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Using Group Awareness Tools to Enhance Students' Behavioral and Cognitive Engagement with Peer Feedback in Online Collaborative Essay Writing

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Abstract: Group awareness tools have the potential to increase student engagement in computer supported collaborative learning. However, few studies have investigated the influence of group awareness tools on student engagement with peer feedback in online collaborative language learning settings. This study used a quasi-experiment method to explore the effects of group awareness tools on students' behavioral and cognitive engagement with peer feedback in online collaborative essay writing. The experimental group (n = 21) was required to complete 3-round collaborative writing and peer assessment of an argumentative essay supported by group awareness tools and the control group (n = 21) was asked to complete the same tasks without group awareness tools. The results showed that the students with group awareness tools demonstrated higher behavioral engagement with peer feedback. They provided significantly more comments across all the three rounds of peer feedback. Additionally, the students provided with group awareness tools showed significantly higher cognitive engagement in providing both surface-level and meaning-level feedback. The students in the experimental class engaged in significantly more meaning-level feedback in the last round of peer assessment. This paper also provides suggestions for future studies on applying group awareness tools in collaborative writing.

Keywords: Online collaborative writing, behavioral engagement, cognitive engagement, group awareness tools, peer feedback

1. Introduction

Collaborative writing has drawn much attention in second language learning in recent years (Calzada & García Mayo, 2021). Collaborative writing is defined as a task in which students work in small groups to collaboratively discuss, negotiate, and construct a shared written text (Li, 2018; Storch, 2013). Collaborative writing can develop writing skills (Awada, Burston & Ghannage, 2019), improve writing performance (Rahimi & Fathi, 2021) and increase writing efficiency (Chao & Lo, 2011). With the advent of web 2.0 tools, research in collaborative writing is now turning its interest towards online collaborative writing. Without the limitation of time and space, online collaborative writing provides more convenience and has the potential to make collaboration more effective. However, online collaborative writing may also result in low student engagement (Peng, Li, Su, Chen, & Jiang, 2022) and increase free rider (Michinov & Primois, 2005).

Group awareness is generally defined as some types of perception or understanding of the collaborating group or learning partners (Bodemer, Janssen, & Schnaubert, 2018). Previous research has indicated that group awareness tools can improve students' engagement (Liu, Liu, & Liu, 2018) and enhance social presence (Kimmerle & Cress, 2008) in online collaborative learning environment. Group awareness tools have been mainly adopted in domains of

educational psychology, electronic commerce, and computer science (e.g., Li, Li, Zhang, & Li, 2021; Lin, Szu & Lai, 2016). However, the effects of group awareness tools have not been adequately addressed in the field of language education, particularly in the context of peer evaluations in collaborative learning. Therefore, this study aims to explore whether group awareness tools will enhance students' behavioral and cognitive engagement with peer feedback in online collaborative essay writing. Specifically, we sought to address the following two questions:

(1) Did group awareness tools enhance students' behavioral engagement with peer feedback in online collaborative essay writing?
(2) Did group awareness tools enhance students' cognitive engagement with peer feedback in online collaborative essay writing?

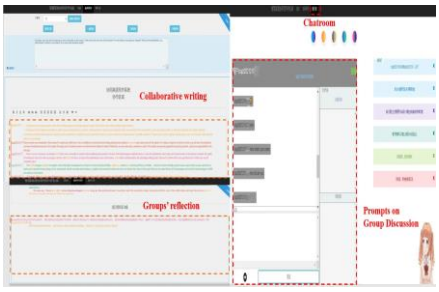
2. Methodology

2.1 Participants

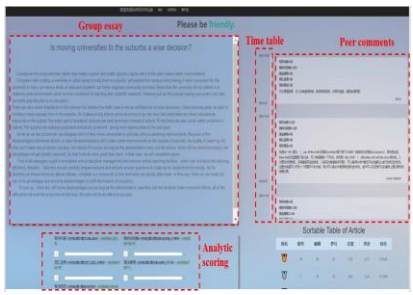
The participants were 42 first-year undergraduate students majoring in telecommunication at a university in northern China. They were enrolled in a 16-week College English course which was a compulsory degree course for the non-English majors at the university. Both classes were randomly divided into the experimental group and control group. Before the experiment, we checked the differences between the two groups' English proficiency using their English scores of entrance examination, and the results indicated that there was no significant difference in the two groups' English language proficiency ($p=0.23>0.05$, $t=1.23$).

2.2 System description

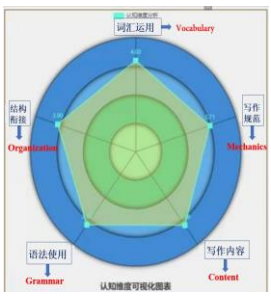
The system used in this study is *CollaWrite* which is a web-based writing platform that allows users to participate in group discussion, synchronous editing, and peer assessment of essays. Figure 1 showed the functions of *CollaWrite*. During collaborative writing, students can engage in real-time discussions in groups' chatroom and collaboratively edit, revise, and reflect on their writing. After writing, they can give comments and marks for another group's writing. This platform records the files of students' real-time discussion, essays, and peer feedback. *CollaWrite* can also provide cognitive and behavioral group awareness tools to support students' writing. Cognitive awareness tool displays students' writing performance on five dimensions of content, organization, vocabulary, grammar, and mechanics while behavioral awareness tool mainly shows group members' participation status like the number of discussion messages.



Screenshot of *CollaWrite*



Peer feedback



Cognitive group awareness tool

Behavioral group awareness tool

Figure 1. The screenshot of *CollaWrite* platform

2.3 Procedures

Students in both the experimental and control group were required to work in small groups to jointly write an argumentative essay. The task took the process writing approach and it included three rounds of peer feedback activities. In each round of peer feedback, students rated other groups' writing from five dimensions: content, organization, vocabulary, grammar, and mechanics. More importantly, they provided qualitative feedback and suggestions on other's writing. Being different from the control group, students in the experimental group were provided with group awareness tools. The collaborative writing task was carried out on *CollaWrite* and the whole task lasted six weeks.

2.4 Measures

Behavioral engagement with peer feedback was measured by the number of comments and the word count of comments. The collaborative writing system collects data regarding the number of comments and the word count of comments.

Cognitive engagement with peer feedback was coded by the researchers using a code scheme adapted from Tian and Zhou (2020). As Table 1 shown, cognitive engagement is classified into surface-level feedback and meaning-related feedback. Surface-level feedback indicates few changes of meaning, whereas meaning-level feedback involves meaning changes. In addition, student engagement with feedback were further categorized into sub-codes including lexical, sentence, and paragraph levels, grammar feedback (i.e., tense, single plural forms and the third-person singular), and mechanic feedback (i.e., capitalization, punctuation marks and academic writing conventions).

The coding was completed by two coders. After training, both coders coded 20% of peer feedback and discussed discrepancies. Inter-rater reliability using Cohen's Kappa achieved 0.72, indicating a relatively high level of consistency. Then both coders finished the rest of the coding work

Table 1. *Coding scheme of cognitive engagement with peer feedback*

Categories			Examples
Surface-level feedback	Meaning-preserving	Lexical	*"Changing 'lower' to 'decline' is better."*
		Sentence	*"There are many long sentences. You can combine long sentences and short sentences."*
		Paragraph	*"Good consistency between paragraphs."*
	Grammar		*"In the sentence 'people have they own idea', 'they' should be changed into 'their'."*
	Mechanics		*"There are more cases of capital confusion in the article."*
Meaning-level feedback	Meaning-related	Lexical	*"Aboriginals means original inhabitants, and it cannot be used to describe people living in suburbs."*
		Sentence	*"The last sentence seems to be a bit off topic."*
		Paragraph	*"Reference to our school is useless content in my opinion. Because it doesn't support the argument."*

3. Results

3.1 Comparison of behavioral engagement with peer feedback

Behavioral engagement with peer feedback involves the number of comments and the word count of comments. As shown in Figure 2, the number of comments in the experimental group is higher than those in control group in round 1, round 2, round 3, and the sum of the total three rounds as well. Figure 3 indicated that the experimental group was higher than control group on word count of comments in round 1, round 2, round 3, and the total of three rounds.

To further explore whether group awareness tools enhance students' behavioral engagement with peer feedback in online collaborative essay writing, independent samples t-test was used to analyze the differences in the number of comments and the word count of comments between experiment group and control group in the three rounds of peer assessment. As can be seen in Table 2, there was significant difference between experimental group and control group in the total number of comments. Additionally, significant difference also existed on the word count of comments between experimental group and control group in round 1, round 2, round 3, and the total of the three phases. The results showed that group awareness tools had a positive effect on students' behavioral engagement with peer feedback in online collaborative essay writing.

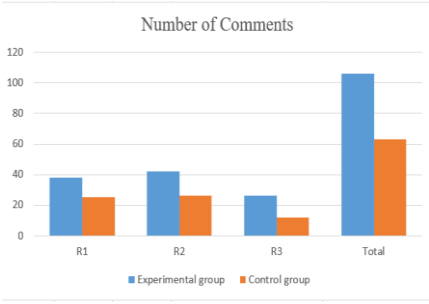


Figure 2. Number of Comments

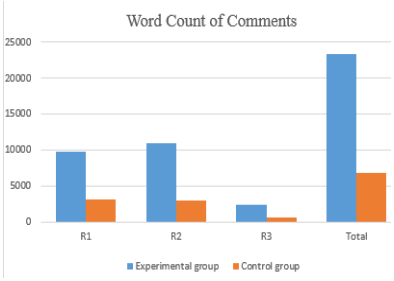


Figure 3. Word Count of Comments

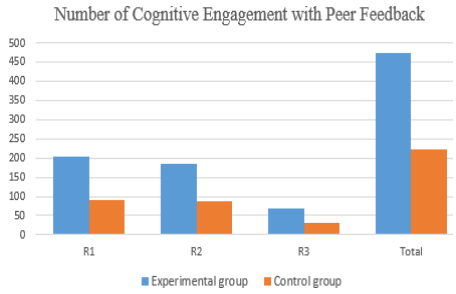


Figure 4. Number of Cognitive Engagement with Peer Feedback

Table 2. *Independent samples t-test for measures of behavioral engagement with peer feedback*

		Experimental Group		Control Group			
Round	Categories	Mean	SD	Mean	SD	t	*p*
Round 1	Number of comments	7.60	1.52	5.00	2.45	2.02	0.08
	Word count of comments	1970.60	672.64	627.00	505.05	3.57	0.01
Round 2	Number of comments	8.40	2.41	5.20	3.90	1.56	0.16
	Word count of comments	2205.20	907.56	606.20	368.62	3.65	0.01
Round 3	Number of comments	5.20	2.78	2.40	1.52	1.98	0.08
	Word count of comments	491.00	248.05	125.40	78.34	3.14	0.01
Total	Number of comments	21.20	4.09	12.60	3.51	3.57	0.01
	Word count of comments	4666.80	1121.80	1358.60	645.46	5.72	0.00

Table 3. *Independent samples t-test for measures of cognitive engagement with peer feedback*

Round	Categories	Experimental Group			Control Group				
		N	Mean	SD	N	Mean	SD	t	*p*
Round 1	Surface-level feedback	122	24.40	2.19	82	16.40	7.83	2.20	0.08
	Meaning-level feedback	55	11.00	3.00	37	7.40	2.30	2.13	0.07
Round 2	Surface-level feedback	113	22.60	7.23	73	14.60	8.79	1.57	0.16
	Meaning-level feedback	56	11.20	4.60	33	6.60	5.27	1.47	0.18
Round 3	Surface-level feedback	53	10.60	4.28	16	3.20	4.15	2.78	0.02
	Meaning-level feedback	23	4.60	2.51	8	1.60	1.14	2.43	0.04
Total	Surface-level feedback	288	57.60	7.96	187	37.40	9.71	3.60	0.01
	Meaning-level feedback	134	26.80	6.38	89	17.80	5.26	2.43	0.04

3.2 Comparison of cognitive engagement with peer feedback

Cognitive engagement with peer feedback includes surface-level feedback and meaning-level feedback. Figure 4 showed students' cognitive engagement with peer feedback in the experimental and control class. The results showed that the students with group awareness tools demonstrated higher cognitive engagement with peer feedback across all the three rounds of writing. To further explore whether group awareness tools enhance students' cognitive

engagement with peer feedback in online collaborative essay writing, independent samples t-test was conducted. As shown in Table 3, regarding the total of the three rounds of peer feedback, the results indicated that the students in the experiment group showed significant higher engagement with both types of feedback. Analysis for each round of peer review indicated that the difference in both level of feedback between the experimental group and control group was only significant in round 3.

4. Discussion and conclusion

This study conducted an empirical study to explore whether group awareness tools will enhance students' behavioral and cognitive engagement with peer feedback in online collaborative essay writing. In comparison with students in the control group, the experimental group had a greater number of comments and word count of comments. The results revealed that the students in the experimental class outperformed those in the control class regarding behavioral engagement with peer feedback. This result coincides with Pifarré, Cobos and Argelagós (2014) in that group awareness tools could contribute to promote students' behavioral involvement with peer feedback. The result also confirms Lin and Tsai (2016) in that collaborating students provided with group awareness tools engaged in more peer interactions and made more personal contributions compared to those without group awareness support.

In addition, the students provided with group awareness tools also showed significantly higher cognitive engagement in providing both surface-level and meaning-level feedback. The result indicated that group awareness tools contributed to the improvement of students' cognitive engagement with peer feedback. By using group awareness tools, the students in the experimental class may establish a better understanding of the group's knowledge and learning status, which may implicitly triggered socio-cognitive strategies that could be beneficial to the learning process (Sangin, Molinari, Nüssli, & Dillenbourg, 2011).

Though this study sheds light on the effect of group awareness tools on language learners' engagement in collaborative learning, it has two main limitations. First, this is only a pilot study and involves a relatively small sample size. Future studies need to invite more students to participate in the writing activity to increase the sample size. Second, in this study students only wrote one genre of writing (i.e., argumentative essay). In the future, we will further explore whether group awareness tools have different influence on writing of different genres in online collaborative learning settings.

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