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The Effects of Online Corrective Feedback on University Students' Self-Regulation in Writing

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Article information	
Abstract	This study aimed to determine how teachers' online written corrective feedback (WCF) affected university students' self-regulation in writing and how the effects differed among students of different English proficiency levels. The participants were 27 second-year university students enrolled in a required online writing course. Throughout the 16-week course, the students received online WCF on their writing through Google Docs. Results from pre- and post-questionnaires and interviews revealed the positive effects of teachers' online WCF on students' self-regulation in writing, especially those with mid- and low-proficiencies. Results from this study provided an indication of the effectiveness of online WCF in developing L2 learners' self-regulation. They also gave insight into how language proficiency levels affect learners' perception of online feedback and its impact on self-regulated learning development.
Keywords	online corrective feedback, online written corrective feedback, self-regulation, self-regulated learning, writing
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Introduction

With today's technological advancements, the role of online teaching is becoming more prominent, especially since the emergence of the COVID-19 pandemic which has affected traditional teaching and learning in physical classrooms around the world. Self-regulation was found to contribute to success in second language learning, especially in online learning environments where learners need to be more autonomous and actively engage in their own learning in order to achieve satisfactory outcomes (Wang et al., 2013). A number of previous studies have reported a direct relation between self-regulated learning strategies and academic achievement (e.g., Inan, 2013; Vrugt & Oort, 2008; Wang et al., 2013) since learners with self-regulation tend to be more effective learners who are more persistent, resourceful, and confident, and are therefore usually higher achievers (Schunk & Zimmerman, 1994; Zimmerman & Schunk, 2001).

As Broadbent and Poon (2015, p. 2) have pointed out, "self-regulated learning strategies affect learning outcomes by assisting learners to acquire and retain knowledge in a structured and methodological way." This is because the SRL process comprises a set of learning strategies that can be taught to learners to apply to their real-world tasks (Zimmerman, 2000). Teachers can facilitate learners' SRL by structuring learning environments in ways that make learning processes explicit, encourage meta-cognitive training, promote self-monitoring, and provide learners with opportunities for self-regulation practice (Schunk & Zimmerman, 1994).

According to Fernández-Michels and Fornons (2021), online learning, feedback, and self-regulation are interrelated. This is because self-regulated learning is crucial for the success of online learning, and teachers' corrective feedback is an important factor that drives learners' SRL process. An important component of self-regulation is monitoring, which is the cognitive process learners use to assess their progress to achieve a task goal and generate feedback that can guide their further action (Zimmerman & Paulsen, 1995). Self-regulated learners use both internal and external feedback, such as teachers' corrective feedback, to monitor how well they are performing to meet the learning goals (Butler & Winne, 1995). Therefore, learners' self-regulation

can be affected by a number of interventions such as teachers' constructive feedback on their efforts, explicit teaching of learning processes, effective learning strategies for tackling learning tasks, and active encouragement of self-monitoring (Chung & Yuen, 2011).

In an extensive review of literature on teaching self-regulation, Travers (1999, cited in Travers & Sheckley, 2000) identified five instructional practices that are most effective in helping students promote their self-regulation. The five teaching practices include (1) guiding students' self-beliefs, goal setting, and expectations; (2) promoting reflective dialogues; (3) providing corrective feedback; (4) helping students make connections among abstract concepts; and (5) helping students link new experiences to prior learning. Among the five teaching practices, corrective feedback is an integral part in teaching L2 writing in both online and on-site contexts.

When teaching L2 writing online, teachers' written corrective feedback (WCF) can be delivered electronically through several different editing functions, such as track changes, commenting, and highlighting, found in Microsoft Word and Google Docs. Also, it can be given both synchronously while the students are writing and asynchronously after submission like paper-based feedback. The rapid growth of online teaching and the multi-functions online feedback provided make teachers' online WCF interesting to investigate.

Putting together the importance of self-regulation in language learning, the growth of online teaching, and the role of corrective feedback in promoting learners' self-monitoring, which is an important component of self-regulation, the effects of online corrective feedback on learners' self-regulation should be investigated. In addition, as self-regulation is strongly related to language learning achievement, it is interesting to study the extent to which different levels of language proficiency can affect the role of corrective feedback in SRL development.

Literature Review

Self-Regulation in Second Language Learning

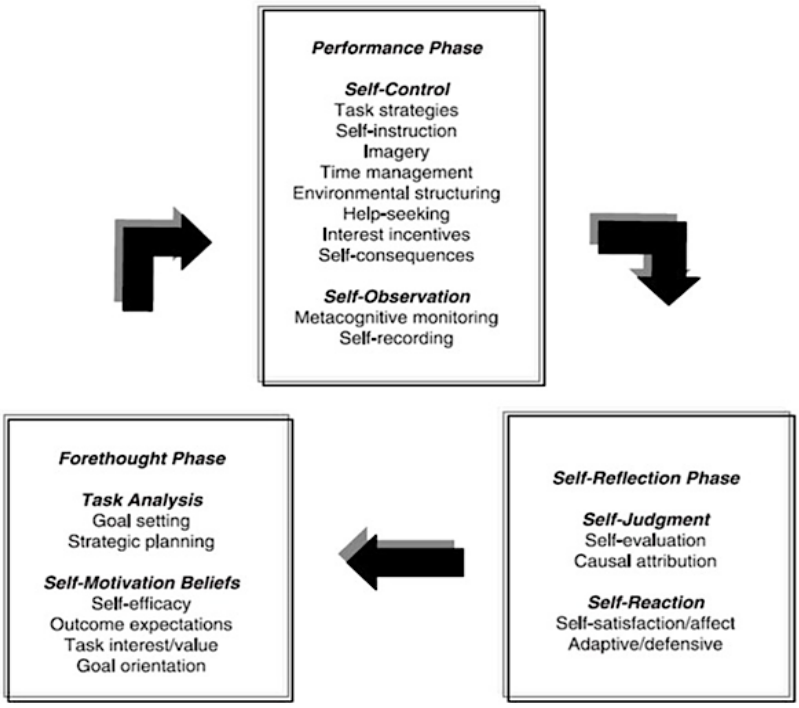
According to the social cognitive theory (Zimmerman, 2000), self-regulation or self-regulated learning (SRL) is defined as a cyclical process that involves three sequential phases: forethought, performance, and self-reflection. In each phase, learners use a set of self-regulated strategies in order to complete the task goals. In the *forethought phase*, learners use self-regulated strategies to analyze the task, set goals, and plan a number of strategies to reach them. To do so, learners need self-motivation beliefs to drive them to use their own learning strategies to achieve their goals.

In the *performance phase,* learners actually perform the task and monitor their own process in completing the task using a set of self-control and self-observation strategies. The self-control strategies include a number of sub-strategies such as task strategies, self-instruction, and help-seeking, while self-observation deals primarily with self-monitoring, or systematically monitoring their own performance. Teachers' corrective feedback serves as external input for learners to observe and monitor their work.

In the *self-reflection phase*, learners have to assess how well they perform the task (*self-judgment*) by analyzing the factors attributed to their success or failure in performing the task (*causal attribution*). This self-assessment can influence how learners perform the task in the future as they may adapt their learning strategies to improve their task performance (*adaptive inference*), or simply defend their past performance (*defensive inference*). The current model of the cyclical process of self-regulated learning is presented in Figure 1 below.

Figure 1

Cyclical Phases Model of Self-Regulation (Zimmerman & Moylan, 2009)



According to Zimmerman (2000), self-regulation benefits language learning since self-regulated learners have metacognition and motivation and are more active in their learning process. Learners with high motivation are more likely to use self-regulatory strategies when performing a task. Previous studies have explored the relationships among self-regulation, motivation, and learning outcomes (e.g., Csizér & Tankó, 2017; Teng & Zhang, 2017; Wilby, 2020). Recent findings have reported that both self-efficacy and SRL strategies greatly contribute to learners' proficiency in L2 writing (Sun & Wang, 2020).

Wilby (2020) investigated college students' changes in and the relationship among writing motivation, self-regulation, and essay writing scores in an English for academic purposes course. Results revealed a significant increase in self-efficacy, but stable levels of motivation and the use of SRL strategies. The results also showed a strong inter-relationship between self-efficacy and self-regulation, indicating that students' confidence in their writing is important for developing self-regulatory strategies. The findings were in line with Csizér and Tankó's (2017) study which

indicated that learners' motivation, anxiety, and self-efficacy were directly related to the use of self-regulatory strategies.

Self-regulated learning has been found to be closely relevant to learners' language performance and academic task achievement (e.g., Pintrich, 2002; Pressley & Ghatala, 1990; Teng, 2019; Teng & Zhang, 2017). In a large-scale study of 512 undergraduate Chinese students, Teng and Zhang (2017) investigated the relationship between writing scores and the use of self-regulated strategies. Results from self-reported questionnaires and an English writing test showed that there were strong correlations between metacognitive and cognitive strategies and the students' writing scores. The findings suggested that in order to use other SRL strategies, learners need to possess knowledge of motivational regulation.

In a more recent large-scale study by Teng (2019), the relationships between metacognitive regulation and writing performance were investigated. Data collected from 882 EFL learners from eight universities in China revealed a number of metacognition parameters that were positively correlated with the learners' writing performance. It was found that planning, monitoring, evaluation, and procedural knowledge were significant predictors of learners' writing performance. In addition, learners' metacognitive knowledge and regulation were found to be closely and positively associated. Therefore, it could be concluded that metacognitive regulatory skills should be developed to enhance university students' writing performance.

There have been a small number of studies aiming to find a relationship between self-regulation and instructional practices such as corrective feedback. Vasu et al. (2020) carried out an experimental study to investigate the effects of self-assessment and indirect teacher feedback on undergraduates' self-regulated learning (SRL) in writing. It was found that both self-assessment and indirect teacher feedback benefited learners' self-regulation. However, self-assessment was proven to be more effective at promoting learners' SRL than the teacher's indirect feedback.

Online Corrective Feedback and Self-Regulation

Previous studies have been conducted to examine the effects of online corrective feedback on writing accuracy (e.g., Nassaji & Swain, 2000; Shintani, 2016) and writing performance (e.g., Ferris & Roberts, 2001; Shang, 2022). Other studies were undertaken to determine the effects of synchronous and asynchronous peer feedback (Chang, 2012; Shang, 2017) and the effectiveness of paper-based and online asynchronous peer feedback (Huang et al., 2020). However, few studies focused on the relationship between online corrective feedback and learners' self-regulation although both play an important role in learning foreign languages online. Previous studies also showed that learners' perception of the corrective feedback they received may be related to their writing achievement, self-efficacy, and self-regulation in writing (e.g., Evans, 2013; Magno & Amarles, 2011; Schunk, 1994; Tsao, 2021).

In one study, Ekholm et al. (2015) examined the relationship between feedback orientation and self-regulated learning and found that both learners' perception of teachers' feedback and their self-efficacy were predictive factors of their SRL aptitude, or how they perceived themselves as self-regulated learners during writing tasks. Moreover, their motivation and affective responses to writing feedback played an important role in their self-regulation in writing. A later study undertaken by Waller and Papi (2017) reported a positive relationship between learners' feedback-seeking orientation towards WCF and motivation in L2 writing but a negative relationship between feedback-avoiding orientation and learners' L2 writing motivation.

Xu (2021) investigated university students' orientations towards WCF and their use of self-regulated learning strategies in online English writing courses. Results were in line with those of Ekholm et al. (2015) in that learners' feedback-seeking orientation significantly predicted their use of SRL writing strategies. Also, teachers' and learners' interactive feedback could promote learners' engagement in their writing tasks. Therefore, the positive effect of online WCF on the use of SRL writing strategies was identified.

To conclude, empirical evidence has indicated that self-regulation can enhance learning motivation and self-efficacy (Chen et al., 2019), benefit L2 learning (Hu & Zhang, 2017; Pintrich, 2002; Pressley & Ghatala, 1990), and increase L2 writing efficiency (Teng, 2019; Teng & Zhang, 2017; Sun & Wang, 2020; Wilby, 2020). Most studies on SRL have been done with similar objectives of investigating the relationship either between self-regulation and motivation or self-regulation and learning outcomes, while studies on corrective feedback focused more on language accuracy and learning performance. More research is needed for a better understanding of how learners' perception of corrective feedback is related to their self-regulation and help-seeking behaviors (Evans, 2013). Considering the significance of corrective feedback and self-regulation, the current study aimed to offer insight into how online written corrective feedback (WCF) affected learners' self-regulation.

The two research questions of the current study were the following:

1. How does online WCF affect learners' self-regulation in writing?

2. What are the differences between high-, mid- and low-proficiency learners' self-regulation in writing after receiving online WCF?

Methodology

Participants and Sampling Method

An intact group of 27 second-year accountancy students at a public university in Bangkok, Thailand was recruited. They were enrolled in a required English correspondence writing course and volunteered to participate in the study. The 27 participants were from different sections, two of which were taught by the researcher and the other two by two different instructors who followed the same lesson plans, employed the same teaching materials and used the same kind of WCF. Google Docs and Google Classroom were used as the medium for writing exercises and giving online WCF both synchronously and asynchronously. Since all the participants had to take another required writing course as a prerequisite in the former semester, their grades obtained from the prerequisite course were used to divide them into three groups—high-

, mid-, and low-proficiency groups. The three groups were categorized using the following criteria:

High-proficiency group (H):	nine students with scores between 85 and 100 (Grade A)
Mid-proficiency group (M):	nine students with scores between 75 and 79 (Grade B)
Low-proficiency group (L):	nine students with scores between 55 and 69 (Grades C, D+, and D)

Instruments

To probe into how online WCF affected students' self-regulation in writing, the following two instruments were used:

1) Self-Regulation (SRL) Questionnaire

The SRL questionnaire was adapted from the self-regulation checklist (Wilby, 2020) to collect quantitative data on the participants' use of SRL strategies in completing the writing tasks. The 15-item questionnaire with a five-point Likert rating scale of frequency (never, rarely, sometimes, often, and always) was classified into three phases—forethought, performance, and self-reflection—according to the self-regulation model employed in this study (Zimmerman, 2000). Each item was translated into Thai, and the content validity of the questionnaire was determined by three experts in the field of second language assessment using Item Objective Congruence (IOC).

2) Semi-Structured Group Interviews

All 27 participants were invited to take part in the semi-structured group interviews, with four to five participants in each group. Each interview lasted approximately one hour. The purpose of the interview was to elicit in-depth data regarding the participants' perception of online WCF and how it mediated their use of SRL strategies. Interview questions were adapted from a group interview protocol (Chong, 2019), and the participants were encouraged to share their experiences from the course regarding how they perceived and contributed to their instructor's online WCF on their writing. The content validity of the interview questions was confirmed by the same three experts in the field of second language assessment using Item Objective Congruence (IOC).

Data Collection and Data Analysis

The 16-week writing course was carried out online using Zoom meetings with approximately 30 students per class. The participants were assigned to complete writing tasks, either in pairs or individually, during the last hour of the 180-minute class meeting. The in-class writing assignments were done on Google Docs so that the instructors could see the students' writing process and give them synchronous written corrective feedback (WCF) via the "Chat," "Comment," and "Reply" functions. The asynchronous WCF was given later using the editing functions in Google Docs after the participants had submitted their work.

At the beginning of the course, the participants were asked to complete the self-regulation questionnaire via Google Forms, and at the end of the 16-week course they were required to respond to the same questionnaire again. After that, all 27 participants from the three groups (H, M, and L groups) attended a one-hour group interview.

To minimize any influence on interviewees' discomfort due to the researcher being the teacher of the course, the interviewer for all groups was an appointed research assistant and all participants were not required to give their names. The participants were assigned codes in order to match the pre- and post-questionnaire responses and to refer to the interviewees' opinions while keeping all the responses anonymous. The codes Athens1-9 were randomly given to the participants of the high-proficiency group, while Berlin 1-9 and Cardiff 1-9 were assigned to those of the mid- and low-proficiency groups, respectively. The interviews were conducted in Thai with an explanation of technical terms, such as synchronous and asynchronous online feedback, to overcome language barriers.

Data obtained from the pre- and post-questionnaires were analyzed using descriptive statistics and inferential statistics. To determine the difference in levels of self-regulation across the three groups of participants, a non-parametric Wilcoxon signed-rank test was employed with a level of significant difference set at 0.5. Qualitative data from the group interviews were transcribed and translated into English. As the

interpretation was done directly from the interview transcription, a conventional content analysis approach was employed to analyze data.

Results

Research question 1: How does online feedback affect learners' self-regulation in writing?

Results from the questionnaire and the interviews correspondingly revealed that participants across the three groups showed improvement in their use of self-regulation in writing after receiving online WCF.

Table 1 below shows descriptive statistics and Wilcoxon signed-rank tests of participants' self-regulation both before and after receiving online WCF. Overall, the participants' SRL scores after receiving online WCF were higher ($M = 4.13$, $SD = 0.45$) than those reported before the treatment ($M = 3.74$, $SD = 0.63$). The findings also showed improvement in SRL scores in all three phases.

Table 1

Descriptive Statistics and Wilcoxon Signed-Rank Tests of the Participants' Self-Regulation Before and After Receiving Online WCF (N = 27)

SRL Stage	Before		After		*z*	*p*	*r*
	M	SD	M	SD			
Forethought	3.48	0.94	3.93	0.68	-2.142	.032*	-.41
Monitoring	3.90	0.63	4.22	0.47	-3.469	.001**	-.67
Self-reflection	3.65	0.76	4.14	0.52	-3.830	.000**	-.74
Total	3.74	0.63	4.13	0.45	-3.687	.000**	-.71

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

A Wilcoxon signed-rank test indicated that the difference between the participants' SLR levels before and after the treatment reached a statistically significant level ($T = 30.50$, $z = 3.687$ $p < .01$). When considering the difference in each SRL phase, it was found that the post-questionnaire scores for all three phases also increased with statistical significance, during the *Forethought phase* ($T = 83.50$, $z = 2.142$ $p < .05$), the

Performance phase ($T = 34.50$, $z = 3.469$ $p < .01$), and the *Self-reflection phase* ($T = 16.50$, $z = 3.830$ $p < .01$).

Table 2 shows the mean and standard deviation of each SRL phase both before and after receiving online WCF. Overall, the participants' SRL scores on the post-questionnaire increased during all three phases. In the *Forethought phase*, the average SRL score from the post-questionnaire ($M = 3.93$, $SD = 0.68$) was higher than that of the pre-questionnaire ($M = 3.48$, $SD = 0.94$). The results also showed that in the *Performance phase* the post-questionnaire score was higher ($M = 4.22$, $SD = 0.47$) when compared to that of the pre-questionnaire ($M = 3.90$, $SD = 0.63$). The post-questionnaire mean score ($M = 4.14$, $SD = 0.52$) of the *Self-reflection phase* was also higher than that of the pre-questionnaire ($M = 3.65$, $SD = 0.76$).

Table 2

Mean and Standard Deviation of Each SRL Phase Before and After Receiving Online WCF (N = 27)

Items	Before		After	
	M	***SD***	***M***	***SD***
Planning	**3.48**	**0.94**	**3.93**	**0.68**
1. Before writing, I plan the content that I will include in my emails.	3.63	1.11	4.15	0.91
2. Before writing, I think about how to organize my emails.	3.67	1.24	4.15	0.95
3. Before writing, I think about the set of vocabulary I will need to use.	3.15	1.13	3.48	1.12
Monitoring	**3.90**	**0.63**	**4.22**	**0.47**
4. While writing, I monitor if my text fits my plan.	3.96	0.81	4.30	0.72
5. While writing, I monitor whether everything I wanted to say is in the text.	4.19	0.92	4.56	0.58
6. While writing, I monitor my text for spelling and grammatical mistakes.	3.63	1.01	4.11	0.80
7. While writing, I monitor if my argument is logical.	3.70	0.99	4.07	0.87
8. While writing, I monitor if the organization of my email is clear.	3.56	0.85	4.04	0.76
9. While writing, I monitor that I have fully answered the question.	4.15	0.91	4.56	0.58
10. While writing, if I'm not satisfied with what I have written, I make changes immediately.	4.15	0.86	3.89	0.75
Regulating	**3.65**	**0.76**	**4.14**	**0.52**
11. When I finish writing, I reread my text to check if I have fully answered the question.	4.04	0.98	4.56	0.64
12. When I finish writing, I reread my text to check the accuracy of my language.	4.15	0.86	4.67	0.62
13. When I finish writing, I reread my text and make changes if necessary.	4.15	0.72	4.59	0.64
14. When I finish writing, I think about what I could have done better.	3.15	1.29	3.52	0.94
15. When I finish writing, I think about the improvements I could make in my next writing.	2.78	1.09	3.37	0.88
Overall	**3.74**	**0.63**	**4.13**	**0.45**

Content analysis from the interviews supported the quantitative results as it revealed that online written corrective feedback positively affected learners' self-regulation in writing in several ways.

1. Online WCF encouraged planning in the M and L groups.

The participants from all three groups agreed that the instructor's online WCF encouraged them to plan before writing. The M and L groups were more willing to read and learn from the online WCF, so they wanted to apply what they had learned in their next piece of writing. This encouraged them to plan content and organization before writing, as stated by a participant:

> Online feedback benefits planning because I can apply the feedback on content from my previous work to the current one…I can plan better and list what I want to include in my writing beforehand. (Berlin 4).

2. Online WCF helped with content selection for writing.

The participants from the M and L groups stated that the teacher's online WCF had benefited their selection of content during the writing task. This was especially true when they received synchronous WCF while completing the tasks, which were single-draft writing tasks. A participant from the M group mentioned:

> …immediate feedback received while writing affects changing of content at the time of writing…mainly the incomplete and illogical information. I prefer correcting the content right away…because the assignments are not multiple drafts. When I receive feedback after submission, I will not correct the mistakes. (Berlin 2)

3. Online WCF led to more revision before submission.

Across the three groups, the participants explained that the online WCF contributed to more revisions of their subsequent works before submission. The revisions were done by checking several areas of the language. Overall, they mentioned

checking the content, organization, word choice, and language accuracy against the WCF received on their previous work, as one participant described:

> I review my work more carefully and look at the content and how to make the language smooth. I think I receive online feedback in a more detailed and more frequent manner than paper feedback, so I feel like I have to be more careful with my work. (Berlin 5).

4. Preference for WCF led to feedback engagement and more use of self-regulated strategies.

The participants' preference for online WCF was said to result in their becoming more motivated and engaged in reading and learning from the feedback. It also made them want to apply it in their future writing tasks. Several participants mentioned using more SRL strategies to improve their writing as a result of their engagement in SRL, as can be seen in the following excerpts:

> I learn from my mistakes and apply them to my next writing. … I pay more attention to the comments when it's online. For example, I check more carefully for task completion and some grammar points. (Athens 4)

> I check my writing with the feedback received from my previous work. I remind myself to plan and check the organization every time. (I) try not to make the same mistakes. (Berlin 5).

The participants mentioned a number of reasons for their preference for online feedback. Firstly, the clarification of feedback and its convenient retrieval encouraged self-monitoring. The more elaborated and comprehensible traits of online feedback led to better understanding, while its convenient retrieval encouraged them to monitor themselves by consulting the WCF on their previous work while working on their current writing.

Secondly, online feedback provided multiple editing functions, which encouraged revisions and self-monitoring. The H and M groups mentioned that the online WCF through Google Docs allowed them to hide the instructor's comments and make any corrections to their mistakes by themselves first. This practice helped them learn from their mistakes better, as mentioned by one participant:

> Sometimes I look at the highlighted parts without checking the teacher's comments first. I would try to find the mistakes by myself before checking the correct answers. I think doing it this way helps me remember the mistakes more than going straight to check the teacher's corrections. (Athens 4).

Another reason behind their preference for online feedback was mentioned by the M and L groups. They believed that online feedback provided more opportunities for real-time collaboration and shared comments in writing and this promoted their SRL strategies. This is because they could write collaboratively with their peers and learn from the instructors' WCF on their peers' work, as a participant from the L group mentioned, "...I sometimes compared my work with others. I can learn from my classmates' work also." (Cardiff 8).

Research question 2: What are the differences between high-, mid-, and low-proficiency learners' self-regulation in writing after receiving online feedback?

Both quantitative and qualitative findings revealed that after receiving online WCF, participants of the mid- and low-proficiency groups gained higher improvement in SRL when compared to participants with higher proficiency.

Table 3 shows descriptive statistics and Wilcoxon signed-rank tests for all three groups' SRL scores. Although the H group's mean score on the post-questionnaire was higher than that of the pre-questionnaire, the difference was not statistically significant

(z = -.712 p = .476). In contrast, there were significant differences between the pre- and post-questionnaire scores for the M (z = -2.494 p = .013) and the L (z = -2.524 p = .012) groups.

Table 3

Descriptive Statistics and Wilcoxon Signed-Rank Tests of the Three Groups' Self-Regulation Before and After Receiving Online WCF (N=27)

Group	Stage/Variable	Before		After		*z*	*p*	*r*
		M	SD	M	SD			
High (n=9)	Forethought	4.11	0.93	4.11	0.53	-.211	.833	-.07
	Performance	4.41	0.25	4.51	0.22	-.862	.389	-.29
	Self-reflection	4.16	0.53	4.38	0.21	-1.36	.174	-.45
	Self-regulation	4.27	0.37	4.39	0.20	-.712	.476	-.24
Mid (n=9)	Forethought	3.44	0.97	4.11	0.65	-1.62	.105	-.54
	Performance	3.97	0.65	4.37	0.45	-2.319*	.020	-.77
	Self-reflection	3.91	0.53	4.47	0.45	-2.53*	.011	-.84
	Self-regulation	3.84	0.55	4.35	0.39	-2.494*	.013	-.83
Low (n=9)	Forethought	2.89	0.47	3.56	0.75	-2.399*	.016	-.80
	Performance	3.33	0.38	3.78	0.36	-2.561*	.010	-.85
	Self-reflection	2.89	0.53	3.58	0.32	-2.67**	.008	-.89
	Self-regulation	3.10	0.26	3.67	0.33	-2.524*	.012	-.84

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

When looking closely into the individual SRL phases, it could be seen that even though there was some improvement, the difference between the H group's pre- and post-questionnaire scores was not statistically significant during all three SRL phases. The difference between the pre- and post-questionnaire scores for the M group during the *Forethought phase* was also not statistically significant (z = -1.62 p = .105); however, there were significant differences between the pre- and post-questionnaire scores during the *Performance phase* (z = -2.319 $p < .05$) and the *Self-reflection phase* (z = -2.53 $p < .05$).The difference between the pre- and post-questionnaire scores for the L group reached a statistically significant level across all three phases, i.e., the *Forethought* (z = -2.399 $p < .05$), the *Performance* (z = -2.561 $p < .05$), and the *Self-reflection phases* (z = -2.67 $p < .01$).

Table 4

Kruskal Wallis Test for Participants' SRL from the H, M, and L Groups After Receiving Online WCF (N=27)

SRL phase	Group	N	Mean Rank	X^2 (chi-square)	*df*	*p*	Post-Hoc
Forethought	High	9	16.17	3.368	2	.186	-
	Mid	9	15.72				
	Low	9	10.11				
Performance	High	9	19.33	13.443**	2	.001	High, Mid > Low
	Mid	9	16.33				
	Low	9	6.33				
Self-reflection	High	9	18.06	16.204**	2	.000	High, Mid > Low
	Mid	9	18.56				
	Low	9	5.39				
Total SRL	High	9	18.44	14.399**	2	.001	High, Mid > Low
	Mid	9	17.72				
	Low	9	5.83				

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

Table 4 shows the Kruskal Wallis test for the H, M, and L groups' self-regulation after receiving online feedback. According to the analysis, the SRL scores among the three groups were significantly different at .01 ($X^2 = 14.399$, $df = 2$ $p < .01$). Results from the post-hoc analysis showed the corresponding scores from the H and M groups, which were evidently different from that of the L group.

In the *Forethought phase*, the difference between the three groups' post-questionnaires was not statistically significant ($X^2 = 3.368$, $df = 2$ $p = .186$). However, the difference in SRL scores from the three groups reached a statistically significant level in both the *Performance* ($X^2 = 13.443$, $df = 2$ $p < .01$) and *Self-reflection phases* ($X^2 = 16.204$, $df = 2$ $p < .01$). A Post-Hoc analysis also revealed a major difference between the scores from the H, M, and L groups.

In line with the quantitative results, content analysis from the interviews revealed a number of differences in perspectives from the three groups regarding their use of SRL as a result of online WCF.

1. Online WCF increased awareness of planning from the M and L groups.

Corresponding with the quantitative data, the M and L groups reported an increased awareness of planning before writing as a result of the online WCF, while the H group mentioned no perceived effects to only a slight effect of online WCF on their planning as they usually planned before writing. This raised awareness was reported to come from the WCF received from their previous work, so they learned to plan the content and organization of their future work, as one participant pointed out:

> Sometimes the feedback I received was about missing content. So, I learned that planning the content and how to organize it is important. ... I think it helps me work more systematically. (Berlin 8).

2. Online synchronous feedback affected learners' SRL differently.

Although all three groups were aware of the benefits of online WCF on their writing, it was found that synchronous online WCF may have affected the self-regulation of learners from the H, M, and L groups differently. Only the M group reported a preference for synchronous online feedback since this interactive feedback helped them monitor their work and correct major mistakes at the time of writing and could help them stay more focused:

> I prefer immediate feedback because it reminds me to stay focused while writing. I check what I have written more closely because I know that the teacher can check my progress at any time. ...If I have questions, I can ask the teacher, get the answers, and make necessary changes right away. (Berlin 2).

Unlike the M group, the H and L groups preferred receiving CF after the submission of their work, reporting a number of reasons for this. The L group admitted that asynchronous online WCF was more preferable and useful for them since it allowed more time in making corrections and more convenience in correcting all of the errors at once. Unlike the L group, the H group preferred asynchronous feedback since they

wanted to stay focused and be in full control of every stage of their writing. Immediate feedback could sometimes distract them while writing, as explained by one participant from the H group:

> I prefer receiving feedback after submission. ...I want to work all by myself from planning, writing, and checking. I want to stay focused. Immediate feedback can be distracting to me while writing. (Athens 1).

To conclude, results from the interviews corresponded with those from pre- and post-questionnaires in that learners from the mid- and low-proficiency groups gained higher improvement in SRL after receiving online WCF when compared to higher proficiency learners, who tended to already be equipped with some self-regulatory strategies. Qualitative findings obtained from the group interviews further yielded in-depth data and led to a better understanding of why students with different proficiency levels preferred different manners of time in receiving corrective feedback, i.e., synchronous and asynchronous online feedback.

Discussion

The current study aimed to explore the effects of online written corrective feedback on students' self-regulation in writing. The results from the study revealed positive effects of online WCF which promoted students' self-regulation. The results of this study also shed light on the different effects that WCF had on SRL of students with different English proficiency levels.

1. Students' motivation and engagement in the feedback leads to revisions and SRL development.

The participants in the current study reported their engagement with online WCF as they preferred receiving and learning from online WCF to paper feedback. Multiple features of online WCF were mentioned in the interviews as facilitative of their self-monitoring. The participants also reported an increased awareness of their mistakes and intention to adapt their learning strategies in order to avoid making the same mistakes.

The study results were in line with Chong (2019) in that learners' preference for online WCF resulted from its legibility, text-specific comments, and more comprehensibility compared to the paper-based corrective feedback. The participants' preference for online WCF led to their higher motivation and engagement in reading and applying the online WCF in their subsequent tasks.

One plausible explanation for this is the important role of corrective feedback in promoting SRL development. Corrective feedback serves as an external input to students' learning and their SRL development process; therefore, students need to actively engage with the feedback in order to produce an effect on their internal processes and then external outcomes (Nicol & Macfarlane-Dick, 2006). Learner engagement with corrective feedback can be measured by how learners respond to the feedback, which involves *behavioral*, *attitudinal,* and *cognitive* dimensions (Ellis, 2010). The participants in the current study reported their engagement in the online WCF in all three dimensions as they clearly showed preference (attitudinal dimension) for reading online feedback, used metacognitive strategies in revising their work (cognitive dimension), and adapted their learning strategies in the subsequent tasks (behavioral dimension).

This engagement could motivate them to interpret and construct the input from the teacher's feedback, and this internal process could trigger the use of SRL strategies in making revisions and adapting their learning strategies to improve their writing performance. The findings were in line with Fernández-Michels and Fornons's (2021) study, which revealed that students' engagement in corrective feedback generated their expressions of self-regulatory actions such as planning, self-judgment, and reflection on their performance.

2. Differences in language proficiency can impact the effects of online WCF on self-regulation.

The results from the current study showed that online WCF positively affected SRL development among mid- and low-proficiency learners to a greater extent when

compared to high-proficiency learners. The H group, who made significant improvement only in the *Self-reflection* phase of SRL, reported merely slight effects of online WCF on planning and monitoring, which were the strategies they usually incorporated into their writing process. Thus, the effects of online WCF on their already installed SRL strategies were mainly to increase self-monitoring and self-reaction to improve their work.

Unlike the H group, the M groups' SRL scores significantly increased in two phases of SRL, i.e., the *Performance* and *Self-reflection* phases, while the L group significantly improved their SRL in all three phases. Although the L group significantly gained the SRL scores from the post-questionnaire, their overall scores were still significantly lower than those of the M and H groups.

The findings were in line with existing literature on the relationship between SRL and academic achievement in that the higher the language proficiency scores learners obtained, the more self-regulated strategies they employed (Inan, 2013; Vrugt & Oort, 2008; Zimmerman, 2000). This is because self-regulated learners are proactive in pursuing their learning goals and taking control of their learning processes and environments. In order to do so, they need to use a set of self-regulated strategies such as goal setting, strategic planning, self-monitoring, help-seeking, and adapting their strategies to continually improve their performance. Therefore, online feedback can serve as external inputs for the high- and mid-proficiency students to continue consulting their self-regulation, while attracting the lower-performing students' attention and triggering them to use SRL strategies in writing.

Contrary to this finding, Apridayani and Teo (2021) found that students with low English proficiency demonstrated a higher use of SRL than the high proficiency students. They also found that both low- and high-proficiency groups reported high use of planning strategy, which was different from the current study's findings, which found the pre-intervention use of planning only among the H group. However, one major difference between the current study and Apridayani and Teo's is the study contexts. While this study focused on the use of SRL strategies in English writing among accountancy

students, Apridayani and Teo's study surveyed the SRL strategies in an integrated skills general English course offered to freshmen from various faculties. The difference in contexts of study and participant groups can result in different findings of SRL use across contexts (Nandagopal & Ericsson, 2012).

3. Synchronous feedback can have different effects on learners' self-regulation.

The findings revealed different effects of synchronous WCF on promoting SRL among students of different proficiency levels. While the mid-proficiency group preferred synchronous feedback as it facilitated help-seeking and monitoring strategies, the high-proficiency group showed a preference for asynchronous feedback because they wanted to take full control of their writing process. The low-proficiency group, on the other hand, preferred asynchronous feedback due to time flexibility and the convenience of making corrections.

One plausible explanation could be the distinction between the correctness of responses and the learning processes each feedback type focuses on. Butler and Winne (1995) noted that delayed or asynchronous feedback promotes learning strategies as it provides students time to reflect on how they learn, while immediate or synchronous feedback stresses the correctness of the performance. These feedback focuses may serve the needs of each participant group. While the mid-proficiency preferred seeking help in monitoring the accuracy of their work that synchronous feedback provided, the high-proficiency preferred asynchronous feedback that allowed them to spend time on their SRL process. The findings were in line with You and Kang (2014) in that asynchronous learning offers a sense of high-perceived academic control, which requires the students to self-regulate their learning.

As for the low-proficiency group, they believed asynchronous feedback benefited them more due to time flexibility in making corrections and convenience in making corrections all at once after receiving feedback. This yielded support to the finding of Fanous (2020) which revealed that asynchronous feedback was proved to be more

effective in promoting low-proficiency learners' engagement in the writing process. This was partly because they did not feel any time pressure when making corrections.

Such findings, however, were in part different from Shintani and Aubrey's (2016) study, which found the superiority of synchronous feedback over asynchronous feedback. This may be because synchronous corrective feedback could trigger three key cognitive processes: internalization, modification and consolidation, while asynchronous feedback provided little opportunity for consolidation. However, Shintani and Aubrey's study was different from the current study in that their study investigated the effects of corrective feedback on students' grammar and did not take students' proficiency levels into account. Overall, the results of the current study were consistent with those reported by Yi and Luan (2021) in that online interaction could have different benefits for learners of different personalities and language proficiency levels.

To conclude, the key findings from the current study corresponded with results reported in recent studies in that teacher feedback plays a significant role in the development of self-regulated learning (Fernández-Toro & Furnborough, 2014; Nicol & MacFarlane-Dick, 2006). And this is especially true in online learning environments, where SRL development relies on continuing feedback on learning effectiveness (Zimmerman, 2000).

Implications of the Study

The results of this study had a number of practical implications for language instructors and researchers. They also contributed to existing literature by demonstrating the multiple benefits online corrective feedback contributes to self-regulation in writing. It was found in this study that online WCF benefited the development of students' self-regulated learning although to varying degrees depending on learner factors including language proficiency and preference for feedback timing.

Based on the study findings, it is recommended that to enhance learner engagement in feedback revisions and SRL development, language instructors should

provide feedback that focuses on learning processes and incorporates self-regulatory strategies rather than focusing on language correctness alone. Explicit guidance of SRL strategies in feedback can help learners focus more on developing self-regulated strategies.

In addition, the timing of feedback should be planned carefully to suit students' needs. Students of different language proficiency levels can learn to develop SRL differently and have different preferences for feedback timing. Although student preferences are not a clear indicator of feedback effectiveness, positive attitudes towards the feedback can make the students more engaged in the feedback and the tasks. Such engagement can trigger the use of feedback and SRL strategies in improving their work.

As such, teachers should take into account the different effects of feedback on learners of different language proficiency levels. As low-proficiency learners tend to possess fewer SRL strategies, especially planning, teachers should introduce strategic planning and other task strategies in their feedback for low-achievers. As for the high-proficiency learners, teachers may consider giving feedback mainly through asynchronous timing and assist them synchronously only when they seek help.

Limitations of the Study

As the study aimed to investigate the effects of online corrective feedback on self-regulation in real teaching and learning environment, the WCF provided in this study was uncontrolled. Depending on individual instructors, the WCF provided greatly varied feedback focus (accuracy vs. processes), types (direct and indirect), and proportion of synchronous and asynchronous feedback. This led to a limitation as it was difficult to know whether the improved SRL was triggered by any kind of corrective feedback, or by some specific feedback qualities. Research in the future could be undertaken to find the answers to this. Also, to shed further light on the effects of WCF, studies should be conducted with collection of data on the participants' previous knowledge about self-

regulatory strategies so as to see the real effects of online WCF on students of each English proficiency level.

Conclusion

The current study investigated the effects of online corrective feedback on learners' self-regulation in writing. The findings revealed that online WCF promoted students' development of self-regulation as they tended to be more engaged in online feedback and more willing to apply it to improve the quality of their subsequent tasks. To do so, the students were triggered to employ self-regulated learning strategies to improve their performance and direct their tasks towards the task goals. As online WCF can deliver more detailed corrective feedback that is text-specific, interactive, and easy to retrieve, it provides more comprehensive feedback that can facilitate metacognitive monitoring, self-observation, self-judgement, and self-reaction in the SRL process. However, individual factors like language proficiency levels and preference for feedback timing may impact the positive effects of online feedback on the development of self-regulation. Therefore, language instructors should take into account the focus of corrective feedback (to focus on learning product or process), the appropriate timing for each group of students, and the integration of self-regulated strategies into the feedback they provide.

About the Author

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