Korean EFL Learners' Approach to and Perception of Computer-Suggported Collaborative Writing

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The study explored computer-supported collaborative writing (CSCW) from learners' perspectives, in terms of the writing process and challenges and benefits associated with CSCW. A total of 26 college students from two writing classes participated in this study. One class used a wiki and the other class used *Daedalus* for CSCW. The students first experienced writing individually on a wiki or *Daedalus* for two weeks and then wrote essays as a group for two weeks. They were asked to write learning journals at the end of each class and reflection journals after experiencing CSCW. The study found some similarities and differences in the way the students performed collaborative writing tasks. It is interesting to note that the students did not always work together for collaborative writing. Regarding difficulties, the students reported feeling psychological burden, facing disagreement or conflict, or dealing with different writing styles. They also mentioned some benefits of CSCW, including lowered writing apprehension or improved writing skills through their peers' texts. The findings of the study are useful for understanding the processes involved in CSCW and thus can be used to design an effective writing lesson.

I. INTRODUCTION

With the emergence of a social constructivist approach to learning, the importance of collaborative learning has been stressed because learning occurs not just through individual effort but through collaboration and negotiation with peers in an authentic social environment, and collaborative learning is being widely implemented in school settings (Kim, 2005). Although the importance of collaborative learning has been recognized and collaborative

writing has been frequently conducted in the workplace, it has not been easy to adopt collaborative writing in class. But with the expansion of technology for computer-supported collaboration, it is possible to facilitate and enhance collaborative learning, and collaborative writing has become a viable option for teaching English writing.

Many researchers have explored the pedagogical value of computer-supported collaborative writing (CSCW). Some researchers have examined various tools for computer-supported collaborative writing to find out whether those tools are useful for conducting collaborative writing (Abrams, 2019; Erkens et al., 2005; Ithnin et al., 2018; Woo et al., 2011). Other researchers have examined learner perception of collaborative writing via computers (Chao & Lo, 2011; Kim & Pae, 2013) or students' collaboration (Kwon et al., 2014; Tocalli-Beller, 2003; Wichmann & Rummel, 2013). Although CSCW is known to foster social skills as well as writing skills (Abrams, 2019; Erkens et al., 2005; Ithnin et al., 2018; Woo et al., 2011), students often find it challenging to construct texts together in a computer-supported collaborative writing environment.

Most of these studies have focused on simply describing learner perception of CSCW while few studies have examined learner voice, particularly Korean students' voice, regarding how they actually experience collaborative writing supported by different CSCW tools. Therefore, this study aims to look into the process of CSCW through participants' eyes and examine the challenges and benefits of CSCW from learner perspectives.

II. LITERATURE REVIEW

1. Approach to Collaborative Writing

Some researchers have tried to reveal how people approach collaborative writing (Lai et al., 2016; Lowry et al., 2004; Saunders, 1989). Saunders (1989) explored whether people collaborate or not at different stages of writing and classified the approaches to collaborative writing into three types, including co-writing, co-publishing, and co-responding. Co-writing is the approach where all group members collaborate at each and every stage of writing, which is generally at the planning, writing, and revising stages. The co-publishing approach means that group members collaborate at the planning and writing stage, while the co-responding approach means that group members collaborate at the revising stage.

Lowry et al. (2004) focused on how people divide up the workload considering writing

tasks, group size, and meeting availability and classified the collaborative writing approaches into five types: single-author writing, sequential writing, parallel writing (further divided into horizontal-division writing and stratified-division writing), and reactive writing. The single-author writing approach means only one of the group members writes all the text, while sequential writing is the approach where each group member takes turns writing the text. The parallel writing-horizontal division approach means that group members start with dividing the parts of text, choose a part, and write the part. The parallel writing-stratified division is the approach where each group member takes a role out of writer, reviewer, or editor. And reactive writing is the approach where each group member writes a part of the text and reviews and modifies the text by reacting to their member's work.

Lai et al. (2016) focused on the writing and revising stage of writing and identified three types of approaches to collaborative writing. The first type (single composing and interactive revising) is the approach where one of the group members writes the whole text, and the other members revise the text. In the second type (parallel composing with concurrent interactive revising), each group member divides up the parts of text and writes the chosen part, and then most of the group members revise the text. The last one (parallel composing with limited interactive revising) requires that each group member divides up the parts of text and writes the chosen part, and then one member revises the text.

Following the classifications of collaborative writing proposed by earlier studies, this study aims to describe in more detail how EFL learners approach CSCW. An understanding of their approaches to CSCW will help us refine strategies for teaching writing (Duin, 1991).

2. Learner Perception of Collaborative Learning and CSCW

Various computer-supported tools have made collaborative writing easy to carry out, and thus CSCW is widely adopted in writing classes (Abrams, 2019; Richardson, 2010). Many studies have been conducted to examine various aspects of collaborative writing. First, there has been a lot of research on the effects of various tools on collaborative writing. Previous studies have shown that using computer-supported writing tools, such as wiki, *Google Docs*, or others, was helpful for implementing collaborative writing and improving learners' writing skills for all levels of students (Abrams, 2019; Erkens et al., 2005; Ithnin et al., 2018; Woo et al., 2011). For example, Erkens et al. (2005) used TC3 (Text Composer, Computer supported, and Collaborative), a computer program developed for writing in pairs, and examined 145 pairs of high school students working together to complete essays. They specifically examined whether

planning tools in TC3, which provide a shared argumentation diagram and a shared outline, would contribute to raising the quality of the written texts. They concluded that the use of TC3 for overall coordination and planning enabled students to create quality text.

As another tool for collaborative writing, the pedagogical value of a wiki was examined by Woo et al. (2011). They used a wiki for primary school students' collaborative writing and concluded that it was helpful for promoting teamwork and improving writing. In addition, Ithnin et al. (2018) investigated the effects of a wiki with secondary school students. They reported that collaborative writing with a wiki helped the students improve their English writing proficiency. Wichmann and Rummel (2013) also examined a wiki-based writing environment, but they focused on students' revision activities. Specifically, in a comparison of a scripted collaboration group with an unscripted collaboration group, they discovered that the scripted group displayed more frequent coordination and produced quality texts. More recently, Abrams (2019) used *Google Docs* for college students and investigated the relationship between collaboration patterns and text quality. The study discovered that successful collaborative groups produced texts that were good quality in terms of content and coherence, although the effects were not observed in light of linguistic features such as accuracy, syntactic complexity, or lexical diversity.

Second, studies have investigated how students would perceive their collaborative writing experience supported by computer and reported that students in general were satisfied with the use of computer tools (Chao & Lo, 2011; Kim & Pae, 2013). For example, Chao and Lo (2011) conducted a survey to investigate students' perception of using a wiki for collaborative writing and found that the students were positive about wiki-based collaborative writing. In a survey of college students' responses to *Daedalus* and a wiki, Kim and Pae (2013) also discovered that the students had favorable attitudes toward using the tools for their writing.

Despite the positive effects reported in some studies, other studies have cautioned that adopting collaborative learning itself may not guarantee better outcomes. These studies have investigated how students feel about working collaboratively in second language classrooms or what teachers do to promote active and positive collaboration (Kwon et al., 2014; Tocalli-Beller, 2003; Wichmann & Rummel, 2013). For instance, Tocalli-Beller (2003) looked into the challenges inherent in collaborative work, focusing on conflict, disagreement, and repetition. She suggested that learners should manage conflict and disagreement to yield positive outcomes from collaborative learning and that teachers should create a learning context where students can feel comfortable with others. In a study of student interaction in a collaborative learning context, Kwon et al. (2014) identified good and bad collaborators. They

examined how six groups of students would collaborate with their peers in light of group regulation and socio-emotional interaction. They found that good collaborators showed intensive interactions and positive socio-emotional interactions, whereas bad collaborators demonstrated few socio-emotional interactions. They also reported that most groups fell into ill-advised collaboration patterns without teacher intervention.

Previous findings taken together indicate the needs for more qualitative studies that can describe in depth how EFL students view their own experience of CSCW. It is important to understand the functions of various computer tools for collaborative writing. In addition, it is worthwhile to examine benefits and challenges associated with CSCW from learner perspectives.

III. METHOD

1. Research Questions

This study examined how students experienced and perceived collaborative writing in a computer-supported environment. Specifically, the study delineated the actual process, challenges, and benefits of CSCW from student perspectives. These objectives are specified in the following research questions:

1) How do students approach collaborative writing in a computer-supported writing environment?
2) How do students perceive their CSCW experience? What do they perceive as the challenges or benefits of CSCW?
3) How do students perceive *Daedalus* and a wiki as CSCW tools?

2. Participants

The participants of this study were a total of 26 college students from two writing classes. One class was composed of 15 students (seven males and eight females, from Student #1 to Student #15) and used a wiki for their collaborative writing. The other class was composed of 11 students (five males and six females, from Student #16 to Student #25) and used *Daedalus* to perform writing tasks.

3. Instrument

Two CSCW tools used for the study are a wiki and *Daedalus*. Wiki, first developed by Ward Cunningham in 1994, is a website which allows any user to add, delete, or edit the content posted. It also allows its users to track changes made in the content. For this study, the students, as a group, opened a wiki webpage for their group and wrote their essays on the webpage. In contrast, *Daedalus* is an intranet-based program designed for teaching and learning writing. It supports a process approach of writing as well as collaborative writing. It is composed of several modules, including INVENT, WRITE, RESPOND, INTERCHANGE, and others. INVENT provides a series of questions and facilitates students to generate ideas on a topic before writing a draft whereas RESPOND supports the peer review process prior to revising the draft. WRITE is a type of word processing tool that allows students to write, and INTERCHANGE is a chatting program that enables students to communicate with each other.

4. Data Collection Procedure

For data collection, the students were asked to perform both individual writing tasks and collaborative writing tasks using two CSCW tools: a wiki and *Daedalus*. The students had one week to try out the tools in order to familiarize themselves with them. After learning how to use the two tools, they first experienced writing individually on a wiki or *Daedalus* for two weeks (Week 3 and Week 4). They were then grouped for collaborative writing tasks on a wiki or *Daedalus* for two weeks (Week 5 and Week 6). They were randomly assigned a group and the group formation remained the same while completing the two writing tasks.

For collaborative writing, the students worked in groups of three or four during Week 5 and Week 6. They generated ideas from brainstorming, wrote a draft, and reviewed and revised their essay as a group. The classes met twice a week and worked on one essay per week. In the first class of the week, the students were given a topic to write and two reading texts about the topic. Each student read the reading materials and searched for more resources for 15 minutes, when necessary. Then, the students, as a group, discussed their understanding of the topic and the organizational structure of their essay for 20 minutes. Afterwards, they wrote a draft of their essay for 20 minutes and revised their draft for another 20 minutes.

Then in the second class of the week, for the first 30 minutes the students reviewed the draft written by the other peer group, and at the same time discussed their analysis of peer

groups' texts via online chatting. After discussion, each group returned their discussion log to their peer group. Then each group went over the feedback from their peers and discussed how they would revise their draft for 15 minutes. They then revised and proofread their writing for 30 minutes. The students, as a group, worked together throughout the process of brainstorming, drafting, and revising.

In order to identify the students' actual approach to writing and their perspectives on CSCW, the students were asked to write learning journals after each class in Week 5 and Week 6. They were also asked to write a reflection journal at the end of Week 6. For learning journals and reflection journals, the students were asked to write about their CSCW experience including the process of their collaborative writing, and the challenges and benefits they experienced during the process.

They were also asked to reflect on the use of the computer-supported tools and write reflection journal entries. They focused on answering a couple of questions, such as how they felt about using a wiki or *Daedalus* for collaborative writing, and what is good or bad about using the tools. While all the students were expected to write four learning journals and one reflection journal, five of them did not turn in one learning journal. Therefore, a total of 99 learning journals and 26 reflection journals were collected. The students were allowed to write either in Korean or in English; 16 students wrote their journal in English and 10 students wrote in Korean.

4. Data Analysis

For data analysis, the students' learning journals and reflection journals were collected and analyzed by the researchers. The two researchers initially coded student responses in the learning journals and the reflection journals of one class. Afterwards, they exchanged their coding results to compare and cross-check their coded categories. Most of the codes were identical and consistent across the researchers although there were some differences in some of sub-categories, which were discussed and adjusted.

The analysis focused on the approach to and learner perception of CSCW, as the purpose of the study was to identify and describe the trajectory of learning in each stage of collaborative writing and their perception of the writing experience. Out of the several coding methods suggested in Saldaña (2016), a mixture of structural coding (i. e., question-based coding) and subcoding (e.g., coded as APPROACH TO CSCW-DRAFTING) were employed in the first cycle coding. And in the second cycle coding, pattern coding was employed to find repetitive

patterns and then group those coded patterns into categories and subcategories.

IV. RESULTS

1. Students' Approach to Computer-Supported Collaborative Writing

The classes adopted a process-approach to writing. In the first class, the students received guidance about what to do in each stage of the writing process, including brainstorming, drafting, and revising. For example, in the brainstorming stage, the students were instructed to read the given materials, search for additional resources regarding the topic, and plan how they would write their draft. In the drafting stage, they were guided to write their draft on the topic. They were allowed to talk to each other when necessary while writing their drafts. Upon completing the writing task, the students exchanged their drafts with the other group, provided feedback to one another, and revised their texts according to the suggestions from their peers.

Although the students received some guidance, they were allowed to decide how they would collaborate at each stage of writing. For instance, they, as a group, discussed their writing topic, and decided their position regarding the topic. Afterwards, they talked about how they would divide their workload for writing their draft, as shown in Excerpt 1.

Excerpt 1
Our group talked over the issues generally first, and set our opinion about it. Then we assigned each member which parts they do. (Student 12, Week 6)

However, there were some differences in the way the students used the brainstorming session. Some groups focused on what they were going to write about, as shown in Excerpt 2. They quickly decided their position on the given issue so that they could allocate more time to online research and planning. Once they agreed on their position on the issue, they were able to search for supporting evidence and examples, and develop their argument into a detailed plan for writing. They prepared a precise plan before they set out writing as they had to deal with timed writing tasks. This planning helped them construct a well-organized essay despite the fact that they had to cope with time constraints.

Excerpt 2
In the beginning, we decided which side we are going to take. There were a number of ways to talk about

this issue, so we tried to keep the discussion as focused as possible. Then we discussed what reasons and examples we are going to suggest and I put everything together and made into a writing plan. Everything went very smoothly. (Student 11, Week 6)

In the drafting stage, every group worked together, although it was far from collaborative writing. Members in each group divided their workload and then wrote the parts assigned to them individually, as shown in Excerpt 3 and 4. They then combined texts from each member and merged them into one essay. The students seemed to feel more comfortable about writing individually than writing the same text simultaneously with one another. They also used time management strategies, in that they were required to complete an essay within limited time. As they usually had to write four paragraphs (one introduction paragraph, two body paragraphs, and one concluding paragraph), most groups with three members assigned one paragraph each to two of the members and the rest two paragraphs to one member. For two paragraph writing, there were differences among groups. Some groups allocated two body paragraphs or a combination of introduction and conclusion to a member. Other groups assigned a combination of one body paragraph and an introduction paragraph, or a combination of one body paragraph and a conclusion paragraph.

Excerpt 3

I got one of the body part and conclusion, and it was a bit more comfortable to write the body than the conclusion. (Student 12, Week 6)

Excerpt 4

We divided up into three parts and started writing, since we couldn't write conclusion by the deadline last time. We divided up into introduction-body-conclusion, not into three different paragraphs. (Student 3, Week 6)

Interestingly, one group tried out a different approach in their second attempt at collaborative writing, as shown in Excerpt 5 as they wished to find out a more effective way of collaborative writing within limited time. Unfortunately, they were not satisfied with any of the methods they had used.

Excerpt 5

This time, I think my team's strategy of writing failed. Last time, each person wrote one part of an essay -

introduction, body and then conclusion and put 3 parts together. The essay didn't look good and lacked unity. So, this time, our team members decided to wrote whole essay each and extracting good ideas and sentences or paragraph and then put them together. It turned out to be harder task. (Student 21, Week 6)

It is notable that the students were not as much interactive and collaborative during the drafting stage as they were in the brainstorming state. They just divided the workload and wrote the assigned part individually. Workload division and individual writing seemed to be used as time management strategy to finish the group writing in time.

In the revising stage, every group put together what they had written and worked together to revise their essay. All groups focused on lexical or grammatical errors when they reviewed and revised their essays. The group members collaborated to fix language-related errors, as shown in Excerpt 6. They also discussed to find words or sentences that were appropriate to express their ideas, as indicated in Excerpt 7.

Excerpt 6
When revising, other members helped me to find out grammatical errors and wrong choice of words that I missed to notice. I found it helpful that other members gave me feedback on making the sentences more consistent throughout the essay. (Student 2, Week 5, Originally written in Korean)

Excerpt 7
At the end, we proofread the final essay and told each other about better vocabulary choices and grammar patterns. (Student 11, Week 6)

However, many groups noticed problems with inter-paragraph transitions after combining texts written by each member (see Excerpt 8 and Excerpt 9). They also discovered some discrepancies in writing style among the group members. This made their ideas unconnected and inconsistent, as shown in Excerpt 10. Thus, the students worked on those organizational problems in their revision to ensure consistency and unity of the text.

Excerpt 8
When everyone finished each part, we put the essay together and looked for anything that made the essay looked like it was written by more than one person. The most important in writing an essay as a group, I think, is uniformity. It is crucial to make arguments and sentences in the essay consistent. (Student 11, Week 6)

Excerpt 9

However, it had difficulty in collecting 3 parts of the essay and revising. When 3 parts - introduction, body and conclusion - were put together, the essay lost its unity. While we were writing the part each person would write, the flow of our essay ran into different direction from that we discussed before. I think when we do group writing, it's the most important thing to communicate each other sufficiently. (Student 21, Week 5)

Excerpt 10

The style of writing sentences and choosing words of each member was different even when writing about the same contents. Since each member wrote a paragraph or two and combined them into an essay, we needed time to work on making the essay more consistent. (Student 2, Week 5, Originally written in Korean)

There was a case when a group had to re-write most of the parts they had written after combining each other's work, as shown in Excerpt 11 and Excerpt 12. While revising essays, they realized that the flow of their paragraphs was not consistent or natural. Thus, they had to rewrite some parts of their essays to match them with the rest of the text.

Excerpt 11

In revising step, I spent most time rewriting the conclusion. As I had slightly different focus to write it, the connection between other parts and the conclusion was not enough. (Student 12, Week 6)

Excerpt 12

When we collected a part of the draft in the next class, I can see the biggest drawback of group writing. That is, the connection of the writing was awkward. The writing looked very cluttered and incoherent. We exchanged opinions with each other and agreed to revise the body and the conclusion parts. Since we started the essay by asking which of the two is preferred, we though we'd better express our position more clearly to the conclusion. We also agreed to revise the body part by deleting abstract stories and putting it more concisely. (Student 13, Week 6)

However, this organizational problem was not an issue for some students. These students allocated sufficient time to discussing how to structure their text and making a precise outline in the early phase of writing. For that reason, the draft constructed from multiple texts by different members contained fewer organizational problems (see Excerpt 13).

Excerpt 13

Our group combined, revised, and polished the writing about [...]. This time, two parts are smoothly

connected. I think it's because we discussed sufficiently how to organize the paragraphs. (Student 19, Week 6)

All groups in this study adopted Saunders' (1989) co-writing approach since all groups collaborated during the brainstorming, drafting, and revising stages. Unlike the results of Lai et al (2016), no group in this study took the single composing and interactive revising approach. Rather, most groups used the parallel composing and interactive revising approach, which is similar to parallel writing-horizontal division presented by Lowry et al. (2004). The results suggest that the approach to CSCW was not different from the approach to collaborative writing.

2. Challenges and Benefits of Computer-Supported Collaborative Writing

1) Challenges of CSCW

Most of the students in this study have never experienced writing collaboratively, let alone writing on a wiki or *Daedalus*. Some students have had little experience of writing in English on a computer. Due to this lack of experience, they perceived CSCW as quite challenging. One of the challenges they have experienced during collaborative writing was a psychological burden for their contribution to group work. Many students felt nervous or anxious about their limited proficiency in writing, thinking that it could negatively affect the quality of their group work, as shown in Excerpt 14 and Excerpt 15.

Excerpt 14
It is true that I felt a great deal of pressure to write when writing together as a group, rather than when writing alone. Since I felt a lot of lack of English, I was worried that I would not be able to help but bother my team members. (Student 4, Week 6)

Excerpt 15
When I heard I would do write with other students, I feel convenient, because I would be able to release my tension. But my expectation went completely wrong. [...] But, assignment of writing brought new burden to me. When writing by myself, I was comfortable. But in group writing, if I don't write well, I gave damage to others. So, I'm still conscious about it. (Student 24, Week 5)

In addition, some students found it difficult to cope with disagreement from their group members, particularly during the brainstorming or the revising stage. This conflict among

members obviously made it difficult to collaborate with one another. For instance, in the brainstorming stage, some groups had a hard time determining a position to take and as a result they spent a lot of time on discussion, as seen in Excerpt 16 and Excerpt 17. The students had to decide a certain position on the writing topic and find supporting ideas for that position to write an essay. Thus, when they were given a controversial topic, some groups ended up spending so much time on debating the issue that they had little time for collecting and choosing evidence to support their position.

Excerpt 16
Basically, my opinion and their opinions were totally different. [...] We discussed over again, finally we made one conclusion. We decided to make a poison on advocating to [...] The process that we, 3 persons, gather our different views to only one idea was felt hard for me and it took a lot of minutes. (Student 23, Week 5)

Excerpt 17
It was the first time we've worked as groups and I found it very complicated. For example, our group wasn't succeed in keeping track of time. We spent too much time brainstorming so the teacher warned us to move on to the next step, drafting. We didn't even have time to search on the Internet to get information which is related to the topic. (Student 4, Week 5)

In the review and revision stage, some students found it challenging to revise the content or organization of their essay, as shown in Excerpt 18. They had to reach an agreement about how to fix content- or organization-related problems, which required more time than mechanical problems, such as grammatical or lexical errors.

Excerpt 18
During we revised our article there are many conflicts in our opinions. Especially, I think when we make a conclusion it is very effective to paraphrase my points in the body of the article. After that, I wanted to out some final message to impress you. But two other my grouper said it is too repetitive. I was the biggest conflict between their opinions and mine. (Student 23, Week 5)

They also perceived the revision process as even more demanding when they had to deal with varied styles of writing by different members. The texts created by group members differed not only in terms of word choices or sentence types, but also in the way they developed and organized ideas and arguments. As the students were required to complete an

essay as a group, they had to unify different styles of writing to make their essays consistent and coherent, as in Excerpt 19.

Excerpt 19

I love make an article very clearly through explicit marks like proper conjunctions and clear division of the paragraphs. But my two other groupers did not do like that. Thus I suggested it would be clearer if we add some conjunctions and make division of paragraph more precisely. They accepted my suggestions and put some conjunctions and rearrange paragraphs. (Student 23, Week 5)

Another factor that caused difficulties on the part of learners was that they were not used to typing in English. As they were required to perform timed-writing tasks as a group, they were expected to be good at typing in English. As they were not proficient, they felt insecure about using computers to write in English, as indicated in Excerpt 20 and Excerpt 21.

Excerpt 20

Then we discuss with DIWE. I felt like I'm doing internet chatting. The system was good but we were not used to type English words and we didn't have much time. (Student 19, Week 5)

Excerpt 21

At the very beginning, I was very worried. I'm not really good at typing. It's my weakest point. I usually write things on paper and type them on a computer lastly. It means I'm not used to writing on computer. For me, write with a pencil and correct with an eraser are the fastest way. Still, I prefer to use paper although I might be able to revise on a computer. (Student 4, reflection paper)

It seems that most of the challenges addressed by the students have to do with collaborative writing rather than with CSCW. They were more conscious of their contribution to the group work, perhaps because of peer pressure, and thus experienced some anxiety or tension about collaborative writing.

2) Benefits of CSCW

The students also expressed some benefits of collaborative writing in a computer-supported environment. One of the benefits was that they felt less anxious about writing. For example, writing a three- or four-paragraph essay in English, particularly under time constraints, can become a daunting task for many Korean students as they have not received sufficient training

about how to write in English. The fact that the participants of the study could write collaboratively on a computer led to lower levels of writing apprehension, as shown in Excerpt 22, 23, and 24. They felt at ease about writing as they were able to seek help from their group members when they faced problems in writing. They were also more comfortable about CSCW because they shared responsibility for writing by diving workload.

Excerpt 22
Overall, I felt more comfortable with group writing since we could split up our works. (Student 3, Week 5)

Excerpt 23
Overall, I enjoyed a lot by group writing. It was less stressful than writing by myself for the fact that I could communicate with others and ask for some help when I am stuck. (Student 3, Week 6)

Excerpt 24
I felt less nervous than I wrote an article myself. I think it's because I thought I am very poor at writing even poorest in the class but my group members have the same problems. We solved several problems together so it was effective to write with others. (Student 19, Week 5)

While it is true that some students felt pressured to contribute to their group work, they became more responsible at the same time for writing in groups and thus worked harder while working on the CSCW task, as indicated in Excerpt 25 and Excerpt 26. Understanding that their individual work would account for the quality of the whole essay, they did not want to be a burden to their group members and became more engaged in their group work.

Excerpt 25
I felt responsible for writing [when I write together as a group]. It is true that I felt a great deal of pressure to write when writing together as a group, rather than when writing alone. [...] So I researched more and I was more careful in choosing a word than I did when I wrote alone. Two group writing has served me as an occasion for a more cautious and responsible attitude in writing. (Student 4, Week 6)

Excerpt 26
What is impressive most is, I felt more responsibility with writing when with group than when alone. It's maybe because I was writing just a single part of a whole essay. It made me feel more responsible. And I paid more attention to grammatical agreement than any other time. (Student 25, Week 5)

Another benefit the students reported about collaborative writing was that they could learn how to write a good essay from their classmates, as seen in Excerpt 27 and Excerpt 28. While

working together in a CSCW environment, they were able to observe what their peers were doing and how they tackled the process of writing. This observation obviously helped them perform better by modelling after their peers.

> Excerpt 27
> *One more good thing about it was I could see other members writing in different ways as mine in terms of expressions and words. I tend to keep using the same expressions over and over. I learned words and expressions that I was not used to from other members. And more than all, it was nice for me to have a chance to know other students in the class. (Student 16, Week 5)*

> Excerpt 28
> *But, I think this group writing is better than individual writing because we can learn writing with each other. (Student 24, Week 5)*

As a matter of fact, some students reported that the quality of their essay was raised due to the CSCW experience, as indicated in Excerpt 29, 30, and 31. While conversing during the brainstorming stage, they were able to encounter diverse ideas and multiple perspectives, which helped them develop and organize ideas better. In addition, the process of review and revision made it easy for them to notice problems or weaknesses in their essays and to modify and refine their texts in terms of content, organization, and language use.

> Excerpt 29
> *The third [advantage] is the abundance of writing. Rather than squeezing and writing myself alone, I think I could write a wide range of diverse, brilliant ideas, and a wide range of sentences. (Student 13, Week 5)*

> Excerpt 30
> *While reviewing and reviewing, I focused on the connectivity of each paragraph and the direction to the topic. I once again felt the greatest advantage of group writing in this part. Grammatical points and sentence structure were especially helpful in refining the writing. It also seems to be a better writing practice by sharing ideas about organizing the flow associated with the topic. (Student 8, Week 6)*

> Excerpt 31
> *It was good to revise with others because we were able to be critical. One can't see his or her mistakes easily but others can. (Student 19, Week 5)*

Students in this study seemed to experience benefits of collaborative writing as suggested by Laal and Ghodsi (2012), such as feeling more responsible, working harder, or learning from their peers in the process of working together. They also experienced challenges of coping with disagreement between group members during collaborative writing (Tocalli-Beller, 2003). Interestingly, in terms of psychological burden, the students felt both less anxious and more anxious about writing together. They felt less anxious as they could divide the workload and get help from their group members. At the same time, they became more anxious when they were pressured about their contribution to CSCW. Overall, most students displayed favorable responses to collaboration in the brainstorming and revising stages, whereas some students showed positive reaction to the stage of collaborative writing.

3. Student View of CSCW Tools

1) Student View of *Daedalus* for CSCW

As to *Daedalus*, the participants of the study recognized some benefits and drawbacks. First of all, many students enjoyed the INVENT module of *Daedalus* because it helped them to get ready for writing. INVENT has a list of questions to stimulate students' thinking about the topic; by answering those questions, the students were able to generate ideas efficiently for their essays, as shown in Excerpt 32. This module was particularly useful for some students who did not know how to make an outline before writing. In contrast, other students either thought that it was not easy to answer some of the questions (see Excerpt 33) or believed that the prompts given in the INVENT module were not useful for organizing their essays (see Excerpt 34).

> Excerpt 32
> *The part that was most helpful to me was preparing an outline. When I write an essay, I often start writing without any effort, so if I think of a better example or support while I'm writing, I go up and revise it. But then I feel the flow of my writing is not natural, and somehow I spend a lot of time correcting or correcting it. However, if I answered the questions in the program, I could complete the outline. And if I added a few more sentences to them, I can get at least four paragraphs, including an introduction, two body paragraphs, and a conclusion. When I took out the outline alone, all I could do was that I think of my position on the topic and two or three supporting ideas. However, if I use the program, I think I was able to write with great stability as I was able to get an outline, general statement that I can use in the introduction paragraph, and a conclusion. The outlining process of the program was the most helpful because making an outline was the hardest part to me. (Student 23, Week 6)*

Excerpt 33

Daedalus seems to have different questions to consider in the process of brainstorming for different genres of writing. However, I've only experienced one type of question during class, so I am not sure how useful Daedalus is. When I actually answered the question, it was difficult to write the answer correctly. But it seems to be much easier to write than when I did not brainstorm before writing. (Student 21, Week 6)

Excerpt 34

Daedulas (?) helps us to organize making structures of text. We answered to the questions in which Daedulas program. However, those questions are tend not to have a close relations between questions and actual writing. The answers to the questions sometimes became a good-for-nothing. I had to reorganize structure to write text. (Student 20, Week 6)

Many students also liked the RESPOND module of the program because it made their revision process much more efficient and effective. Like INVENT, RESPOND has a series of questions to facilitate the peer review process. While answering them, the students could see what they were supposed to do to make their text well-organized (see Excerpt 35 and Excerpt 36). The module was particularly valuable for those who lacked experience in reviewing and revising texts or those who paid attention to mechanical errors only in the revision process.

Excerpt 35

Yet, I like the respond program the most. It made me read the writings I did previously again with some insight and helped me a lot in making my composition clear and precise. (Student 22, Week 6)

Excerpt 36

When I first came across DIWE, it was very refreshing to see that DIWE gave feedback primarily on structural aspects, while I mainly focus on the content and give feedback. I found that DIWE saw structural problems as very big when I was given questions during RESPOND such as "Which paragraphs should be left out or supplemented?", "Are the paragraphs closely linked?", or "Are there any sentences that need to be deleted or added?" (Student 25, Week 6)

While the students had favorable views about the Invent and Respond module, they did not about the WRITE module. They found the WRITE module inconvenient to use as it did not provide convenient word processing features, like spell check or grammar check, as seen in Excerpt 37. Students also felt uncomfortable about using the module, thinking that it was not user-friendly, as shown in Excerpt 38. As the module only carried very simple functions like typing, it was not good enough to arouse learner interest. Thus, instead of WRITE, they used

MS Word or Hangul (hwp) equipped with diverse word processing features. Upon writing a draft on one of those word processing programs, they copied and pasted the finished product onto the WRITE module.

> Excerpt 37
>
> *And one thing I was particularly disappointed with is that the program does not catch errors such as spelling or grammar errors. DIWE 7 does not seem to check for grammatical errors that WORD or Hangul (hwp) program does. (Student 17, Week 6)*

> Excerpt 38
>
> *When writing, it looked pretty crude anyway because there were no typesetting marks, and the spacing between the writings was too narrow. It was a little inconvenient for us who were familiar with MS WORD or Hangul (hwp). Of course, I was able to control the font shape or size when I entered the tool, but it was inconvenient to manipulate each time. It was not easy to read the text when writing in the default set. (Student 17, Week 6)*

2) Student View of a Wiki for CSCW

Many students in this study believed that a wiki was beneficial for collaborative writing because it allowed them to share a document that they were working on, as in Excerpt 39 and Excerpt 40. As the program enabled the students to access the same document simultaneously, they could observe how their document was being constructed or changed when someone edited it. This was useful when they, as a group, wrote and revised their draft.

> Excerpt 39
>
> *I think wikis was a great tool for group writing, since all our works were opened to each other, in other words, we could share our written works easily. If we were only using word sheets and some kind of messenger, we would have to save the whole file and then sent it to others, which would be very complex. [...] but within wikis, everyone could see the work at the same time. (Student 3, Reflection paper)*

> Excerpt 40
>
> *However, when it comes to group writing, it seems to be a great attraction that many people can add and edit the same text. I think it was helpful when revising the text by letting people read and edit the same text and edit. (Student 9, Reflection paper)*

Particularly, the students appreciated the track-change feature in the wiki, as seen in Excerpt 41 and Excerpt 42. This feature made it easy to track changes by comparing their texts before

and after revision. The students were able to review and revise their essay more efficiently as the feature allowed them to check the changes in the text.

> Excerpt 41
> *When collaborative writing, wikis was useful. I could know which part was revised by other group members and the revising order, too. (Student 21, Reflection paper)*

> Excerpt 42
> *The best part of using wikis was the revising process. Since it was possible to recognize how the text is modified by each team member through 'past-comparison' menu, it seems that commenting on it was also effective. (Student 2, Reflection paper)*

While most students were favorable about using the wiki, some students found it uncomfortable to use, as it did not carry some useful word processing features, including spell check and automatic correction, as in Excerpt 43 and Excerpt 44.

> Excerpt 43
> *As for wikis I found it a little bit inconvenient. It doesn't seem to have functions as many as MS WORD or Hangul (hwp). For instance, it doesn't show any errors of spelling, punctuation, capitalization, paragraphing. It is hard to find mistakes. Maybe I should copy the writing into MS WORD or Hangul (hwp) and revise using them. (Student 4, Reflection paper)*

As it contained simple typing features only, the students used MS Word or Hangul (hwp) program instead of the wiki. In addition, some students found the track-change feature inefficient to use, as shown in Excerpt 45.

> Excerpt 44
> *Wiki was not bad to work with but one of the problems was that it didn't have any auto-correction function. As I was used to writing using word processor, I was used to the auto-correction function as well. There were many spelling mistakes that I hadn't spotted out. (Student 11, Reflection paper)*

> Excerpt 45
> *It is inconvenient to read the contents before and after revision at a glance through 'past-comparison' menu. (Student 2, Reflection paper)*

V. CONCLUSION

The present study explored the process of CSCW from learner perspectives and the challenges and benefits associated with CSCW. The study also investigated how the students perceived their experience of using a wiki and *Daedalus* for collaborative writing. The findings of the study indicate that even though the students were encouraged to work collaboratively in the CSCW environment, they did not always write together with their group members. Interestingly, how the students performed writing tasks was different depending on the stage of writing. For instance, whereas the students were more interactive during the brainstorming and revising stages, they did not interact much and worked individually while writing their drafts. In addition, there were some similarities and differences in the way the students approached collaborative writing.

Another finding was that the student responses in their journals suggested both challenges and benefits of CSCW. Challenges addressed by the students include feeling psychological burden, managing disagreement or conflict with their group members, or dealing with inconsistency due to different writing styles. As for the benefits of CSCW, the students were less anxious or more comfortable about writing. They also reported that CSCW was beneficial as it allowed them to write a good essay by working together or by observing advanced peer writers.

Third, the study demonstrated that the students perceived some benefits and drawbacks associated with the two tools for collaborative writing: *Daedalus* or a wiki. As for *Daedalus*, the participants of the study found the features of INVENT and RESPOND useful as they facilitated the process of drafting and revising. In contrast, the students were not content with the WRITE function because it did not carry word processing features, like spell check or grammar check. Regarding a wiki, the students believed that it was useful for collaborative writing because it allowed them to write and share the same document simultaneously. They also found it inconvenient to use a wiki as it lacked word processing features.

These findings have some pedagogical implications for the writing classroom and teachers. First, CSCW tools can be used in the writing classroom to promote learner engagement, foster collaborative interaction, and develop learner proficiency in writing. However, teachers should be aware of the strengths and weaknesses of CSCW tools and apply the tools to lesson planning. They should also select tools that best fit the purpose of instruction and design writing tasks using the tools. In addition, classroom teachers should utilize some instructional strategies to promote group interaction during collaborative writing. For instance, they can

generate some questions to facilitate discussion or develop guidelines about how to coordinate group interaction while writing collaboratively. Wichmann and Rummel (2013) recommended that teacher willingness to foster interaction can contribute to enhancing group coordination and raising the quality of text.

While the findings of the study offer valuable information about CSCW in a higher education context, they are not generalizable to other contexts. It is thus worthwhile to conduct further research with primary through secondary school students. It is also necessary to conduct more studies to find out learners' approach to and perception of CSCW using various sources of data, including questionnaires, interviews, or observation since this study examined learner' learning journals and reflection journals. In addition, it would be also helpful to examine other tools that can be used for CSCW.

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