gass and Varonis (1985) provide a useful tool to characterize and understand a particular type of interaction that is said to promote SLA. Therefore, this study analyzed the sequence of meaning negotiation based on Varonis and Gass's model in a task-based CMC context.

2.2. Meaning Negotiation in SCMC

Synchronous computer-mediated communication (SCMC) provides an ideal environment for activating interaction and facilitating negotiation of meaning. Previous studies have shown that the use of SCMC enhances language learning (Beauvois, 1998; Kern, 1995; Lee, 1997; Oliva & Pollastrini, 1995; Pellettieri, 2000). Kern (1995) showed that students produced a greater amount of production in terms of turns, words, and sentences in SCMC than in face to face discussion. Pellettieri (2000) also

examined negotiation of meaning following the Varonis and Gass's (1985) model. She found that with 20 university intermediate-level Spanish students that both jigsaw and decision-making tasks produced negotiation of meaning. She confirmed CMC's potential for fostering the negotiation of meaning in task-based interaction. Pellettieri also found that learners formed their output and produced lexical, syntactic and semantic output modifications in response to negotiation as well as corrective feedback. This result demonstrates that task-based synchronous CMC can aid the negotiation of meaning. Fernandez-Garcia and Martinez-Arbelaiz (2002) investigated whether nonnative Spanish speakers engage in negotiation when exchanging ideas in synchronous computer-mediated interaction. The analyses of the interactions showed that negotiation do occur in the electronic medium and special concern was the use of L1 to solve instances of non-understanding. Recently, Smith (2001, 2003) argued that the Varonis and Gass's model (1985) is "insufficient to adequately deal with negotiation in a CMC environment" and proposes "an expanded model of meaning negotiation in task-based CMC" (2001, p. 222). According to Smith, many triggers are ignored, so he included a new expanded model for text-based meaning negotiation.

2.3. Studies on task type and group structure

Task type has been widely discussed as another factor contributing to the variability of L2 interaction and negotiation of meaning (Gass & Varonis, 1985; Doughty & Pica, 1986; Pica & Doughty, 1985; Pica, 1987). These studies have investigated which types of task are most productive in classroom context and have found that information gap tasks by dyads provide the most opportunities for negotiation of meaning (Ellis, 2003; Long, 1980). Blake (2000) suggested that jigsaw tasks elicit the greatest amount of negotiation while Smith (2003) argued that decision-making tasks evoke negotiated interaction most. Gass and Varonis (1985) compared NNS/NNS interaction between a one-way and a two-way task. The results showed that interlocutors initiated negotiation more frequently in the one-way task.

Most of these studies on task type have focused on classroom-based tasks between teacher and student or student and student (Gass & Varonis, 1985; Oliver, 2002; Sauro, Kang & Pica, 2005). There is still lack of studies to investigate task-based SCMC in an EFL context. Therefore, the main concern of this study is to study the effect of task on NNS-NNS pairs in a synchronous text chatting context. Meaning negotiation studies in an EFL context have increased in recent years (Lee, 2002; Lee, 2005; Lee, 2006; Park, 2003), but there is still little empirical research investing the effect of group structure and task type. Along the same lines as the result of this study, Park (2006) investigated the effects of task type and task repetition on Korean college students' language performance and meaning negotiation in SCMC. Forty students produced a greater amount of language in jigsaw tasks than in decision-making tasks on the same topic. Learners also showed a higher quantity of meaning negotiation in jigsaw tasks than in decision-making. There is much research on group dynamics in the L2 classroom. Olaf (2003) investigated students' level of participation related to group size. The group with only four members profited most from the equalizing effect of the chat room. Senior (1997) argues that L2 classes need to be transformed into bonded groups. Groups affect the member attitudes, such as confidence and satisfaction, and these attitudes influence interaction. Research on the effective formation of cooperative groups has shown that random groupings or interest-based groupings can provide a perception of fairness (Olsen & Kagan, 1992). In a study of child-child interactions, Oliver (2002) confirmed the results of the Varonis and Gass's study, finding that NNS-NNS dyads used more negotiation than did the NNS/NS and NS/NS dyads in two types of task (a one-way task and a two-way task). However, homogeneous NNS dyads produced more negotiation than heterogeneous groups. This result was inconsistent with the findings of Varonis and Gass but implies that group structure affects negotiation of meaning. This current study examined the effect of group structure in task-based SCMC and its result is consistent with Oliver's (2002). In order to foster peer feedback and peer pressure, small groups or dyads can have a significant impact on the effectiveness of learning. Group formation can be an important adjustment for successful L2 acquisition.

A few studies suggest that SCMC provides optimal opportunities for language acquisition (Chun, 1994; Kern, 1995; Warschauer, 1996). Negotiation of meaning has also been identified as one type of interaction that is particularly facilitative of acquisition (Gass & Varonis, 1985; Pica & Doughty, 1985; Pica, 1994). However, its success depends on how effectively task type and group structure are planned and implemented taking account the characteristics of students. Most studies on meaning negotiation

in SCMC have failed to consider these two factors. Therefore, this study has set out to verify the effect of task type and participant structure on meaning negotiation in a SCMC context. In particular, the present study aimed to answer the following research questions: (1) Does the amount of meaning negotiation differ according to three different task types? (2) Does the amount of meaning negotiation differ between homogeneous and heterogeneous groups?

3. Method

3.1. Participants

The participants consisted of lower-intermediate-level EFL students (n=24, 8 females and 16 males) from English writing course in the fall of 2007 at a large Korean University. Their ages ranged from 21 to 30, and they had a wide range of majors: mechanical engineering, computer science, history, philosophy, sociology, economics, management, dance and English. Most students were non-English majors (Non-English majors: 80% vs. English majors: 20%). The purpose of the class, as stated in its course syllabus, was to improve writing ability through a text-chat experience. Some students showed curiosity and enthusiasm about using computer technology in an English writing class. Teacher's official feedback was provided after the text chat was finished. Although all dyads used the same native languages, they were supposed to use English only during text-chat proceeds in a class. Proficiency level was determined by an essay writing test and a cloze test and students' pairing was preplanned based on their proficiency test score.

3.1.1. Participants Group Formation

According to language proficiency, 24 students were assigned into two groups where they were paired with one partner: the homogeneous group (Higher-higher/Lower-lower) and the heterogeneous group (Higher-lower) based on their total scores on two pretests (a cloze test and an essay writing test). However, students were not explicitly informed of these scaffolding roles. Table 2 shows the demographics of the student pairs. During week 6-8, 6 pairs worked in the homogeneous group and the rest 6 pairs worked in the heterogeneous group. During week 9-12, 6 pairs who had worked in the homogeneous group switched to the heterogeneous group and the rest 6 pairs who had worked in the heterogeneous group switched to the homogeneous group.

TABLE 2 Demographics of the Student Pairs

Homogeneous Groups	Heterogeneous Groups
1. H-H(high-high)	7. H-L(high-low)
2. M-M(middle-middle)	8. H-L(high-low)
3. M-M(middle-middle)	9. H-L(high-low)
4. M-M(middle-middle)	10. H-L(high-low)
5. M-L(middle-low)	11. H-L(high-low)
6. L-L(middle-low)	12. H-L(high-low)

3.2. Summary of Pilot Research

Pilot study was carried out during a full semester as an almost entire re-test to support more reliability and ensure the validity of the main study. The purpose of pilot research was to examine the quality of the data collection procedure prior to administering the main research. The research instruments, research method and data collection procedure were tested and confirmed in the pilot

study. Results of the pilot were used to revise the data collection procedures and research as a whole. As for the group structure, the interview results showed that most students preferred pairing of two people to groups of three in text-chat discussion. Therefore, students were grouped into pairs in the main study. As a result of the pilot study, the questionnaire format was modified and some items were added for students' better understanding. The Internal consistency reliability of all the items was tested using Cronbach's Alpha and some items evoking confusing were revised and adjusted. Qualitative analysis revealed that some important factors affecting negotiation of meaning were group structure, the number of group members, typing speed and familiarity between group members. On the basis of these results, in the main study, participants with the same major, familiarity with group members and English typing speed were considered in assigning group divisions.

One of the major lessons from the pilot study was the effect of topic and task order. Since different topics were used in the three different tasks, it was difficult to discriminate the difference within groups by only employing task type. Thus, in the main study, students were asked to complete three different tasks with the same topics so that task order and topic familiarity could be controlled at the same time. In the main study, the topic was identical in the completion of the three different tasks and task order. The homogeneous-heterogeneous balance and the frequency were also rigidly controlled.

3.3. Data Collection Procedure

MSN messenger text-chat in English only was conducted for 40 minutes once a week for 11 weeks in a campus computer lab during regularly scheduled class meetings. After an introductory session on week 1, the students participated in a training session and practiced three different tasks during weeks 3-5. The main data collection started from weeks 6-11. As for the task order, three tasks were carried out in the order of jigsaw, decision-making, and open-ended tasks on the first class day. Then, task order was repeated as shown in the following table (TABLE 3). There were nine text-chat topics: shopping, job, the noisy neighbor, bus trip, computer breakdown, marriage, cleaning, presents, and Christmas. Among these, six topics were used for data collection.

TABLE 3 Task Order and Topics

	Task order	Topic	Activity
week 1			Introduction
week 2			Training Session
week 3	J-D-O task	Shopping	Task Practice
week 4	D-O-J task	Jobs	Task Practice
week 5	O-J-D task	A noisy neighbor	Task Practice
Main Study			
week 6	J-D-O task	Bus trip	Text chat
week 7	D-O-J task	Computer breakdown	Text chat
week 8	O-J-D task	Marriage	Text chat
week 9	J-D-O task	Cleaning	Text chat
week 10	D-O-J task	Presents	Text chat
week 11	O-J-D task	Christmas	Text chat
J (Jig-Saw task)	D (decision-making task)	O (Open-ended task)	

All of the students in the class were divided into three parts to complete each of the three different tasks (jigsaw, open-ended, and decision-making). Among the total 12 pairs, four pairs were supposed to do each different task with the same topic so that task order and topic familiarity could be controlled at the same time (Table 4). If all of the students had the same task in a class, the students would have had to do text chat with the same topic, which would have been boring and would have affected the

amount of meaning negotiation and lessened their text-talking. The task order and task division were carried out during week 6-8 and students changed their text-chat partner to have group mode switched. The same process was administered during week 9-11 (Table 4).

TABLE 4 Task Order and Task Division

Week	Task-Division			Total
Week6	4 pairs (J-task)	4 pairs (D-task)	4 pairs (O-task)	12 pairs
Week7	4 pairs (D-task)	4 pairs (O-task)	4 pairs (J-task)	12 pairs
Week8	4 pairs (O-task)	4 pairs (J-task)	4 pairs (D-task)	12 pairs
Text-Chat partner change				
Week9	4 pairs (J-task)	4 pairs (D-task)	4 pairs (O-task)	12 pairs
Week10	4 pairs (D-task)	4 pairs (O-task)	4 pairs (J-task)	12 pairs
Week11	4 pairs (O-task)	4 pairs (J-task)	4 pairs (D-task)	12 pairs

J-task (Jig-Saw) D-task (decision-making) O-task (Open-ended)

3.3.1. Data Collection by Group Structure

The data of the students' text chat were collected for six weeks from week 6 to week 11. Half of the students did text chat in the homogeneous group and the other half of the students did text chat in the heterogeneous group. From week 9 to 11, they switched the mode; the pairs who had worked in the homogeneous group first switched to the heterogeneous group and vice versa (Table 5). One of the pair played a leader's role by turns in leading text-chat. All students had two text-chat partners throughout the semester to balance the group structure.

TABLE 5 Group Structure in the Text Chat Schedule

week 6		
week 7	Homogeneous Pair	Heterogeneous Pair
week 8		
week 9		
week 10	Heterogeneous Pair	Homogeneous Pair
week 11		

3.4. Research Instruments

Several instruments for collecting data were incorporated in the study: an electronic text chat program, interviews, student learning journals, a cloze test, an essay, and student perception questionnaires. In order to gain an in-depth understanding of students' beliefs and thoughts about text-chat, eight interviewees were selected from each higher and lower level and the interviews were conducted in Korean. All the interview data were recorded and transcribed for analysis. Student perception questionnaires were administered twice during the duration of the study when they met a new partner to find out which mode of group structure (homogeneous or heterogeneous group) they preferred in terms of the group satisfaction and the affective aspect. This study mainly relies on the electronic text-chat transcripts that the students created in their pair interaction. The data was stored by a group leader and uploaded on the class community bulletin board. The interview was carried out twice: once in the middle and then again at the end of the semester when their text chat partner had changed. Each interview lasted approximately 30 minutes. All the interview data were recorded and transcribed for analysis. Students were asked to write journals once a week after

reviewing their text chat. In this study, Bachman's (1982) cloze test was selected in order to obtain consistent validity and reliability. Questionnaires were administered twice during the duration of the study. Each scale included 10 items and the total number of items was 20. The purpose of conducting the questionnaires was to find out which mode of group structure they preferred in terms of the group satisfaction and the affective aspect. A five-point Likert scale on each item was used and the measures of the internal consistency of all the items obtained from the pilot research led to some modifications in the main study. Analysis of the group satisfaction scale was found to be at .950 for Cronbach's Alpha reliability and the affective aspects scale resulted in a Cronbach's Alpha of .924.

3.5. Data Analysis

Data in the study was analyzed both quantitatively and qualitatively. Routines of negotiation of meaning are categorized using the model of Varonis and Gass (1985), and the amount of meaning negotiation is analyzed using the repeated measures ANOVA to examine the effects of tasks and group structure over time. The result of questionnaires on the level of students' group satisfaction and learning anxiety was analyzed through a paired sample *t*-test to see if the degree of two groups' satisfaction was statistically significant or not. For qualitative analysis, the transcripts of the interviews and student journals were open-coded based on the procedures suggested by Strauss and Corbin (1990). All data from different sources (interview, journals, questionnaires, and electronic text chat) were triangulated to explore the research questions.

3.6. Coding

The routines of this negotiated interaction in the students' text chat were first marked and the number of Trigger (T), Indicator (I), Response (R), Reaction to Response (RR) sequences were counted according to task and group structure. The main data analysis, the participants' text chat was analyzed and coded by the model proposed by Varonis and Gass (1985). Table 6 shows an example of one of the routines used by two nonnative speakers to negotiate a non-understanding.

TABLE 6 Varonis and Gass's (1985) Model of Meaning Negotiation

Utterance	Function
NNS 1: I will be staying four months.	Trigger (T)
NNS 2: four months?	Indicator (I)
NNS 1: Yes.	Response (R)
NNS 2: Stay four months here until April.	Reaction to Response (RR)

Adapted from Varonis and Gass (1985)

NNS1's first utterance "I will be staying four months" serves as a trigger. According to Varonis and Gass (1985), a trigger is an utterance or portion of an utterance on the part of the speaker that results in some indication of non-understanding on the part of the hearer. The NNS2 repeats the word "four months" with rising intonation. This utterance is the indicator. The indicator is an utterance that has triggered a non-understanding. The NNS1's utterance, "yes" confirms that "four months" was the word she had used and constitutes the response. Finally, the utterance from NNS2, "Stay four months here until April" is the reaction to the response. Coding procedure was conducted on the basis of approximately 600 single pages of text-chat scripts analysis.

4. Results

4.1. Meaning Negotiation across Task Type

To answer the first research question, the amount of meaning negotiation according to task type was analyzed using the repeated measures ANOVA. Table 7 shows that participants produce the negotiated interaction most in the jigsaw task ($M=10.1667$), followed by the decision making task ($M=5.3333$) and the open-ended task ($M=3.1667$). When compared with mean difference, there are

quite big mean difference between the jigsaw task and open-ended task. The open-ended task is not recommended to facilitate negotiation of meaning in text-chat discussion. The amount of meaning negotiation is quite low in open-ended task. These findings seem to be consistent with Pica et al.'s (1993) study which posited that the Jigsaw task (picture-sequencing task) should facilitate negotiation over the information gap, decision-making and opinion exchange tasks. The jigsaw task required an information exchange for task completion.

TABLE 7 Descriptive Statistics: Amount of MN per Task Type

Task type	N	M	SD
A-Jigsaw task	24	10.1667	3.8636
B-Decision-making task	24	5.3333	3.4974
C-Open-ended task	24	3.1667	2.2393

Tables 8 shows that task type affects quantity of meaning negotiation. This statistical result regarding the effect of task type on meaning negotiation indicates that the amount of meaning negotiation is significantly different according to task type ($F=51.618$, $p<.001$). This finding shows that meaning negotiation is more prevalent in the jigsaw task than any other type of task, resulting in more production of output. The jigsaw task is most effective for inducing negotiation of meaning, if only quantity is considered. However, it is difficult to conclude that the amount of negotiation of meaning can guarantee comprehension and acquisition. More qualitative analysis on the relationship between meaning negotiation and task type will be discussed further in Section 4.3.

TABLE 8 Repeated Measures for Task Effect

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between	307.111	23	13.353		
Within	850	24			
Task	588.000	1	588.000	51.618	.000***
Error	262.000	23	11.391		
Total	1157.111	47			

Note. * $p<.05$, ** $p<.01$, *** $p<.001$

4.2. Comparison of Meaning Negotiation across Group Structure

To answer research question 2, the effect of group structure on meaning negotiation in text-chat class was investigated in terms of quantity between two groups. Group formation was assigned to half of the students in the homogeneous group and the other half of the students in the heterogeneous group during week1- week3. From week 4 to 6, they switched the mode; the pairs who had worked in the homogeneous group first switched to the heterogeneous group and vice versa. Comparison of meaning negotiation across group structure was conducted at three weeks' term. Table 9 shows the mean scores of meaning negotiation produced by homogeneous and heterogeneous pairs according to task type. The data from week 6 to week 8 was used to analyze mean difference between these two groups. Students in the homogeneous groups produced more negotiated interaction in the jigsaw task ($M=5$). In contrast, students in the heterogeneous groups produced more negotiated interaction in the decision-making ($M=3.33$) and open-ended task ($M=1.83$), but there seems to be no difference of mean score between the two groups.

TABLE 9 Meaning Negotiation Quantity between Two Groups during week6-week8

Task type	N	Homogeneous groups		Heterogeneous groups	
		M	SD	M	SD
Jigsaw	24	5	2.95	3.33	1.56
Decision-making	24	3.17	3.33	3.33	3.39
Open-ended	22	1.45	1.11	1.83	1.52
total		9.62		8.49	

Due to student absence, only 22 students participated in the open-ended task. In order to confirm statistical difference between these two groups, the repeated measures ANOVA was carried out twice at three weeks' term. Even if the mean score of homogeneous groups (M=9.62) are higher than that of the heterogeneous groups (M=8.49) in terms of entire of quantity of meaning negotiation, its statistical result appeared to be not significant (Table 10 & Table 11).

TABLE 10 Tests of Within-Subject Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
TASK	100.333	2	50.162	9.353	0.000***
TASK* GROUP	22.333	2	11.167	2.082	0.137
Error	236.000	44	5.364		

Note. *p<.05, **p<.01, ***p<.001

TABLE 11 Tests of Between-Subject Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	612.500	1	612.500	73.903	.000***
GROUP	.500	1	.500	.060	.808
Error	182.333	22	8.288		

Note. *p<.05, **p<.01, ***p<.001

The data from week 9 to week 11 was used to analyze mean difference between two groups (Table 12). Students in the homogeneous groups produced more negotiated interaction in the jigsaw (M=6.66) and open-ended task (M=2.33). Students in the heterogeneous groups produced more negotiated interaction in the decision-making (M=2.16). Even if the total mean score of homogeneous groups (M=10.99) were higher than that of the heterogeneous groups (M=8.82), the result conducted by the repeated measures ANOVA appears to have no statistical difference between the two groups in terms of the amount of meaning negotiation (Table 13& Table 14).

TABLE 12 Meaning Negotiation Quantity between Two Groups during week9-week11

Task type	Homogeneous groups			Heterogeneous groups	
	N	M	SD	M	SD
Jigsaw	24	6.66	3.22	5.33	1.66
Decision-making	24	2.00	1.59	2.16	1.74
Open-ended	24	2.33	1.43	1.33	1.15
Total		10.99		8.82	

To sum up, Oliver (2000) argued that homogenous NNS dyads produced more negotiation than heterogeneous dyads in a study of child-child interactions. Varonis and Gass (1985) found that heterogeneous NNS groups produced more negotiation than homogeneous groups in a study of adult-adult interaction. However, the results of the quantitative analysis in this study show that there was no statistical difference between the two groups, homogeneous and heterogeneous, in terms of the amount of meaning negotiation.

TABLE 13 Tests of Within-Subject Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
TASK	262.111	2	131.056	36.703	.000***
TASK* GROUP	7.444	2	3.722	1.042	.361
Error	157.111	44			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

TABLE 14 Tests of Between-Subject Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	786.722	1	786.722	198.434	.000***
GROUP	9.389	1	9.389	2.368	.138
Error	87.222	22	3.965		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

4.2.1. Analysis of the Survey of Group Satisfaction

To quantify the degree of each group's satisfaction in terms of collaborative learning and anxiety, five point Likert Scale items were used. The participants were asked to mark the degree of their involvement (1 strongly disagree, 2 disagree, 3 agree, 4 strongly agree) according to the homogeneous and heterogeneous groups respectively. A survey consisting of each of ten items for collaborative learning and anxiety was conducted twice in a three week term.

A descriptive analysis and a paired sample *t*-test were carried out to compare the group satisfaction of the homogeneous and heterogeneous groups after some negatively worded items were reverse coded (Table 15&16).

TABLE 15 Descriptive Analysis: Collaborative Learning

Group	N	M	SD
Homogeneous	12	3.4250	.3720
Heterogeneous	12	3.2167	.4859

TABLE 16 T-test Results for Collaborative Learning

Group	Mean Difference	t	df	Sig. (2-tailed)
Homogeneous Heterogeneous	.2083	2.315	11	.041*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 15 illustrates that the mean scores of the homogeneous groups were higher than those of the heterogeneous groups in terms of collaborative learning. This implies that the homogeneous group may have been more effective than the heterogeneous group from the learners' perspectives. In order to verify this finding, a paired sample *t*-test was carried out and a significant statistical difference was found between the two groups ($p < .05$).

4.2.2. Analysis of the Survey of Affective Satisfaction

The following table shows the descriptive statistics and the results of the second category regarding affective satisfaction (Table 17&18). This result indicates that there is a significant difference between the two groups in terms of affective aspects ($p = 0.041$). Students felt more comfortable in the homogeneous group when involved in online negotiated interaction and their anxiety and tension decreased. Degree of comfort, self-esteem, and confidence are affective variables that are significant factors for successful language learning (Selinker & Gass, 2008).

TABLE 17 Descriptive Analysis: Affective Satisfaction between Groups

Group	N	M	SD
Homogeneous	12	3.150	.4642
Heterogeneous	12	2.858	.3919

TABLE 18 T-test Results for Affective Satisfaction

Group	MD	t	df	Sig. (2-tailed)
Homogeneous Heterogeneous	.2917	2.318	11	.041*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

On the basis of this result, affective variables should be more carefully considered when organizing groups in computer-mediated collaborative interaction, which is different from face to face interaction. Meaning negotiation in a SCMC context may cause discomfort and put students in an anxiety-provoking situation where they have to solve a misunderstanding or non-understanding by depending only on the text message itself unlike face-to face discussion. Affective factors can be an important variable to prevent students from pursuing negotiation when communication breakdowns occur. Overall, these two categories, which are group satisfaction for collaborative learning and affective satisfaction, appeared to show a similar tendency in the homogeneous group. The homogeneous group was more effective in terms of collaboration learning and affective aspects than the heterogeneous group.

4.3. Qualitative Analysis of the Results of Students' Journals and Interview

4.3.1. Task Type

As illustrated in the excerpt, students of P, J, and K students mentioned that they had more difficulties with the jigsaw task.

I think it's more difficult than past one; shopping. Why I said is we should have expressed the scenes in detail. Some pictures made us confused. (P)

The story and the order were very confusing. The hard thing was the exact explain about the scene. (J)

Jigsaw puzzle type of text chat, which I think is the most confusing between all. (K)
(Journal entry about jigsaw)

Regardless of the students' English proficiency level, most students ranked task difficulty in the order of jigsaw, decision-making, and open-ended task. Negotiation was activated in the jigsaw task most because they knew what to how to do by describing the pictures. But their vocabulary resources were limited in describing the picture and they felt the strongest tension and pressure in terms of finding the correct answers in a limited time. In addition, the jigsaw task which focused on only picture sequencing and hindered student creativity in interaction. Therefore, an interesting finding revealed in the interview is that their interest and desire for learning decreased in the jigsaw task as text-chat sessions went by even though the negotiation was activated the most. Students explained the group experiences in these terms:

Non-understanding was occurred most in jigsaw task. I positively asked to my partner what I didn't understand. Jigsaw task was the most difficult thing, then decision-making and open-ended task. Jigsaw task itself was interesting but the depth of discussion was not deep. We had to find the correct order of picture sequencing in a limited time. (Interview, J)

I asked my text-chat partner a lot of questions and answered most in jigsaw task. I felt a limitation in expressing pictures in English. This was the most difficult activity. But the lengths of sentences were short. I couldn't get into deep discussion with my partner. The level of discussion was superficial. It made me irritable when my text-chat partner gave me wrong information. I had to depend partner's expression too much. This activity didn't attract my attention. (Interview, O)

In contrast, students were getting interested in the decision-making task, even though the amount of negotiated interaction was less than that of the jigsaw task in quantity. Students still had difficulty in achieving consensus but they learned how to convey their logical explanations effectively and regarded their partner as a creative thinker in the decision-making task. Their opinions are as follows.

Decision-making task was the most interesting activity because it led me to dynamic discussion and I had to make a best decision in a limited condition and situation. I couldn't argue only my opinion. Decision-making task needs a tuning and persuasion process with a partner. It seems to be similar to the real communication. (Interview, H)

I prefer this kind of talks to jigsaw puzzles. But whenever I talk about the puzzle, I just focus on the answer. It's not interesting. However, when I talked about "bus trip or marriage" (decision-making or open task), I could enjoy sharing ideas with my partner. I can be more creative. (Journal Entry, C)

As illustrated in the excerpts, the decision-making task was the most interesting activity because it led students to dynamic discussion and fresh impact which surprised them and stimulated interest. Students enjoyed sharing ideas with their partner in the decision-making task and they believed that

the task is effective in improving English expression. In the case of higher level students, they preferred to exchange their ideas and share their opinions in the open question or decision-making task. On the other hand, they expressed the opinion that the jigsaw task prohibited them from being creative and controlled their freedom of expression. In the open-ended task, students produced the least negotiation. They hardly asked any questions indicating non-understanding. The negotiation process was simple and easy and the type of their text-chat discussion was one sided and not as interactive as in the open-ended task. Student C stated his concerns about the negative aspects of the open-ended task which had low expectations and tension.

I was not surprised at partner's response in open-ended task. Without any tension and pressure, I could freely discuss with a partner and expectation about a response from a partner was low. I just expressed my opinion only. It was the easiest activity among three. (Interview, C)

4.3.2. Group Structure

Higher-level students preferred to vividly homogeneous pairs in collaborative learning. Most high level students stated that learning is effective when they are in homogeneous group as shown by their journal responses.

I think our team work is pretty good so far, and we were able to get an agreement very quickly. (Journal, K)

My partner leaded me well and made me to speak as much as I could. I think the cooperation with partner is really significant. (Journal, P)

Lower level students' responses toward group structure are the following. Three students out of the four preferred to be put in the homogeneous group. Their low anxiety led them to participate in text-chat actively and they were able to take initiative in learning, yielding positive effects in learning in the homogeneous group.

I could express my opinion freely with my partner regardless of grammar, language form with a lot of motivation. I like to meet my partner again. (Interview, K)

At first time, I thought that text-chat with a partner from high proficiency level would be helpful but I realized that familiarity with a partner is more important factor inducing deep discussion. Even if my partner's English proficiency was not good, we could discuss deeply due to our closeness. (Interview, H)

Some students in lower level lost points and wondered what to how to do. Therefore, a teacher needs to monitor their learning progress and pay careful consideration to students who are at a lower level.

My expectation about learning was getting decreased because my partner didn't give me a correct feedback properly in terms of vocabulary learning. (Interview, K)

5. Conclusion, pedagogical implications and further studies

The present study is designed to analyze meaning negotiation according to the effects of group structure and task type in a SCMC context. As for the first research questions, a quantitative analysis of this study reveals that task type affects the quantity of meaning negotiation, and the amount of meaning negotiation is significantly different according to task type. This finding shows that meaning negotiation is more prevalent in the jigsaw task than in any other type of task, resulting in greater learner production of output, which confirms previous task-based research related with negotiated

interaction (Smith, 2003; Pica et al, 1993). The jigsaw task is most effective for inducing negotiation of meaning, followed by the decision-making task and the open-ended task if only quantity is considered.

Consequently, the jigsaw task and the homogeneous pairs produced the most highly negotiated interaction. To increase the amount of interaction, the jigsaw task and the decision-making task are suggested in order to facilitate negotiation of meaning. However, it is difficult to conclude that the amount of negotiation of meaning can guarantee a trigger of comprehension and acquisition. More qualitative analysis on the relationship between meaning negotiation and task type from student interviews, journals, and questionnaires indicates that regardless of the students' English proficiency level, most students ranked task difficulty in the order of the jigsaw, decision-making, and open-ended task. Negotiation to solve non-understanding was activated in the jigsaw task most because they believed that their non-understanding could be solved by describing the pictures. Qualitative analysis also shows that the jigsaw task, which focused only on picture sequencing, hindered student creativity in interaction and controlled their freedom of expression. The decision-making task led more students to have dynamic discussion and interesting activities than the jigsaw task. As a result, their interest and desire for learning decreased in the jigsaw task as text-chat sessions progressed even though negotiation was activated the most. Therefore, as Muller-Hartmann (2000) pointed out tasks must be carefully constructed to foster interaction and negotiation of meaning, so implementation of mixed types of tasks according to the language proficiency levels of learners is desirable.

As for the second research question, a quantitative analysis shows that there was no statistical difference between the two groups, homogeneous and heterogeneous group, in terms of the amount of meaning negotiation. On the other hand, a qualitative analysis demonstrated that the homogeneous group was more effective in terms of collaboration learning and affective aspects than the heterogeneous group. In conclusion, the results of this study suggest that task type affects the amount of negotiation of meaning in a SCMC context. Meaning negotiation has been referred to as proof of successful language acquisition by modifying learner input and output was highly productive in the jigsaw task. There was no statistical difference between the homogeneous and heterogeneous groups in terms of quantity of negotiation of meaning. However, a qualitative analysis from student journals and questionnaires reported that the homogeneous group is more effective in light of collaborative learning and affective aspects.

From the findings of this study, several implications can be drawn. First, the main focus of this study has been on exploring effective group structure in fostering negotiation of meaning. In this vein, this study supports the policy of the Korean Ministry of Education advocated in the 7th National Curriculum that English leveled classes by language proficiency level would help to improve learning. This study is helpful for teachers and teaching materials development that is appropriate to a proficiency-based curriculum. On the basis of students and teachers' needs analysis, instructional materials and lesson plans should be designed. Leveling enacted by the homogeneous groups in this study was welcomed by the students themselves in light of successful collaborative learning and psychological aspects. Second, more carefully designed tasks including jigsaw tasks and decision-making tasks would provide students with more opportunities to negotiate meaning and its proper implementation according to language proficiency level which is also important to successful interactive negotiation. Most importantly, teachers have to choose proper tasks for the students and make detailed tasks to foster interaction and negotiation of meaning. Then, their SCMC classes will be dynamic places where students can enjoy studying with peers by extending the boundaries of discussion.

SCMC has proven to be beneficial for language acquisition, especially to the extent that negotiation of meaning facilitates acquisition. However, its success is related to the features of task and group structure. Even though positive ways of using SCMC in English class have been widely expanded in these days, there are still many difficulties and challenges teachers have to cope with. Some students have difficulty staying on task as they are used to using computers to multi-task for personal interests, so it is not easy for them to concentrate on learning for a long time using a computer. In the case of interacting in English using computer networks in the classroom, students have difficulty in expressing their emotions and thoughts in English. They can give up asking questions and building up conversation easily when they lack unwillingness and motivation. Teachers will therefore need to explore many ways to monitor students' inner states and attitudes toward learning, which cannot easily be monitored. In particular, teacher research on the affective and psychological affair of students learning should be conducted in a CMC educational setting.

For teacher's, it takes quite a lot of time to prepare class and learn a new method and procedures for using the technology. It is difficult to find the opportunity to learn a new media for teacher education training despite its importance. The speed of change in interactive multimedia technology has an effect on effective learning. The primary challenges facing today's teachers are not technological but involve the social interaction to develop dynamic communication and promote meaningful interaction within and outside of classes. As multimedia technologies become more available, text-chat and SCMC within classrooms could be expanded to international text-chat in SCMC. Further research should study the effects of task type in homogeneous groups, conduct longitudinal research to gain more generalizability beyond research limitations, and expand their investigations from primarily text-based chat to designs that incorporate other technology-mediated modes such as video-conferencing or voice-chat.

Appendix A: Sample for Open-ended Task

Topic: Cleaning

Student A, Student B:

Suppose that you and your partner live in a house with garage. Garages are not only a place to store cars, but they are also a great place to store things. But your garbage is so messy that you leave your car in the driveway. In order to get your car back in your garage, you and your partner have to clean the messy garage. Your garage is full of all things you don't know what to do with. Make a good plan for garage cleaning or discuss some steps with your partner to be effective garbage cleaning.

Appendix B: Sample for Jig-Saw Task

Topic: Cleaning

Students A:



A



B



C

(Smith, 2003, p. 55)

You will find three pictures out of six. Your chat partner has the other three pictures. Together with your partner put the scenes in the correct order. To do this, you will need to describe each of your scenes to your partner since he/she cannot see your pictures. The scenes are marked A, B, C, D, E, F. Please type the correct order. For example, "The correct order is F-D-A-B-C-E."

MAKE SURE YOU HAVE THE CORRECT ORDER!!!

Student B:



D



E



F

(Smith, 2003, p. 56)

You will find three pictures out of six. Your chat partner has the other three pictures. Together with your partner put the scenes in the correct order. To do this, you will need to describe each of your scenes to your partner since he/she cannot see your pictures. The scenes are marked A, B, C, D, E, F. Please type the correct order. For example, "The correct order is F-D-A-B-C-E."

MAKE SURE YOU HAVE THE CORRECT ORDER!!!

Appendix C: Sample for Decision-Making Task

Topic: Cleaning
Student A



Tricycle



Snow shovel



Broom



Thermos

(Smith, 2003, p. 55)

Suppose that you and your partner live in a house with garage. Garages are not only a place to store cars, but they are also a great place to store things. But your garage is so messy that you leave your car in the driveway. In order to get your car back in your garage, you and your partner have to clean the messy garage. Your garage is full of all things you don't know what to do with. Below is some equipment you have noticed while cleaning the garage. Each of you has different four things. You must decide together on four items to make your garage cleaning effective.

Student B



Ax



Rake



Dustpan



Overalls

(Smith, 2003, p. 56)

Suppose that you and your partner live in a house with garage. Garages are not only a place to store cars, but they are also a great place to store things. But your garage is so messy that you leave your car in the driveway. In order to get your car back in your garage, you and your partner have to clean the messy garage. Your garage is full of all things you don't know what to do with. Below is some equipment you have noticed while cleaning the garage. Each of you has different four things. You must decide together on four items to make your garage cleaning effective.

Appendix D: Sample Text-chat using MSN Messenger

avis0601@hotmail.com님의 말:

Hmm...a little bit confused...

avis0601@hotmail.com님의 말:

So, You got three pictures numbered 1,2,3 right?

전인학님의말:

Right.

avis0601@hotmail.com님의말:

I have 4,5,6//

avis0601@hotmail.com님의말:

Then, What's the Ax, Rake, Dustpan things?

avis0601@hotmail.com님의말:

Do we need those things to do our activity?

전인학님의말:

We may need to use the tools to explain the pictures.

avis0601@hotmail.com님의말:

okay~ Then I'm gonna explain the picture 4,5,6

전인학님의말:

Could you explain the pictures you have?

avis0601@hotmail.com님의말:

in the picture 4, the boy is in the garage and a girl is opening the door and the garage is very full of other stuff.

전인학님의말:

OK.

avis0601@hotmail.com님의말:

in the picture 5, the boy is in his room and has a dustpan and his room looks very clean.

avis0601@hotmail.com님의말:

In the picture 6, the boy is also in the garage but the garage looks very clean he may clean the room.

avis0601@hotmail.com님의말:

Can you explain the pictures you have?

전인학님의말:

By the way, isn't is the garage in the picture 5?

avis0601@hotmail.com님의말:

No...

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