



## Effects of Task Complexity on Developing University Students' L2 Writing through Synchronous CMC\*

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### ABSTRACT

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Much attention has been focused on integrating technology into task-based language teaching in L2 writing due to the gradual increases using computer-mediated communication (CMC). However, what is essential in CMC settings is the selection of appropriate tasks. When designing tasks, one critical question relates to the adjustment of task complexity level. This study aimed to examine the effects of synchronous CMC (SCMC) tasks and task complexity on developing writing. The participants of the study were 43 students at a Korean university. The students were divided into two groups, the experimental group who carried out a series of SCMC tasks, and the traditional group. The mixed research was conducted using quantitative data such as students' writing pre-, mid-, and post-tests and qualitative data, including reflective journals. Findings from the study revealed that SCMC tasks positively affected the development of L2 writing ability compared to the traditional group. Second, task complexity in the SCMC setting did not affect developing writing ability, but what was interesting was that students perceived complex tasks in the SCMC setting to help develop writing ability. Based on the study, further research will need to modify research design, procedures, and tasks and implement various other task-specific measures.

### KEYWORDS

L2 writing, task complexity, synchronous computer-mediated communication

## 1. Introduction

Over the past few decades, task-based language teaching (TBLT) has been one of the main approaches for successfully implementing language teaching and learning. It may be because tasks provide an authentic context for meaningful output in the target language (Ellis 2003). Participating and engaging learners in performing tasks can offer a better context for activating learning processes and providing better language learning opportunities (Richards and Rodgers 2014). Furthermore, manipulating the cognitive demands of tasks (i.e., task complexity) has been the primary issue in classroom context among other task variables, as advocates of TBLT assumed that carrying out tasks ordered from simple to complex could promote L2 production and development.

Communicating in the computer-mediated communication (CMC) setting has provided students with more opportunities for second language learning (Kern, Ware and Warschauer 2008). Advocates of CMC in language learning highlight empirical evidence in CMC research to support CMC's effectiveness in L2 development and writing. For instance, Sauro (2011) insists that communicating through CMC can promote language learning, presenting examples of noticing, form-focused episodes, and self-repair. It can effectively facilitate the development of writing skills in terms of process-oriented writing (Lee 2021, Lin 2015). From a teaching perspective, it also offers benefits in that CMC settings enable learners to interact efficiently, including peer and teacher feedback in a large class, and allow the teacher to monitor students (Adams, Alwi and Newton 2015, Lee 2021). Due to the distinctive features and successful implementation of computer and mobile technology in L2 writing (Lee 2021, So and Lee 2013), some researchers are interested in combining CMC settings and TBLT (Golonka, Tare and Bonilla 2017, Kim and Lee 2018, Park 2007, Pellettieri 2000, So and Lee 2013, 2018, Stockwell and Harrington 2003, Tare, Vatz, Crooks and Strong 2014, Yilmaz 2011, Yuan 2003). Most related research, which focuses on task and nature of interaction in Synchronous CMC (SCMC) settings, has confirmed the effectiveness of implementing tasks in SCMC settings. However, González-Lloret and Ortega (2014) pointed out that some particularly emphasized the cautious implementation of SCMC, and SCMC settings were just entertainment for learners without appropriate tasks.

Many studies recognized the importance of appropriate and well-designed tasks in SCMC settings (González-Lloret and Ortega 2014, Kim and Lee 2018, Lee, 2021, Park 2007, Pellettieri 2000, Peterson 2010, Yilmaz 2011, Ziegler 2016). Inspired by the hypotheses in the TBLT framework, such as Robinson's cognition hypothesis (2001a, 2005, 2011) and Skehan's trade-off hypothesis (1998, 2009), several attempts were made to examine task design in SCMC environments (Adams and Alwi 2014, Adams, Alwi and Newton 2015, Alwi, Adams and Newton 2012, Baek and Lee 2018, Baralt 2013). The studies have documented the role of task complexity on interaction (Alwi, Adams and Newton 2012), output (Adams, Alwi and Newton 2015), and efficacy of feedback (Baralt 2013, Baek and Lee 2018) within an SCMC setting. Earlier work focuses predominantly on learners' task performance or interaction at a single point in time rather than on learning effects over time (Kim 2017). The difference between performance and learning did not seem to be addressed in most previous studies. There remains a need to incorporate task treatment with different levels of task complexity in a CMC setting to investigate the effects of task complexity on developing learners' writing ability. Most studies of task complexity in SCMC settings have been conducted in laboratories where tasks are regarded as outside the regular curriculum. Furthermore, few studies have investigated the effects of task complexity in SCMC settings on developing L2 writing ability. More research is needed in intact classes to address the pedagogical implications of actual L2 writing classes.

Therefore, this study investigates the effects of task complexity in an SCMC setting on the development of L2 writing ability at the tertiary level. The research questions for the study are as follows: 1) Do SCMC tasks develop

students' L2 writing ability?; and 2) What are the effects of task complexity in SCMC setting on developing students' L2 writing ability?

## 2. Literature Review

### 2.1 Task Complexity in L2 Writing

Many pedagogic tasks can provide learners learning opportunities to process both the input and output for L2 development (Ellis 2003, Skehan 1998, 2009). TBLT allows the learners to experiment with their spoken or written language through tasks and automatize existing L2 knowledge (Ellis, 2003). Within the context of TBLT, understanding the nexus of 'task-performance-acquisition' (Byrnes and Manchón 2014, p. 3) is essential in language learning and research, making classification of task features a critical concern for designing tasks. In general, task complexity is the degree of complexity required to complete a task. Robinson (2001a) stated that task complexity is a cognitive factor of a task, such as "the attention, memory, reasoning, and other information processing demands imposed by the structure of the task on the language learner" (p. 29). Task complexity is subdivided into resource-dispersing and resource-directing factors, which have different effects on resource allocation during L2 task performance (Robinson 2001a). On the other hand, Skehan (1998) proposed three factors: code complexity, cognitive complexity, and communication stress to analyze the difficulty of a task using the term task difficulty concerning task complexity. In this regard, a large and growing body of literature has examined the effects of task complexity (Abrams 2019, Kim 2012, Kim 2017, Lee 2020, Michel, Kuiken and Vedder 2007, Nuevo 2006, Rahimi and Zhang 2018, Révész 2011, Révész, Kourтали and Mazgutova 2017) based on the two hypotheses of task complexity: Skehan's trade-off hypothesis (Skehan 1998, 2009) and Robinson's cognition hypothesis (Robinson 2001a, 2007, 2011).

First, language learners have a limited attentional capacity to process information, and thus a focus on form and meaning compete for attentional resources (Skehan 1998, Skehan and Foster 2001). According to the limited attentional capacity view, a trade-off exists between attention to form and meaning for L2 learners (Skehan 1998, 2009). Skehan (2009) stated that either accuracy or complexity could accompany fluency, but not both in language learning. For example, more complex tasks require more attentional resources for content, resulting in less attention to form. Conversely, more attention to linguistic features is available while performing simple tasks (Skehan 1998). Second, Robinson (2001a, 2007, 2011) proposed the cognition hypothesis as a framework for sequencing and designing a syllabus. In contrast to Skehan's trade-off hypothesis (2009), Robinson (2001a, 2011) claimed that attentional resources are unlimited, so he suggested that learners access multiple and separate pools of attention. Within the task complexity criteria, task complexity is subcategorized into resource-dispersing and resource-directing factors. Complex tasks that were manipulated along with resource-dispersing variables, such as [+/- planning time] and [+/- prior knowledge], hinder learners from focusing on linguistic areas of L2. On the other hand, an increase in complexity and resource-directing variables, such as [+/- reasoning demand] and [+/- few elements], can direct learners' resources to linguistic resources, resulting in more complex and accurate L2 production (Robinson 2001a, 2001b).

Based on the theoretical framework of task design, many researchers have tried to investigate the trade-off and the cognition hypotheses. Some studies have examined the effects of task complexity on L2 writing (Abrams 2019, Cho 2015, Ishikawa 2006, Kang and Lee 2019, Kuiken and Vedder 2007, 2008, Lee 2020, Rahimpour and Hosseini 2010, Xu, Zhang and Gaffnet 2021). The results were generally positive but varied. For example, the results

indicated: 1) Complex tasks led to greater accuracy, syntactic complexity, and fluency but not lexical complexity (Ishikawa 2006); 2) The participants who performed cognitively demanding tasks demonstrated greater fluency but not on measures of accuracy and complexity (Rahimpour and Hosseini 2010); 3) Task complexity resulted in greater accuracy but not complexity (Kuiken and Vedder 2007, 2008); 4) The grammatical accuracy and syntactic complexity of the learners' writing were not affected by the task complexity (Cho 2015); 5) Task complexity and cognitive demands affected students' L2 writing (Xu, Zhang and Gaffnet 2021); and 6) Content provision likely reduced learners' cognitive processing burden, resulting in improvements on all linguistic features (Abrams 2019).

## **2.2 Incorporating Tasks in CMC Settings**

The potential and proliferation of CMC have brought many and valuable opportunities to learn a language through CMC (Lee 2021, Kern & Warschauer 2008). The benefits of CMC settings, e.g., visual saliency, self-paced language processing, collaborative learning, and peer and teacher feedback (Lee 2021, Pellettieri 2000, Sater and Özdener 2008) suggest that SCMC can also be an appropriate educational setting in language learning. In the context of L2 writing instruction, SCMC seems to offer many opportunities for learners to practice their writing while also promoting accuracy, fluency, and complexity. A meta-analysis by Lin (2015) summarized the effects of CMC intervention on second language learning. The results showed that CMC had a generally positive effect on language learning and was the most effective in developing writing skills among the four language skills. Indeed, CMC must be considered a beneficial tool for language teaching and learning and L2 writing instruction (González-Lloret and Ortega 2014, Kern and Warschauer 2008, Lee 2021, Lin 2015, So and Lee 2013, Yoon and Lee 2010).

A considerable amount of literature has provided theoretical reasons and empirical evidence regarding CMC settings as beneficial for language learning and writing instruction. However, no matter how exciting and beneficial the CMC setting may be, it requires a proper instructional model based on theoretical, pedagogical, and language development rationales to properly implement CMC in language teaching and learning (González-Lloret and Ortega 2014, Lee 2021). Among many approaches in language instruction, researchers have considered TBLT particularly suitable as a framework to organize technological designs and implementations (Chapelle 2004, Doughty and Long 2003, Salaberry 2000, Ziegler 2016, González-Lloret and Ortega 2014). It may be because CMC can provide an environment that allows students to learn through “doing things” in language learning (González-Lloret and Ortega 2014, p.3). In short, the potential of CMC to engage learners actively in learning can create a synergy between CMC and TBLT.

TBLT also has noticed the benefits of incorporating CMC into task-based instructional design, recognizing the potential and value of enriching TBLT curricula (González-Lloret and Ortega 2014). For instance, interactive writing tasks and their learning benefits could not be easy to focus on and implement appropriately in TBLT. Writing and its task conditions of most L2 writing classes shown in empirical studies were non-interactive, individual, and out-of-class (Manchón 2014, So and Lee 2013, Yoon and Lee 2010). Incorporating a CMC setting into tasks enables learners to engage in interactive writing tasks in process-oriented writing, allowing new dimensions of writing classes. Therefore, this study intends to apply a text-based SCMC environment in L2 writing classes because CMC can positively affect language learning and develop students' writing ability.

## **2.3 Task Complexity in L2 Writing through SCMC Settings**

As described so far, a CMC environment can provide ample opportunities for learners to interact with their

group members and to practice their writing due to its distinct features, expecting to develop their writing ability. Though many researchers exploring the role and effects of tasks in CMC have made calls for the appropriate tasks for CMC environments (Blake 2000, Park 2007, Yilmaz, 2011), there is still a little amount of research that investigate how different task design features, especially those of cognitive complexity in CMC settings affect improving students' L2 writing ability. Intending to reformulate frameworks for task design in CMC settings, Zigler (2016) emphasized the need to investigate how predictions from task-based frameworks, such as the trade-off and cognitive hypotheses, affect learner accuracy, complexity, and fluency in technology-mediated contexts.

The current studies regarding the task complexity in SCMC settings have been conducted by manipulating various variables (Adams and Alwi 2014, Alwi, Adams, and Newton 2012, Baralt 2013, Park 2007). For instance, Adams and Alwi (2014) examined the effects of task complexity on L2 written production in a text chat setting with forty-eight second-year engineering students. They used a [+/- prior knowledge] variable to manipulate task complexity. They detected a positive impact on lexical complexity and global accuracy only in complex tasks. As Robinson (2001a, 2001b) addressed the impact of task complexity on both interaction and L2 production, subsequent research has also investigated the effect of task complexity on interaction in text chat settings. Alwi, Adams, and Newton (2012) investigated the effects of task complexity on learner-learner interaction with 96 students. The results indicated that cognitively demanding tasks led to a decrease in interaction during SCMC tasks. Unlike the trend in task-related research conducted in a face-to-face setting, the developmental research in an online setting was conducted by Baralt (2013). The study investigated the efficacy of feedback in the form of recasts. 84 learners of Spanish participated in the study and engaged in interaction. While carrying out tasks, they received recasts on the Spanish past subjunctive in a laboratory context. The result indicated that the recasts worked better with simple tasks than those in an online setting. Park (2007) compared the effects of two task types, information-exchange, and opinion-exchange, on syntactic complexity of learner output in an SCMC setting. Twenty-four students performed the tasks for one semester. The results indicated that the opinion exchange prompted more syntactically complex output, in contrast to results in face-to-face settings. Interestingly, the results demonstrated the differences between SCMC and face-to-face settings, suggesting further research for application in SCMC environments.

In sum, most previous studies on the effects of task complexity in SCMC settings have focused on a resource-dispersing variable. As Robinson (2001a) claimed that the effects of task complexity in the two types of dimensions (resource-directing and resource-dispersing) are very different, investigations of the impact of task complexity along the resource-directing dimension in the CMC setting have the potential to fill a gap in the literature. In addition, prior research that has been conducted in SCMC settings has measured its effects on language performance at a single point in time. Concerning the context, there is a need to draw a pedagogical implication from intact classes in which tasks are implemented. This mixed research investigates the effects of task complexity on the development of L2 writing ability in an SCMC environment by implementing writing tasks in actual writing classes.

### **3. Method**

#### **3.1 Participants**

The participants of this study were 43 college students who enrolled in compulsory English writing classes. The course aimed to develop the students' L2 writing ability, expand vocabulary, and increase awareness of various

grammar structures. After reviewing their placement tests, all the students were deemed to belong in the 'Beginner' class. The students were not used to writing in English and were rarely asked to complete interactive activities following task-based curricula. The participants were randomly divided into the control group (fourteen males and six females) and the experimental group (fifteen males and eight females). Task-based instruction was provided to the experimental group, while the control group followed the traditional process-oriented writing instruction.

**Table 1. Participants of the Study**

Group	No. of Students	Gender (male/Female)	Level
Control Group	20	14/6	Beginner
Experimental Group	23	15/8	Beginner
Total	43	29/14	

### 3.2 Data Collection Instruments

#### 3.2.1 The experiment

The experiment was conducted in writing classes for one semester (16 weeks). The participants who enrolled in the course were randomly divided into the control and experimental groups. Both groups used the same textbooks, included various task-based activities, and were instructed by the same professor. The students in the control group were asked to write three drafts for every six topics. The peer and teacher feedback was also given after composing each draft. Using learning tools, the students performed pre-, while- and post- activities such as listing, ordering, and self-correction. In the experimental group, the students carried out SCMC tasks, simple and complex tasks during the while-writing stage. Three simple SCMC tasks and three complex SCMC tasks were designed by manipulating task complexity. A total of six SCMC tasks were performed before writing drafts.

Based on the process-oriented writing instruction, the control group was instructed following the pre-, while- and post-writing stages. The control group was briefed on what each pre-, while-, and post-writing stage would entail. They were instructed to write a draft following each stage to complete their final drafts. The feedback session was conducted after composing their first and second drafts in online and offline environments. Students were given a writing topic during the pre-writing stage and instructed to perform activities such as listing, ordering, and mind mapping to activate their schema. They performed their pre-writing activities individually and then shared their work with their group members. After completing it, the instructor reviewed words and expressions related to the writing theme to make their writing more effective. Based on pre-writing activities, learners composed their first drafts. Once they had finished, they were instructed to upload their work onto the online community in the D portal before coming to the next class. The peer response was conducted based on their first drafts and monitored by teachers to ensure that students participated actively in peer response sessions. Then, students were asked to revise their writing drafts to incorporate their feedback. Students uploaded their second drafts onto the online community in the D portal. Then the final drafting stage began, and they were given individual teacher feedback through video-recorded teaching materials. Students were next asked to revise their second drafts and produce a final draft consolidating the peer and teacher feedback. The final draft was uploaded online. Figure 1 summarizes the entire writing process of the control group in a blended learning environment.

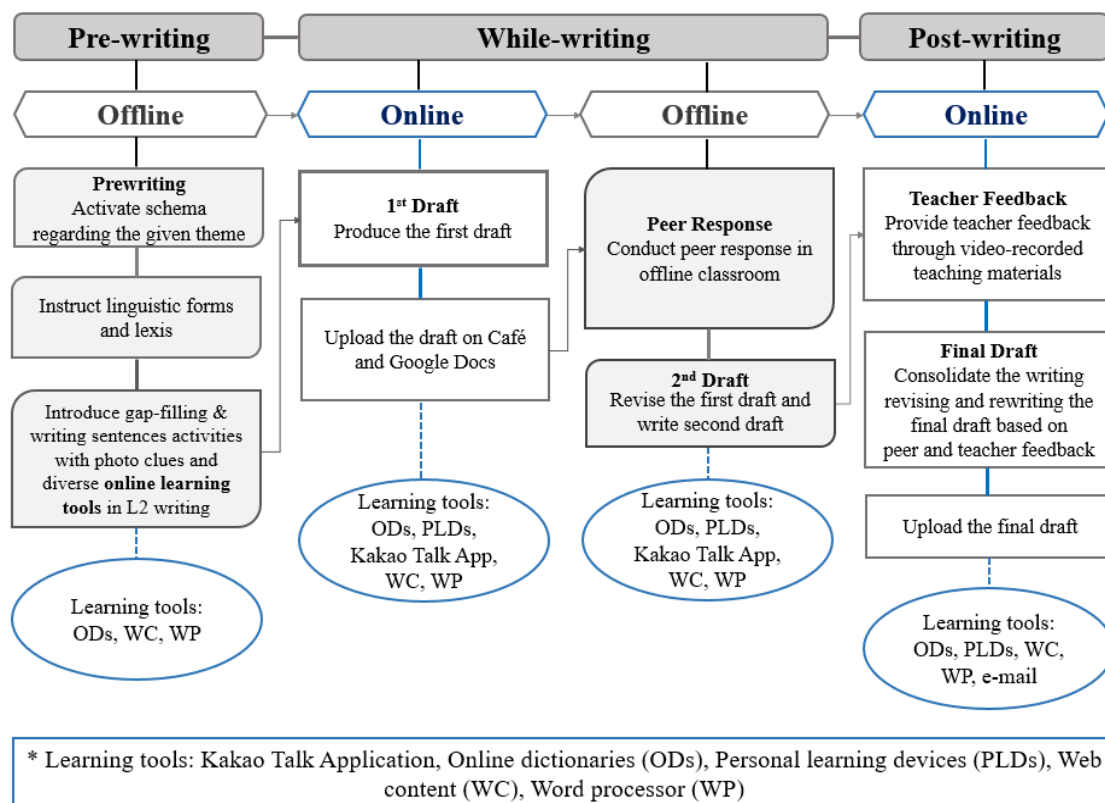


Figure 1. The Instructional Model for the Control Group in L2 Writing

The difference between the control group and the experimental group (the SCMC task group) was that the learners in the experimental group had to carry out SCMC tasks in a while writing stage. Most of the instruction and activities carried out in pre-and post-writing stages were similar to that of the control group. However, learners were asked to perform interactive SCMC tasks in small groups during the while-writing stage. The control group was instructed to compose their writing after pre-writing activities and a couple of activities such as listing, gap filling, ordering, and writing sentences with photos and pictures clues. The experimental group was given opportunities to practice SCMC tasks and interact with their group members before writing their drafts.

Learners were given the same pre-writing activities as the control group to activate background knowledge related to the given themes. Reviews on grammar and vocabulary were covered in the pre-writing stage to assist their writing. During the while writing stage, students were asked to engage in SCMC tasks such as information gap tasks and picture description tasks with their group members for about 20 minutes, which allowed them to practice writing and learn new language related to the topic. After students had completed the SCMC tasks, the instructor provided feedback and answers to the task, if necessary. Students then composed their first drafts drawing upon the language and content they had acquired through the SCMC tasks. Once they had finished writing their first drafts, they uploaded their writing onto a Kakao Talk group chat before coming to the next class. Students conducted a peer response session with their group members while the instructors monitored. After they had received their peer feedback, students were asked to revise their first drafts and begin constructing their second drafts. The second drafts were also uploaded onto a Kakao Talk group chat to receive individual teacher feedback, and self-assess their writing.

The teacher provided individual feedback to produce their final draft and consolidate their writing process in

the post-writing stage. Students evaluated their writing and reflected on their improvements for better writing in the future. The instructor constantly monitored the students throughout the stage while completing their tasks and encouraged increased engagement.

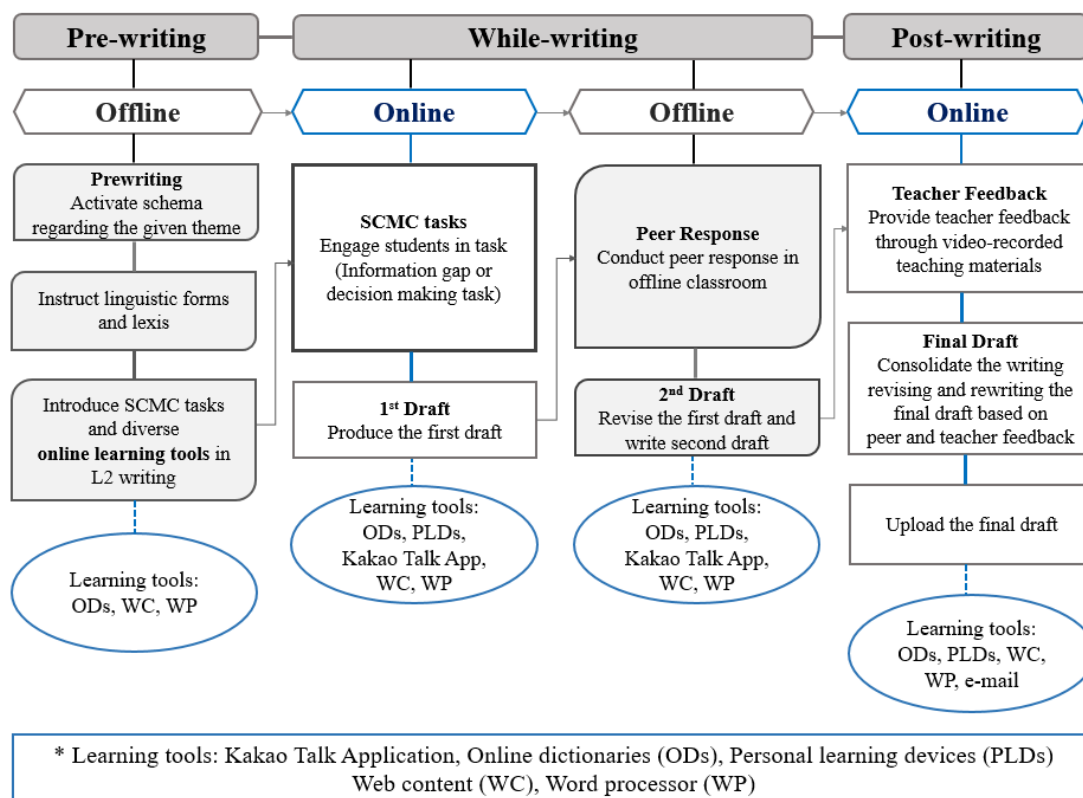


Figure 2. The Instructional Model for the Experimental Group in L2 Writing

### 3.2.2 Tasks for SCMC in L2 writing

Based on the textbook, *World Link 1: Developing English Fluency*, written by Stempleski, Douglas, and Morgan (2015), a total of six SCMC tasks were developed and carried out over the 16-week semester. A series of simple SCMC tasks were assigned for the first six weeks, followed by a series of complex tasks to be completed over the following six weeks. The SCMC tasks were carried out for about 15 to 20 minutes in the while-writing stage. For the task type, information gap tasks and decision-making tasks were used in the current study as suggested by previous research (Kim 2009, 2012). Two versions of each task were designed by manipulating task complexity based on [+/- reasoning demands] along with the resource-directing dimensions (See Appendix A). For the information gap tasks, simple tasks asked learners to only exchange necessary information. In contrast, the complex version of the information gap tasks required learners to make decisions based on their information from the information gap task. In terms of the picture description tasks, the simple tasks asked learners to discuss what was going on in each picture and create a story, while the complex tasks required learners to put six pictures in order with their partner and invent a storyline. Table 2 summarizes the tasks used in this research.



**Table 2. Description of Simple and Complex Tasks**

<b>Simple tasks [ - Reasoning demands]</b>
Information gap task 1 - Introducing J University to Friends
Information gap task 2 - All about Edward and Patrick
Picture description task - A New Year's Resolution and Change
<b>Complex tasks [ + Reasoning demands]</b>
Information gap task and decision making task 1 - Health Problems and Advice
Information gap task and decision making task 2 - Challenging Experience and Achievement
Putting pictures in order and picture description task - At the Movies

### 3.2.3 Writing tests

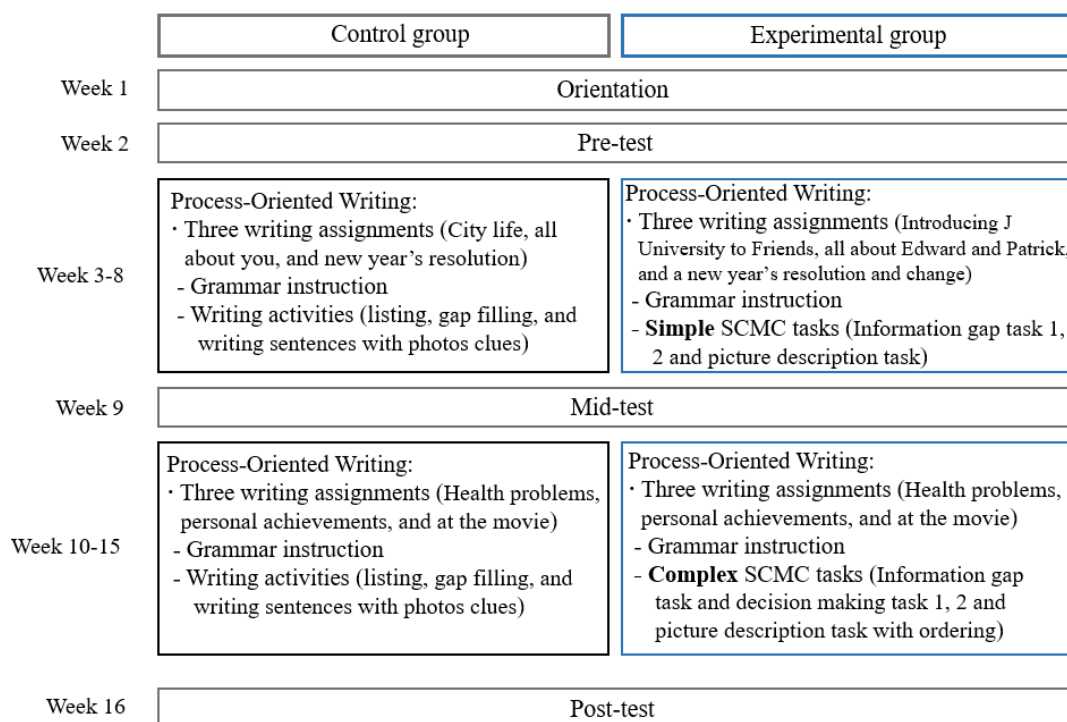
The students in both the control and experimental groups were asked to take pre-, mid-, and post-tests. The pre-test aimed to assess students' proficiency before instruction and ensure that the control and experimental groups had comparable writing abilities. The mid-test was administered to examine the effects of task complexity in the SCMC setting. Then, the post-test was to assess the impact of the SCMC task itself by comparing the scores from the two groups. The three tests required students to write essays on three given topics. The topic of the pre-test was "Describe what you do in your free time," and the topic of the mid-test was "Describe your best friend." The topic of the post-test asked students to "Describe a place you like the most." The students were given 40 minutes of class time to conduct their tests.

### 3.2.4 Reflective journals

Students in the experimental group were asked to write guided reflective journals after completing simple tasks (Week 8) and complex tasks (Week 16). It was to reinforce the results of the quantitative data. Students were clearly instructed to answer every question in their journal entries by showing examples. They were allowed to answer the questions in Korean so that they could express their thoughts and feelings more easily. The questions on the journal entries included opinions about the SCMC tasks, their perceived impact on writing ability, and how different levels of SCMC tasks affected their writing (See Appendix B). Two reflective journal entries were submitted to the teacher in class or through the Kakao Talk application.

## 3.3 Procedures

This study was carried out by two different classes during a semester of their regular English courses at a Korean university. Both classes were taught by the same instructor using the same syllabus and textbook to ensure internal consistency. The students were divided into the control and experimental groups (SCMC tasks). As shown in Figure 3, the first two weeks of the semester were devoted to familiarizing learners with SCMC tasks and carrying out the orientation and pre-tests.



**Figure 3. The Procedure of the Study**

Each topic of writing was introduced to both the experimental and control group. Students in the control group completed six writing assignments over twelve weeks. Students were asked to complete three writing assignments for the experimental group, including simple SCMC tasks for the first six weeks (Week 3 to Week 8). Then, both groups carried out a mid-test in Week 9. Students were asked to complete three writing assignments, including complex SCMC tasks, in the following weeks (Week 10 to Week 15). Lastly, a post-test took place in the last week of the semester (Week 16). The students in both groups followed the pre-, while- and post-writing stages regarding the writing instruction. They wrote three drafts for every six topics chosen from the textbook. The peer feedback and teacher feedback were given after composing each draft. The control group performed necessary activities in each stage, such as listing, gap filling, and self-correction using learning tools. In contrast, the experimental group carried out SCMC tasks during the while-writing stage.

### 3.4 Data Analysis Methods

#### 3.4.1 Writing tests

The tests (pre-, mid-and post-test) were scored using the rubric for academic writing (Yoon and Lee 2010), which was modified to reflect paragraph writing. The scoring rubric consists of four components, including content, organization, structure, and mechanics. The original rubric focused on assessing the content and organization of writing. However, learners in the study could not compose academic writing, as students' proficiency level was low. In this regard, the rubric was modified for paragraph writing, focusing more on structure and mechanics than the original version. The scores of each criterion were adjusted as shown in Table 3. All tests were assessed by three raters: the instructor, the researcher, and a TESOL professor. To ensure inter-rater reliability, the three

assessors discussed discrepancies afterward to reconcile differences in scoring. Pearson's  $r$  for all tests was over  $r = 0.9$  in this study.

**Table 3. Scoring Rubric for Paragraph Writing (Yoon & Lee, 2010)**

Scoring criteria	Total score:100
Mechanics	20
<ul style="list-style-type: none"> <li>• Period, comas, and other punctuations are used correctly.</li> <li>• The spelling is accurate.</li> <li>• The title is centered, and capital letters are used correctly.</li> <li>• The first line is indented, and the font and size are appropriate.</li> </ul>	
Contents	30
<ul style="list-style-type: none"> <li>• The content of the paragraph fits the assigned topic.</li> <li>• The paragraph is interesting and easily understandable.</li> <li>• The content is carefully thought out and is related to the topic.</li> </ul>	
Organization	30
<ul style="list-style-type: none"> <li>• The paragraph has a topic sentence with one or more central ideas.</li> <li>• The paragraph has supporting sentences with at least one example.</li> <li>• The paragraph has a concluding sentence. The paragraph is organized appropriately according to the content.</li> <li>• The paragraph has unity and coherence. Appropriate transition words are used to show the relationship between sentences.</li> </ul>	
Structure	20
<ul style="list-style-type: none"> <li>• Grammar usage is correct.</li> <li>• The sentence structure is appropriate.</li> <li>• Simple, compound, complex, and compound-complex sentences are used correctly.</li> <li>• The paragraph is free of fragments, run-ons, and a comma splice.</li> </ul>	

The mean scores of the writing tests were compared to investigate the effects of SCMC writing tasks on students' L2 writing abilities and explore the impact of task complexity in the SCMC setting. Independent samples  $t$ -test of the pre-tests scores was conducted to check the homogeneity between the two groups. Then, paired-sample  $t$ -tests were conducted to compare the differences between the mean scores of the pre-and post-tests in each group, respectively. The paired-samples  $t$ -tests indicated whether students' writing ability improved from pre-test to post-test in both groups. The independent samples  $t$ -test analyzed post-test scores from the control and experimental groups. Lastly, to investigate the effects of task complexity in the SCMC setting, the Repeated Measures ANOVA was used to compare the scores of the pre-, mid-, and post-tests of the experimental group to examine whether there was a significant difference in the development of writing ability.

### 3.4.2 Reflective journals

The reflective journals were used to triangulate the qualitative data and reach an in-depth understanding of the effects of task complexity through SCMC on students' writing. They were used to identify evidence that provided insight into the research questions. The researchers read the collected reflective journals to explore emergent themes, including their opinions about the SCMC tasks and their influence on their writing ability. The responses

were sub-categorized into positive, negative, and unexpected and were translated into English if considered relevant to the research questions. The first question aimed to offer researchers a better understanding of their opinions and feelings about the SCMC tasks themselves. At the same time, numbers two, three, and four investigated its effect on their writing ability. Finally, question number five was asked to explore how simple and complex tasks affected their writing ability differently.

## 4. Results and Discussion

### 4.1 SCMC Tasks and Development of L2 Writing Ability

The experiment was carried out and analyzed to investigate the effects of SCMC tasks on developing students' L2 writing ability. The results of Research Question 1 were derived from the analysis of pre-and post-tests and reflective journals. Three raters scored the pre-and post-test results of the control and experimental groups. Descriptive statistics for the writing pre-and post-test scores are presented in Table 4. Before comparing the groups, normality tests, examining skewness and kurtosis values, demonstrated that the results of descriptive statistics showed normal distributions. The two groups' mean scores in the pre-test were similar; the control group achieved slightly higher mean scores (49.2), and the experimental group had 47.59 scores.

**Table 4. Descriptive Statistics of Two Groups' Pre-and Post-Tests**

	N	M	SD	Min.	Max.
Pre-test (Control group)	20	49.20	9.3	32	65
Pre-test (Experimental group)	23	47.59	11.69	30	81
Post-test (Control group)	20	50.85	10.42	32	72
Post-test (Experimental group)	23	60.41	9.73	37	84

To ensure no pre-existing differences in writing ability between the two groups, an independent sample *t*-test was conducted to compare the mean scores, as seen in Table 5. The independent sample *t*-test revealed no significant difference between the two groups in the pre-test scores ( $t = 0.49, p = 0.62$ ). The two groups in this study were similar in writing ability and were homogeneous groups.

**Table 5. The Independent Sample T-Test of the Pre-Tests**

	N	M	SD	<i>t</i>	<i>df</i>	<i>Sig.</i>
Control group	20	49.20	9.30	0.49	41	0.62
Experimental group	23	47.59	11.69			

Paired samples *t*-test was conducted by comparing the mean scores in writing pre-and post-tests to examine the effects of each instruction on the development of writing ability within each group. As shown in Table 6, both groups achieved higher mean scores for their post-tests. However, it was worth noticing that the experimental group showed a larger increase in their post-test scores (12.82) than the control group (1.65). Both groups showed significant differences between the pre-and post-tests in terms of developing writing ability ( $t = -2.83, p = 0.011$  for the control group, and  $t = -7.94, p = 0.000$  for the experimental group).

**Table 6. The Paired-Samples *T*-Tests of the Two Groups' Writing Test**

	N	M	SD	<i>t</i>	<i>df</i>	<i>Sig.</i>
Control group						
Pre-test	20	49.20	9.3	-2.83	19	0.011
Post-test	20	50.85	10.42			
Experimental group						
Pre-test	23	47.59	11.69	-7.94	22	.000
Post-test	23	60.41	9.73			

Regarding the effects of the SCMC tasks on the development of L2 writing ability, an independent sample *t*-test was conducted on the writing post-test (Table 7). The experimental group students who were asked to carry out SCMC tasks gained higher scores in the post-test than the control group. There was a 9.55-point gap between the mean scores of the control and experimental groups. The independent sample *t*-test showed a significant difference between the groups ( $t = -3.12, p = 0.003$ ).

**Table 7. The Independent Sample *T*-Test of the Post-Tests**

	N	M	SD	<i>t</i>	<i>df</i>	<i>Sig.</i>
Control group	20	50.85	10.42	-3.12	41	0.003
Experimental group	23	60.40	9.73			

The study results indicated that the SCMC tasks were more effective for developing L2 writing ability than the traditional instruction. This result reconfirms the effectiveness of SCMC tasks on the improvement of writing ability. Some previous studies (Pellettieri 2002, Salaberry 2000, Warschauer 1996) demonstrated that students used more lexically and syntactically complex language in CMC environments, claiming that students used more lexically and syntactically that CMC played a significant role in promoting overall writing ability. A plausible explanation for the result is found in some features of text-based online chat, such as the visual saliency of the text and self-paced language processing (Lai and Zhao 2006, Lee 2021, Pellettieri 2000, Sater and Özdener 2008, Smith 2004). As Smith (2004) argued, "the visual saliency of incoming and outgoing messages as well as the ability to reread previous messages may allow students to better attend to such formal aspects without substantially hindering the flow of communication" (p. 372). The visual saliency of text-based SCMC may enable learners to reread their output while performing tasks and make revisions when they find errors (Lai and Zhao 2006). Furthermore, it also increased the possibility of learners noticing their own and their peers' vocabulary and grammar errors (Chapelle 2004, Lai and Zhao 2006, Smith 2004). The students frequently commented on this point in their reflective journal entries, as in the following excerpts:

**Excerpt 1**

*Sungmin: I was able to reread messages that I wrote through text chat quickly. It helped me to find my grammatical errors more easily. (RJ2)*

*Yuna: The words and expressions my partner used were different from mine, and some words were the ones that I knew but did not use often. I was able to notice those words and make use of more diverse words. My partner and I could complement each other's weaknesses. I think I can now use more appropriate words in the right context and my fluency has also developed. (RJ2)*

As seen in the excerpts above, Sungmin and Yuna indicated that the SCMC environment helped them notice errors and learn new vocabulary from their partners. Sungmin mentioned the benefits of rereading messages while performing tasks. He thought that rereading incoming and outgoing messages helped him self-edit his writing conveniently and efficiently. Yuna also commented on how she learned new vocabulary through SCMC tasks, believing that she had improved since the beginning of the course. She learned vocabulary in the SCMC environment and applied it to her writing.

In addition, Dörnyei and Kormos (1998) insisted that enough processing time is required to encode and monitor second language production. Unlike speaking or voice-based SCMC, text-based SCMC environments seem to provide learners with much time to come up with the following response, as silences are relatively tolerable (Pellettieri 2000, Sater and Özdener 2008). This extra time seems to make self-paced language processing available to learners, thereby prompting them to produce more accurate writing (Smith 2004). Some learners voiced this point of view in their reflective journals.

### Excerpt 2

*Minjun: Even though there were some communication difficulties, I could express my opinion more readily than speaking in person. I could write my opinions with no pressure or burden. (RJI)*

*Minsu: There were times when there were communication difficulties, but overall it was convenient. I had plenty of time to think of my writing and reflect on the feedback I received. Also, I could easily edit my writing. It helped me to write more complex sentences and different words. I think the number of grammatical errors also decreased. (RJI)*

Minjun and Minsu mentioned the benefits of extra time afforded by text-based SCMC environments. Even though there were some difficulties in communication due to the lack of paralinguistic cues, they were optimistic about the SCMC setting. Minjun had less pressure in writing as learners had enough time to come up with the response. In addition, Minsu spent extra time processing and monitoring their language in the online settings. He monitored and refined his writing, perceiving his progress and improved accuracy.

## 4.2 Task Complexity and Development of L2 Writing Ability in the SCMC setting

In the previous section, it was confirmed that SCMC tasks positively affected improving L2 writing ability. The results of Research Question 2 discuss the effects of task complexity on developing L2 writing ability in the SCMC setting. A repeated-measures ANOVA was used for the second research question. The tables below illustrate the results obtained from the three sets of writing tests in the experimental group. Mid-test (simple tasks) refers to the writing test taken after three simple SCMC tasks. Post-test (complex tasks) refers to the writing test resulting from three complex SCMC tasks.

The descriptive statistics to compare the mean scores of each test are presented in Table 8. The experimental group's mean pre-, mid-, and post-test scores were 47.59, 64.02, and 60.41, respectively. The students gained higher scores in their mid-test (64.02) and post-tests (60.41) compared to the pre-tests (47.59). It is worth noticing that the mean score of simple SCMC tasks was 3.62 points higher than that of complex SCMC tasks.

**Table 8. Descriptive Statistics of Writing Tests in Experimental Group**

	N	M	SD	Min.	Max.
Pre-test	23	47.59	11.69	30	81
Mid-test (simple)	23	64.02	10	39.5	88.5
Post-test (complex)	23	60.41	9.73	37	84

A repeated measure ANOVA was conducted on the pre-, mid-, and post-test scores to investigate the effects of task complexity on overall writing ability. The results of the repeated-measures ANOVA are presented in Table 9. A repeated-measures ANOVA with Sphericity Assumed determined that the mean scores differed significantly across the three tests [ $F(2, 44) = 52.694, p = .000$ ].

**Table 9. The Repeated-Measure ANOVA on Writing Tests**

	M	SD	<i>F</i>	<i>df</i>	<i>Sig.</i>
Pre-test	47.59	11.69			
Mid-test (simple)	64.02	10	52.694	2	.000
Post-test (complex)	60.41	9.73			

A post hoc pairwise comparison using the Bonferroni correction showed that the increased mean scores of the writing tests reached significance when comparing both the pre- and mid-tests (47.59 vs. 64.02,  $p = .000$ ) and pre- and post-tests (47.59 vs. 60.41,  $p = .000$ ). The results of the post-hoc test are presented in Table 10.

**Table 10. The Post-Hoc Test for the Writing Test Scores**

	Pre- vs. Mid-test	Pre- vs. Post-test	Mid- vs. Post-test
Test scores	.000	.000	.062

The results suggest that the simple and complex SCMC tasks positively affected the students' writing ability development. However, there was no significant difference between the mid- and post-tests, which means that task complexity does not affect developing students' L2 writing ability in the study. Nevertheless, the responses in the reflective journals were somewhat unexpected. When asked which level of complexity seemed to be more effective for improving their overall writing ability, it was easy to find positive comments about the complex tasks, as in the following excerpts:

**Excerpt 3**

*Junyoung: SCMC tasks helped me to learn not only new vocabulary but also grammar. However, tasks in units 6, 7, and 8 (simple tasks) were too repetitive that they were just asked to exchange information or describe pictures. I think that it did not help me much to improve my writing. In contrast, tasks in units 9, 10, and 11 (complex tasks), especially those in unit 11, helped improve my writing as I had to explain my opinion. It also made me think more about the errors that I often made. (RJ2)*

*Minjun: Relatively tasks in units 9, 10, and 11 (complex tasks) made me think more in many ways. It made me think more about the contents and forms. (RJ2)*

The students perceived complex SCMC tasks to be more helpful for their L2 writing. Junyoung and Minjun both mentioned the benefits of complex SCMC tasks. Junyoung, especially, reflected that tasks that only asked

them to exchange information using similar patterns of questions were too simple to give feedback and improve their writing skills. On the other hand, he believed that complex tasks forced him to think more as he had to state the reasons for his answers. Although there were no differences between the mid-and post-test scores, they valued the complex SCMC tasks. These comments are surprising given the belief that complex tasks are not suitable for low-level students.

The students' favorable responses to complex tasks can be interpreted as follows. The responses might be related to the students' proficiency levels and the lack of learning time. Although the present study has not included learner proficiency as a factor, it can be inferred from previous studies (Ishikawa 2006, Kuiken and Vedder 2007) that low proficiency learners are generally less affected by differences in task complexity. As the cognition hypothesis predicts (Robinson 2001a, 2005, 2011), more complex tasks manipulated along resource-directing dimensions may have directed the learners' resources toward the linguistic aspect resulting in more accurate and complex writing while performing the tasks. The study also mentioned these positive features of complex SCMC tasks in students' reflective journals. However, the students carried out only three SCMC tasks and three writing assignments for different levels of task complexity in a single semester (16 weeks). The amount of time and the participants' limited proficiency in English may have made it difficult for them to adapt what they practiced and learned in the complex SCMC tasks to new contexts (Kim 2017).

## 5. Conclusion

The present study aimed to investigate the effects of SCMC tasks on developing writing ability and examine whether manipulating task complexity in the SCMC settings affects writing ability development based on the two instructional models constructed by the researchers. First, the main finding was that the SCMC task groups performed better than the control group when comparing the post-test results. Specifically, the participants in both the control and experimental groups were able to gain higher scores on their writing post-tests than their pre-tests, which indicates that both of the writing instructions helped develop the students' L2 writing abilities. Especially when comparing the scores of the writing post-tests of the control and experimental groups, the participants who carried out a series of SCMC tasks outperformed the control group in the post-test. This result shows the effectiveness of SCMC tasks on developing L2 writing ability. Second, it is arguable that the study explains the effects of task complexity in SCMC settings on writing ability development due to task performance. Although the students valued the complex SCMC tasks to help develop writing ability, there were no differences between the mid-and post-test scores.

The findings have pedagogical implications for learning and teaching L2 writing. First, it is recommended that SCMC writing tasks be implemented in L2 writing courses based on the two instructional models. The students completed a series of writing tasks in a conventional class and conducted feedback sessions. Still, students at low-proficiency levels need more opportunities to practice and more assistance for successful task performance. The combination of TBLT and SCMC settings seems to satisfy the needs of low-proficiency level students by providing specific guidelines and linguistic help. Students regarded SCMC tasks as concrete guidelines to follow for their writing assignments. They could notice their grammatical errors and learn new vocabulary before they started writing by interacting with other students. The students also reflected what they learned in SCMC tasks in their writing. Teaching and learning L2 writing by combining TBLT and SCMC settings is not only perceived positively by students but is also shown to improve students' writing ability. Second, it is also suggested that complex SCMC tasks be conducted for more than a semester to develop students' writing ability. In the study, the students



frequently mentioned the positive effects of complex tasks on their writing ability and perceived themselves to have improved their writing ability through complex tasks. It might be because the students have been provided with many opportunities to focus on linguistic aspects while carrying out complex tasks. Therefore, it is recommended that the students have ample time to perform complex tasks for developing writing ability. The study also has implications for understanding task sequencing and syllabus design. Robinson (2001a, 2011) argued that sequencing tasks based on task complexity are essential when designing a syllabus, and increasing task complexity will promote the development of the interlanguage system. Based on these assumptions, this study provides an instructional model that includes task complexity manipulation in SCMC settings. Although the degree of complexity that promotes development is still obscure and needs further investigation, the instructional model consisting of simple and complex tasks was proven effective for L2 writing ability.

Finally, further studies with more participants and varying levels will need to be conducted over a more extended period. Further studies need to modify the given educational model, procedures and tasks, and implement various other task-specific measures based on the study.

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Examples in: English  
Applicable Languages: English  
Applicable Level: Tertiary

## APPENDIX A

### 1. An Example of Picture Description Task (simple version)

#### A New Year's Resolution and Change

Many people make changes, or resolutions at the New Year.

**Task 1:** Look at the pictures of Amy. With your partner, describe her change and how she accomplished it.



**Task 2:** Describe six pictures and create a story based on pictures (at least 80 words).

In your paragraph, include

- all six pictures in order
- how she accomplished it
- at least 3 conjunctions.

### 2. An Example of Picture Description Task (complex version)

#### Challenging Experience and Achievement

**Task 1:** Complete the task using Kakao Talk Application.

(1) Look at the pictures of Ji-woo. With your partner, put the pictures in order and explain the reason for it by using 'because'.

\_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_

(2) Talk about what difficult thing happened to Ji-woo and how things got better?.



**Task 2:** Describe six pictures and create a story based on pictures (at least 80 words). In your paragraph, include

- all six pictures in order
- challenging experience
- how she accomplished better score.

## APPENDIX B

### Reflective Journal Prompts

1. Write the pros and cons of 'Task 1 using KakaoTalk.'

(1. ' (Task 1)' / .)

Pros ( ):

Cons ( ):

2. Did you learn anything new (words, grammar, etc.) while communicating with your partners using KakaoTalk? If yes, have you reflected it in your writing (Task 2)?

(2. ( , ) ?  
, (Task 2) ?)

3. Write the difference between when you performed the task using KakaoTalk and when you did not.

(3. .

4. Write how the task (Task 1) with your partner using KakaoTalk affected your English writing (Task 2).

(4. (Task 1)가 (Task 2)  
)

5. Among the activities in lessons 6, 7, and 8, and activities in lessons 9, 10, and 11, which assignment do you think was more helpful for your writing? Write with specific reasons.

(5. 6, 7, 8 9, 10, 11 가 ?  
)

6. Write down the shortcomings you found in the English writing assignment.

(6. .)

7. Write what efforts you have been made to make up for this.

(7. .)