

# A Computer Supported Peer Response Approach for Elementary Student Writing

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**Abstract:** *Peer Response* is an approach to help each other in revision. However, such a collaboration approach usually has to face a challenge of higher time cost for information sharing, in particular, in a paper-and-pencil based environment. Therefore, the aim of this study is to investigate how to implement a computer supported peer response approach at elementary writing classes and evaluate the effects of this approach on writing improvement. Latent semantic analysis was used to analyze the richness of vocabulary in writing and a questionnaire was used to investigate pupil's perception towards such a peer response approach. We found that this approach not only enhances the communication between student readers and writers, but also expands their length of writing and improves the richness of vocabulary in revision. Meanwhile, it is found that both peer writers and peer readers can benefit from this computer supported approach, such as promoting self-reflection or increasing motivation for revision. To the end, all elementary participants showed a stronger agreement on the perception of peer response on writing.

**Keywords:** elementary writing, latent semantic analysis, peer response, revising

## 1. Introduction

Revising plays a key element in the writing process [6]. Among various revising methods, peer response [5] is an approach which allows peers to share efforts to enrich ideas and clarify meaning of content in writing without increasing teachers' workload. With this approach, writers in advanced studies or adults, who are block in the revision process, usually can receive different opinions from other peer readers, who are writers as well, to improve their writing quality.

However, such collaboration usually has to face a high time cost challenge for information sharing, especially, in a traditional paper-and-pencil environment. Therefore, it is critical to find a solution to implement peer response activities with technology support at a low cost to help the revision of student writing, in particular, when we note that the similar block situation in adult writing is also found in the observation of revision of elementary student writing.

Consequently, the aim of this study is to investigate how to implement a computer supported peer response approach at elementary writing classes and to evaluate the effects of such an approach on writing improvement. This study can contribute to develop a potential model of computer supported peer response activates integrated with writing processes at a low cost of time for elementary writing classes. By doing so, children may benefit not only in their writing, but also in the learning of collaboration.

## 2. Literature Review

A computer supported writing environment can be useful to support writing activities [7], such as drafting and revising. However, such a useful mechanism still cannot address the issue of low motivation in children's revision. For example, Beal [1] examined a lot of studies on young writers' revision and found they were reluctant to revise their writing unless they received strong encouragement and support from adults. Therefore, various supportive approaches were proposed for improving revision, such as single peer feedback, multiple-peer feedback [12] and expert feedback [8].

Among these approaches, the peer feedback approach seems a useful way to be implemented in a writing class. For instance, Topping [12] studied the reliability, validity and utility of self and peer assessment. His findings suggested that peer assessment demonstrates the highest reliability and validity, among the assessment groups of self, peer, and professional teachers. It implies peer feedback approach can also take the position of an adult expert to support student's revision and alleviate teachers' workload.

*Peer Response*, a kind of peer feedback, advocated by Elbow [5] is widely applied for the improvement of rewriting, such as EFL writing [10]. His approach more focused on positive and supportive interaction among group members. A writer can receive informative points of view from multiple channels, not just only from one teacher feedback. Due to such collaboration, Elbow [5] indicated that peer response provides several benefits for writing, including solving stuck thoughts, enriching ideas, and clarifying meaning of texts. Therefore, research into improving student revision with computer supported peer feedback approaches has mushroomed (e.g., [9]).

However, most of the subjects in previous research are students in advanced studies, probably with better communication skills and cognitive abilities than pupils. For example, Beal and Flavell [2] found children often overestimated the expressed meaning of their written texts. Thus, it is unsure how elementary students will react to computer supported peer response activities. Therefore, there is a need to enhance the comprehensibility of written feedback. In this vein, this study investigates how to implement a computer supported peer response approach in an elementary writing class. Meanwhile, we also examine how this approach can affect elementary student writing in revision, and how pupils react to such computer supported peer response activities.

## 3. Methodology Design

### 3.1 Participants

The study was conducted at a rural elementary school in Taiwan. Twenty-nine 3<sup>rd</sup> graders from a same class were all recruited, including 14 boys and 15 girls. They had no experiences of peer feedback before. They were required to have basic computer, Internet skills, and Chinese typing skills. More specifically, at least their typing speed is as fast as their hand writing speed.

### 3.2 Research Apparatus

The research apparatus used in this study includes: (1) a computer supported peer response writing group system; (2) a questionnaire to identify pupils' perception on peer response. The following sections illustrated the writing system and questionnaire in detail.

#### 3.2.1 Computer Supported Peer Response Writing Group System

Figure 1. A snapshot of “writing class-small peer response group-student writing area” hierarchy

Figure 2. A student writing area with several writing assignments

A computer supported peer response writing group system with a forum-based mechanism was designed for this study. A three-level hierarchical structure was adopted for this system, including writing class, small peer response writing group, and student writing area (Fig. 1). This structure is similar to the organization of a real classroom: a class, several small student groups in a class, and an individual student in each group.

### 3.2.2 Questionnaire

A questionnaire was designed based on a previous study of Lockhart & Ng [11] to analyze students’ perception towards our peer response approach in revision process. It comprised of 11 question statements, such as the preference of role playing of a giver or a receiver of feedback, the helpfulness of peer response on student revision. All question statements used a four-point rating scale from *strongly disagree* (1) to *strongly agree* (4) to reflect their attitudes towards peer response.

### 3.3 Procedure

Based on participants’ learning abilities, they were evenly allocated into seven groups of four or five students, and seated next to group members. This study consisted of three main steps: *Drafting* (80 minutes) – *Computer Supported Peer Response* (80 minutes) – *Revising* (40 minutes). When drafting, each student posts a new draft as an initial thread into his/her writing area as a new writing assignment. Thus, a student area can have many writing assignments (Fig. 2). In peer response sessions, members in a same group access their peer’s drafts and post a response message to the initial thread (the drafting thread). At the end of online peer responses, a 5-minute face-to-face peer response interaction is conducted at a physical classroom to clarify the meaning of posted responses. Finally, the author posts a revised draft thread at the end of response threads.

### 3.4 Data Analysis

To conduct an automatic segmentation and analysis of words/phrases in Chinese writing, a tool [3] of Latent Semantic Analysis (LSA) for Chinese documents was adopted. This tool was applied to help the quantitative analysis of revision on the amount of Chinese characters and words, instead of using human power.

## 4. Result and Discussion

Only 25 students completed their whole writing assignments, which were considered in our results. They completed seven pieces of descriptive/narrative writing in a school year. As a preliminary analysis, we only evaluated student writing performance in assignments of #2,

#3, and #7, based on the length of writing assignments and the richness of vocabulary. Then, we investigated pupils' perception on peer response in writing.

#### 4.1 Length of Writing & Richness of Vocabulary

Table 1  
Mean Length of Drafts and Revisions (N=25)

# Writing	Mean	SD	t value
#2 Revision	364.92	195.776	<b>3.048**</b>
#2 Draft	328.16	170.479	
#3 Revision	333.80	226.644	<b>2.276*</b>
#3 Draft	277.72	148.507	
#7 Revision	562.52	252.323	<b>3.177**</b>
#7 Draft	496.72	226.188	

\*  $p < 0.05$  \*\*  $p < 0.01$

Table 2  
Mean Number of Words in Drafts and Revisions (N=25)

# Writing	Mean	SD	t value
#2 Revision	76.52	30.226	1.968
#2 Draft	72.56	27.189	
#3 Revision	69.56	30.103	<b>3.237**</b>
#3 Draft	61.56	25.650	
#7 Revision	112.92	32.275	<b>3.987**</b>
#7 Draft	104.28	32.115	

\*\*  $p < 0.01$

Tables 1 and 2 present paired-sample t-test results on revisions and drafts for the analysis of length of writing, and richness of vocabulary, respectively. The significant growth in length indicates that our approach increases writers' motivation and efforts in revision to express more intended thoughts into written texts. This finding is in line with a previous study of peer comments by Cho, Schunn, and Charney [4]. Additionally, the significant growth in richness of vocabulary implies various peer responses may inspire students to learn more vocabulary from high-achieving students' writing, and have new thoughts about writing. Therefore, the use of computer supported peer response in elementary writing can enrich the content and ideas in writing, which are expressed in the length and richness of vocabulary.

#### 4.2 Students' Perception on Computer Supported Peer Response

Twenty-eight students completed the questionnaire at the end of second semester, except one girl, who transferred to another school. In general, participants showed a high agreement on the perception on computer supported peer response, according to the mean of Q11 (3.46; *In general, I like the peer response activities in this study*). Besides, participants also had high agreement on the following two perceptions.

**Perception on role playing of givers and receivers.** Means of Q2 (3.04; *I like to receive peer's responses to my drafts*) and Q3 (3.18; *I like to give suggestions and feedback to my peer's drafts*) are above the agree level. This indicates pupils, on average, are more willing to give or receive feedback to or from peers, in contrast with their initial attitudes, such as anxiety, anger while receiving feedback. This is essential to successfully enhance the interaction between writers and readers in computer supported peer response activities.

**Perception on helpfulness of peer response for readers and writers.** Means of Q4 (3.07; *While responding, I think it is helpful to help me to discover new ideas for my own writing*) and Q5 (3.25; *While responding, I think it is helpful to help me to think how to revise my own drafts*) were both above the agree level. It reveals this response approach can also help student readers in self-reflection on their own writing even in the process of providing feedback. This reflection includes discovering new ideas to enrich writing contents and approaches to revise their own drafts. On the other hand, means of Q9 (3.18; *I will revise my drafts after reading received responses*) and Q10 (3.32; *I think the comments from peer response is helpful to my coming revising task*) imply student writers are more intending to revise their writing after receiving peer feedback and agree that peer response is helpful in their revision.

## 5. Conclusion

This paper presents an empirical study of a computer supported approach to support small peer response groups in elementary writing classes. This approach was integrated into an online writing system to investigate how peer response can help students revise their drafts, and how pupils react to this peer response approach. We found that students are willing to express more intended thoughts into content and generate more ideas with more rich vocabulary and more complex sentences in their writing. Findings from the questionnaire also suggest that this approach is beneficial to both writers and readers, such as self-reflection or motivation for revision.

However, this is a preliminary study. Further analysis needs to be undertaken to provide more detailed information. For example, there is a need for future research to investigate the types of feedback provided by peers. Besides, a limitation of this study is that part of this experiment was conducted at after school club time in order not to interfere with normal teaching tasks. When students are familiar with this approach, we will consider transferring most of peer response activities (such as delivering, reading of writing, and giving responses, except the oral interaction) to network as after school activities to reduce required time in a physical classroom. Then, this computer supported peer response approach can be integrated into elementary writing classroom settings as a regular element in the writing process to improve pupil's writing abilities at a low cost of time.

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## References

- [1] Beal, C. R. (1996). The role of comprehension monitoring in Children's revision. *Educational Psychology Review*, 8(3), 219-238.
- [2] Beal, C. R., & Flavell, J. H. (1984). Development of the ability to distinguish communicative intention and Literal Message Meaning. *Child Development*, 55(3), 920-928.
- [3] Chen, M., Wang, H., & Ko, H. (2009). Using Latent Semantic Analysis to create a Chinese Semantic Space and the validation of psychological reality. *Chinese Journal of Psychology*, 51(4), 397-417.
- [4] Cho, K., Schunn, C. D., & Charney, D. (2006). Commenting on writing: Typology and perceived helpfulness of comments from novice peer reviewers and subject matter experts. *Written Communication*, 23(3), 260-294.
- [5] Elbow, P. (1998). *Writing without teachers*. New York: Oxford University Press.
- [6] Fitzgerald, J. (1987). Research on revision in writing. *Review of Educational Research*, 57(4), 481-506.
- [7] Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. *Journal of Technology, Learning, and Assessment*, 2(1), 1-52.
- [8] Holdich, C. E., Chung, P. W. H., & Holdich, R. G. (2004). Improving children's written grammar and style: Revising and editing with HARRY. *Computers and Education*, 42(1), 1-23.
- [9] Liang, M. Y. (2010). Using synchronous online peer response groups in EFL writing: revision-related discourse. *Language Learning & Technology*, 14(1), 45-64.
- [10] Liu, J., & Hansen, J. G. (2002). *Peer response in second language writing classrooms*. Ann Arbor, MI: The University of Michigan Press.
- [11] Lockhart, C., & Ng, P. (1993). How useful is peer response. *Perspectives*, 5(1), 17-29.
- [12] Topping, K. (2003). Self and Peer Assessment in School and University: Reliability, Validity and Utility. In M. Segers, F. Dochy, & E. Cascallar (Eds.), *Optimising New Modes of Assessment: In Search of Qualities and Standards*. (pp. 55-87). Dordrecht, Netherlands: Kluwer Academic Publishers.