A reciprocal peer review system to support college students’ writing

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Abstract
As students’ problem-solving processes in writing are rarely observed in face-to-face instruction, they have few opportunities to participate collaboratively in peer review to improve their texts. This study reports the design of a reciprocal peer review system for students to observe and learn from each other when writing. A sample of 95 undergraduate students was recruited to construct texts with the support of web-based reciprocal peer review in the processes of modelling, coaching, scaffolding, articulation, reflection and exploration. The results of the study revealed that these six processes helped students externalise and visualise their internal writing processes so that they could observe and learn from peers in writing as well as support peers in making text revisions. During their extensive and reciprocal interactions with various peers, students addressed mutual concerns in each other’s text revisions. They constructed collaborative language knowledge for text improvement as local revisions (grammatical corrections) and global revisions (corrections on the development, organization or style of a text) were made in their final texts. The students’ perceptions towards text improvement in this web-based peer review of modelling, coaching, scaffolding, articulation, reflection and exploration are also discussed in this study.

Introduction
Improving writing skills is important for college students since ‘professional and academic success in all disciplines depends, at least in part, upon writing skills’ (Cho & Schunn, 2007, p. 409). Many studies have emphasised that writing is no longer regarded as an individual task but rather may be supported by feedback from peers to improve the text (e.g., Liou & Peng, 2009; Lundstrom & Baker, 2009; Min, 2006; Vass, Littleton, Miell & Jones, 2008). Students can benefit more from different peers if they have gone through similar writing situations and difficulties in providing helpful suggestions and revisions (van Leeuwen, Tiesinga, Jochemsen & Post, 2009). Through the reciprocal process of peer review in writing, students are able to develop new ideas and perspectives as well as improve their writing skills (Lundstrom & Baker, 2009).

Different from face-to-face writing instruction, web-based peer review allows students to visualise their thinking and behaviors in solving problems of writing, where the thinking process is complicated and not easily observed (Liu, 2005; Patel, Kinshuk & Russell, 2003). Through web-based peer review, students are able to observe each peer’s writing processes recorded online and engage in interaction to receive peers’ assistance or to provide scaffolding to other peers for text improvement. In the pursuit of text improvement, they not only benefit from receiving feedback of peers but also from providing assistance to them (Cheng & Ku, 2009; Duran & Monereo, 2005).
However, previous studies have shown several drawbacks to peer review in writing. First, the rate of adopting peers’ revision is low when peers engage in non-revision-oriented feedback such as chatting and making complimentary remarks, rather than revision-oriented feedback such as suggestions, clarifications and critical evaluations (Liou & Peng, 2009). Second, peer review in writing is restricted to the lexical level for students often fail to participate in the discussion of text content or organisation (Cho & Schunn, 2007; Lundstrom & Baker, 2009; Storch, 2005). Third, students have few opportunities to reflect upon peer review as they cannot compare the differences between the different feedback from various peers (van Leeuwen et al., 2009; Vass et al., 2008; Xiao & Lucking, 2008). Fourth, students will not benefit from peer review until they are asked to rewrite their texts based on peers’ revision (Braine, 1997; Paulus, 1999). Thus, some important issues need to be addressed to ensure the quality and effectiveness of peer review in writing.

Web-based peer review processes

The development of the web-based peer review processes described in this study is based on the theory of cognitive apprenticeship where six processes are included for externalising knowledge—modelling, coaching, scaffolding, articulation, reflection and exploration (Collins, Brown & Newman, 1989). As writing is usually combined with complex internal processes, how to transform one’s thinking into a visible form is important in web-based peer review. Through the web-based peer review processes conducted in this study, students were able to observe peers’ writing process, provide revisions both at the lexical and discourse level, communicate with peers, compare one’s own texts with those revised by peers and decide whether to accept or reject peers’ suggestions.

In the process of modelling, all of students’ texts are presented in the online system for students to observe how their peers read and revise others’ texts. With modelling, students can learn reviewing skills more effectively without repeated struggles of trial and errors (Wang & Bonk, 2001; Williams, 1992). In addition, students have to be more responsible in revising others’ texts because their reviews could also be models for others (Yoshimura, 2009).

In the process of coaching, students read and revise peers’ texts and provide local revisions (corrections of grammatical errors). ‘Coaching may serve to direct students’ attention to a previously unnoticed aspect of the task or simply to remind the student of some aspect of the task that is known but has been temporarily overlooked’ (Collins et al., 1989, p. 481). It is reported that students do not detect their own grammatical errors in writing (Cho & Schunn, 2007; Li, 2006). In this study, peers’ local revisions are considered as coaching as these errors are generally unnoticed by students and regarded as minor mistakes in writing (Cho & Schunn, 2007; Li, 2006).

Different from the process of coaching which refers to peers’ direct corrections on the texts, scaffolding refers to peers’ suggestions for student writers to reorganise their texts by themselves. This support helps students manage complex tasks (Chee, 1995). In this study, global revisions (corrections to the development, organisation or style of a text) are considered as scaffolding as they enable students to reexamine and reorganise their texts in terms of development, organisation or style. This may result in a student writer’s deletion or addition of a new paragraph or the reorganisation of an entire text. Thus, global revisions are not limited to the lexical level but rather expand upon discourse level. Both local and global revisions are important to students’ text improvement (Cho & Schunn, 2007; Li, 2006).

Articulation involves any method of encouraging students to express their knowledge, reasoning or problem-solving processes in peer review. For example, students are encouraged not only to make revisions but also to provide reasons for revisions. Such tasks require students to participate in generating language knowledge and evaluating the writing outcomes. In reflection, students compare their own problem-solving processes in writing with those of peers (Liu, 2005). Such
comparisons aid students in diagnosing their difficulties and adjusting their revision strategies until they achieve the goal of text improvement. Exploration enables students to become independent learners as they are encouraged to select appropriate and effective peer review for improving their own texts. For example, students are encouraged to revise their texts into final drafts based on their evaluation of the feedback from peers. As a result, students are expected to become more active learners.

**Purpose of this study**
The purpose of this study is to engage college students in reciprocal peer review for text improvement using an online system. Participants in the system are encouraged to externalise their thinking throughout the entire process of peer review in writing. Among the reciprocal interactions with peers, the focus is placed on the processes of peer review; because the students’ decisions for making text revisions can be observed (Hansen & Liu, 2005; Storch, 2005). This focus differs from many studies whose emphasis is on the students’ written products. In this paper, three research questions are addressed: (1) how do the processes of peer review improve students’ texts in the online system?, (2) how do students receive support from and provide support to peers in web-based peer review?, (3) how do students perceive their text improvements in web-based peer review?

**Method**
To support college students in reciprocal peer review, an online system was designed for them to experience the processes of modelling, coaching, scaffolding, articulation, reflection and exploration. In the system, students followed each process in peer review with a common goal of text improvement.

**Participants**
Three learning English as a Foreign Language (EFL) writing classes were randomly selected from a university of science and technology in central Taiwan. In these three writing classes, there were 95 students with a common background in two respects: (1) all of them had passed the intermediate level of General English Proficiency Test, a nationwide screening test, administered by the university in the selection of students who wish to major in English; and (2) they had taken the same writing class for 2 years in this university and were in the third year of their studies. The objective of these three writing classes was to develop students’ writing skills through the support of peer review. Students were randomly assigned a user identifier (ie, P1–P95) in order to be anonymous in the online system. They were encouraged to interact with their peers by revising peers’ texts and evaluating peers’ suggestions before rewriting their first drafts.

**System development**
Designing an extensive and reciprocal learning environment is important to promote peer review in writing (Patel, Kinshuk & Russel, 2003; Woolley & Jarvis, 2007). Six processes—modelling, coaching, scaffolding, articulation, reflection and exploration—were implemented in the system to encourage students’ thinking and problem-solving processes in writing. Each process is described as follows.

1. **Modelling:** Some students might have difficulties in writing a text that their teacher has assigned. One possible way to overcome their difficulties is to read peers’ texts before posting their own texts in the system. As shown in Figure 1, the number of clicks made when reading each individual student’s text is presented in the system; students are also allowed to use the function key ‘My Collection’ to collect their favorite peers’ texts for modelling. That is, peers’ texts can serve as models for them to develop and organise their own texts on the same line.
2. Coaching: A list of error types in local revision is provided by the system for students to select when checking peers’ texts (Figure 2). The definitions and examples for each error type are also provided in the system for students to look up. After the students’ selection of error types, their local revisions are automatically highlighted with a number and a triangle icon (Figure 3). With peers’ coaching in local revisions, students can pay attention to the grammatical errors that they have not noticed.

3. Scaffolding: A list of error types in global revision is provided by the system for students to refer to (Figure 4). A definition and example of each error type is also presented for students to look up.

4. Articulation: In the system, students are allowed to discuss each revision in a dialogue box. In the dialogue box (Figures 5 and 6), peers’ selected error type and explanations for a local or global revision are presented. Student writers then evaluate the revision and give feedback to peers’ comments. Through articulation, students externalise their knowledge and thinking process in making text revisions.

5. Reflection: Students can use the Diff Engine embedded in the system to compare their texts with the ones revised by peers. As shown in Figure 7, the differences between the two selected texts are detected and highlighted by boldface and crossing-out. While reflecting on peers’ revision, students decide whether to accept it or not. With reflection, students can acquire multiple perspectives from peers on the same topic.

6. Exploration: In order to become independent writers, students are encouraged to revise their first drafts into their final drafts based on their evaluation of peers’ comments.
Different versions of a revised text are shown in the system. These enable students to raise their awareness to take steps in improving their texts. After posting their final drafts, students were also asked to evaluate their revisions for the final drafts by reporting their reasons for revision. With evaluation, students are responsible for their text revision and improvement.

Students’ actions in each of the six processes of peer review are recorded in the trace result of the system. This is available not only for the teacher to monitor students’ actions in the system, but also for students to visualise their writing processes. From the trace result, the process of peer review for text improvement can be examined.
Procedures of data collection
The present study was conducted between September 15th, 2008 and June 15th, 2009. Ninety-five undergraduate students were encouraged to write and rewrite their texts by themselves in and after class. They were recommended to finish the following tasks in each writing cycle:
1. write and post the first drafts of a reaction essay;
2. revise peers’ first drafts by providing local and global revisions;
3. rewrite their own first drafts into final drafts after evaluating peers’ local and global revisions; and
4. write a reflective journal to express their perceptions towards web-based peer review in writing.
Each task took 3–4 days so that the participants could complete each writing cycle in approximately 3 weeks.

Procedures of data analysis
Data collected in this study, including students’ first drafts, final drafts and reflective journals, were analysed by content analysis. This procedure helped the researcher discover and describe the focus of individual, group, institutional or social attention, and allowed the researcher to make inferences (Patton, 1990; Weber, 1990). Four stages of content analysis were conducted in this study: coding, categorization, description and interpretation. First, the researcher and the research assistant coded meaningful statements with highlights while reading students’ first/final drafts and reflective journals. Next, the meaningful statements were assigned into categories in terms of local and global revisions for each participant, and the students’ text improvement was assessed in terms of local and global revisions in their final drafts. Then, the researcher described the statements by presenting and summarising the main ideas. Finally, the researcher interpreted the main ideas by offering explanation, drawing conclusions and making inferences. The inter-rater reliabilities of students’ first draft, final drafts and reflective journals were 0.78, 0.80 and 0.83, respectively. Any disagreement between two raters (the researcher and the research assistance) was resolved by discussion. Data interpretation driven by these research methods is further explained in the following sections.

Results
The results of this study are described in three sections: (1) implementation of peer review processes for text improvement, (2) students’ reciprocal interactions in web-based peer review, (3)
students’ perceptions towards text improvement in web-based peer review. One student, student A, was randomly selected as an example to show the influence of peer review processes on her text improvement. Her reciprocal interactions with peers to support and to be assisted by peers are also presented. In addition, a sample of 30 students’ reflective journals, 10 from each writing class, was randomly selected to examine students’ perceptions in general towards text improvement in web-based peer review.

The influence of peer review processes on student A’s text improvement

From the trace result, it was found that student A read peers’ texts before writing and posting her text in the system. As shown in Figure 8, she read 11 peers’ texts before posting her own text; seven of them were reviewed more than twice. Among the 11 peers, student A read two peers’ texts (P24 and P42) for four times. In repeatedly reading peers’ texts, student A was engaged in modelling to observe peers’ writing processes and obtain some ideas for her own writing.

In addition to reading the model texts of 11 peers, student A also interacted with three peers—P24, P19 and P38—who contributed 1, 11 and 5 local revisions, respectively, and suggested global revisions. After posting her first draft, student A read peers’ local revision (coaching), read peers’ global revision (scaffolding), gave feedback to peers’ comments (articulation) and used the Diff engine to compare her text with the one revised by peers (reflection). The frequencies of these interactions with the three peers are presented in Figure 9. It was found that each peer made different contributions to student A’s peer review in writing. For example, in coaching, student A read local revisions from P19 for 49 times while she read P24’s for three times and P38’s for 31 times. Thus, student A read P19’s local revisions much more than those of the other two peers. This might have resulted from P19’s better language proficiency in providing more local revisions.

With the support of modelling, coaching, scaffolding, articulation and reflection from peers, student A finally engaged in exploration to revise her first draft into a final draft. Figure 10 shows a comparison between her first and final draft by the Diff Engine in the system. Each revision is indicated in boldface for newly added words or crossing-out for deleted words. Student A improved her text in terms of local and global revision, eg, by revising ‘label’ into ‘labeled’ in the second paragraph and adding a new sentence in the concluding paragraph.

Student A and her peers’ thinking process and language knowledge construction for each revision could be visualised through the trace result in the system. Table 1 shows student A’s peer review processes in one of her local revisions. In coaching, P19 revised student A’s text ‘enough well’ into ‘well enough’. In articulation, P19 gave the comments and student A provided feedback to P19: ‘I often misuse “enough”. Thank you for reminding me the mistake. I will keep this usage in mind’. In exploration, student A made a local revision in the final draft and evaluated that ‘well

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Figure 8: The frequency of student A read peers’ texts before posting her first draft
enough’ was the correct usage. From student A’s and her peers’ reflective dialogues in the system, student A’s and P19’s thinking process and language knowledge construction for peer review in writing could be identified.

Table 2 shows student A’s peer review processes for global revision in her final draft. In scaffolding, the three peers provided global revision. In articulation, student A agreed with the three peers’ suggestions to write more of her own opinions towards the reading text provided by the teacher. They thought that because the assignment is a reaction essay, student A should express her opinions more instead of just summarising the ideas in the reading text. In reflection, student A compared her own text with those of peers to learn different perspectives. In exploration, student A added a sentence in the conclusion in her final draft. She thought that her text could be improved by expressing more opinions to support the main idea in her final draft.

With the six processes of peer review in the system, student A and her peers’ thinking process for each text revision can be externalised. Their learning experiences become more meaningful to themselves.

**Student A’s extensive and reciprocal interaction with peers**

From student A’s trace result, it was found that she not only received support in peer review from the 11 peers shown in Figure 8 and the three peers shown in Figure 9, but also provided support in peer review to the other three peers—P21, P04 and P14—as shown in Figure 11. The interaction between student A and her peers is presented to show the extensive and reciprocal

![Figure 9: Student A’s actions after receiving peers’ revised texts](image-url)
interaction possible in web-based peer review. It was found that through web-based peer review, students were able to interact with various peers to receive support from and provide help to peers for text improvement.

Among the extensive and reciprocal interactions, collaborative language knowledge was constructed. According to the trace result (Table 3), student A revised two peers’ texts (actions #14 and #17) before receiving peers’ revision. After reading P19’s revisions (actions #18 and #26), she started to revise P14’s text (action #34). During student A’s support to and from peers in writing, mutual concerns about local and global revision were addressed. In local revision, they noticed that past tense should be used to describe events in the past (actions #14, 26 and 34); in global revision, more supporting ideas were recommended (actions #17, 18 and 36). Thus, the linguistic knowledge they shared and constructed was externalised in the system and could be observed by peers if they did not know how to support each other.

Students’ perceptions towards text improvement in web-based peer review

From the students’ reflective journals, their perceptions towards the six processes of peer review could be investigated (Table 4). In modelling, students liked to read and collect peers’ texts before

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Show differences

According to the article "Literacy in the United States" (author and date were not provided), it indicated that although the literacy rate of the United States was estimated to be 99.7%, actually it still had some arguments about the survey and different definitions of the literacy.

First, governments labeled individuals who can read a couple of thousand simple words they learned by sight in the first four grades in school as literate. However, in "The World Factbook" the CIA claimed the controversial definition of literacy as being able to read and write when a person is 15 years old or older. Government’s definition was only marginally literate. Moreover, the comprehensive study argued that such adults were functionally illiterate that they can’t read well enough to hold a job. The study showed that 21% to 23% adult Americans were not able to locate information in text, and earned a yearly average of 2,105 that less than the poverty level threshold for an individual. Jonathan Kozol in his book "Illiterate America" explained that the Census Bureau reported literacy rates of 99% were not fully correct, because of the object of study could not represent the whole population and the definition of literacy was certain to underestimate illiteracy.

In my opinion, the definition of literacy should be established firmly and the method of determining should be improved. If someone is considered to be illiterate, I think government can encourage him to improve his reading and listening skill or offer him more learning resources so that he can have more opportunity of finding a good job. No matter in the work place or even the whole society, I think literacy was an essential ability to support people’s life.

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Table 1: Student A’s peer review processes for one of the local revisions

<table>
<thead>
<tr>
<th>Peer review processes</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coaching</td>
<td>P19 revised ‘enough well’ into ‘well enough’ in student A’s text</td>
</tr>
<tr>
<td>Articulation</td>
<td>P19’s comment: ‘Well enough’ is the correct usage. Student A’s feedback to P19: I often misuse ‘enough’. Thank you for reminding me the mistake. I will keep this usage in mind.</td>
</tr>
<tr>
<td>Exploration</td>
<td>Student A made a local revision by revising ‘enough well’ into ‘well enough’. Student A’s evaluation of P19’s revision: ‘Well enough’ is the correct usage.</td>
</tr>
</tbody>
</table>
posting their own texts in the system. In coaching, students received a lot of local revisions (grammatical corrections) from peers that they had not noticed before. In scaffolding, students regarded global revisions as useful suggestions for them to improve their text organisation. In articulation, students liked to discuss local revision and global revision with peers. In reflection, students compared their first drafts with the one revised by peers to have different perspectives. In exploration, students expressed more confidence on final drafts because they had evaluated revisions in the final draft.

Most students appreciated peer review in writing because they thought that peer support was helpful for text improvement (Table 5). They indicated that peers’ texts served as models for them to plan for their writing. Although the peers were not experts, they were able to provide relevant and timely assistance and encouragement for text improvement, as they encountered similar difficulties in their own writing tasks.

Students not only benefited from peer review but also contributed to peers’ text improvement (Table 6). They made every effort to revise their peers’ texts and they encouraged them to make

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Table 2: Student A’s peer review processes for the global revision

<table>
<thead>
<tr>
<th>Peer review processes</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaffolding</td>
<td>P24’s global revision: You could write more about your opinions in the conclusion. P19’s global revision: Your summary for the article is good, but you should present your reflection to the article. P38’s global revision: You could express more about your opinions by pointing out how to improve the literacy in the United States.</td>
</tr>
<tr>
<td>Articulation</td>
<td>Student A’s feedback to P24: I will write more about my opinions in the conclusion to support my main points. Thank you for your suggestion. Student A’s feedback to P19: My reflection to the article is not enough. It is necessary for me to improve it. Thank you for your suggestion. Student A’s feedback to P38: It’s a great idea. Thank you.</td>
</tr>
<tr>
<td>Reflection</td>
<td>After student A compared her text with those of her peers, she developed different perspectives.</td>
</tr>
<tr>
<td>Exploration</td>
<td>Student A added a sentence in the conclusion to express her opinions. Student A’s evaluation: My text was improved by expressing more about my opinions to support my main idea.</td>
</tr>
</tbody>
</table>

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Figure 11: The extensive and reciprocal interactions among student A and her peers
further improvements. The motivation for students to support each other could be fostered by collaborative language knowledge construction from peer review. In reviewing peers’ texts, they could learn from and reflect on the strengths and weaknesses of peers’ texts. Furthermore, during the interaction with peers, they realised that they had the ability to improve peers’ texts. This awareness might encourage them to be more confident in their text revisions and facilitate more interactions with peers.

Students were extensively engaged in peer review processes supported by the system (Table 7). It was found that the system functioned well for students to observe peers’ writing processes, identify local and global revisions, communicate with peers, reflect on revised versions of a text and facilitate text improvement. Without going through the six processes of peer review supported by the system, students could neither externalise their linguistic knowledge and thinking process in writing nor could they further co-construct new knowledge in terms of local and global revisions with peers. Besides, without the externalised knowledge and thinking process presented

Table 3: Constructing collaborative knowledge among student A and her peers

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Action</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-11-27 17:13:48</td>
<td>#14 Student A provided local revision to P21</td>
<td>Student A asked P21 to use past tense to describe events in the past.</td>
</tr>
<tr>
<td>2008-11-27 17:32:12</td>
<td>#17 Student A provided global revision to P04</td>
<td>'Your opinions are seldom expressed in the text. You should write the introduction first, point out the main ideas, and express your ideas in the end. The organization of the text could be further improved.'</td>
</tr>
<tr>
<td>2008-11-27 17:41:28</td>
<td>#18 Student A read global revision from P19</td>
<td>P19 encouraged student A to express more of her opinions.</td>
</tr>
<tr>
<td>2008-11-27 17:51:08</td>
<td>#26 Student A read local revision from P19</td>
<td>P19 suggested student A to use past tense to describe things in the past.</td>
</tr>
<tr>
<td>2008-11-27 18:08:31</td>
<td>#34 Student A provided local revision to P14</td>
<td>Student A asked P14 to use past tense to describe events in the past.</td>
</tr>
<tr>
<td>2008-11-29 15:47:29</td>
<td>#36 Student A read global revision from P24</td>
<td>P24 encouraged student A to express more of her opinions.</td>
</tr>
</tbody>
</table>

Table 4: Students’ perceptions towards peer review processes as revealed in their reflective journals (n = 30)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>A In modeling, I would like to collect good texts to imitate.</td>
<td>P03, P09, P22, P35, P56, P84</td>
</tr>
<tr>
<td>B In coaching, I learned a lot from peers’ local revisions that I had never noticed before.</td>
<td>P02, P05, P18, P22, P29, P33, P47, P53, P60, P67, P73, P86, P93</td>
</tr>
<tr>
<td>C In scaffolding, the most helpful support from peers was their global revisions which improved my text organization.</td>
<td>P09, P15, P17, P33, P42, P51, P69, P83</td>
</tr>
<tr>
<td>D In articulation, I enjoyed the discussion with peers.</td>
<td>P15, P18, P24, P51, P53, P75, P95</td>
</tr>
<tr>
<td>E In reflection, comparing my first draft with the one revised by peers, I could understand the weaknesses of my writing and avoid making the same mistakes next time.</td>
<td>P22, P24, P51, P60</td>
</tr>
<tr>
<td>F In exploration, I believed my final draft was better than the first one since I had verified each revision.</td>
<td>P09, P18, P42, P53, P63, P95</td>
</tr>
</tbody>
</table>
in the system, they would not be able to observe peers’ writing processes and have opportunities to improve their own texts. Thus, the system served as an extensive and reciprocal learning environment for students to demonstrate their writing process and improve their texts by practising peer review.

**Discussion**

From the results of this study, various aspects of web-based peer review in writing can be observed. First of all, this study discusses three aspects of peer review: interaction, impact and attitude. These correspond to the findings of Ferris’s study in 2003 that peer review studies generally fall into three categories—the interactions during peer review, the impact of peer review on students’ text improvement and students’ attitudes towards peer review. With the six processes of peer review conducted in the online system, these categories can be extended to provide more detailed information for teachers to design follow-up curriculum.

Moreover, peer review in the online system was reciprocal as students received help from and provided support to peers at the same time. In order to reach the common goal of text improvement, they were engaged in interaction to exchange information and language knowledge. In their extensive interactions with various peers, some students would go through the same problem-solving activities to construct collaborative language knowledge as common local and global revisions were found in their final drafts. However, if the understanding is not mutual between a student and a peer, it would be hard for them to continue interactions in text revisions. Teacher intervention then became important to keep the interaction going on until students could improve their texts.

Finally, the online system with the six processes of peer review effectively supported students’ text improvement by providing an external model of internal writing processes. The system was an extensive and reciprocal learning environment for students to improve their writing because the entire writing processes were presented in the system for students and teachers to observe. In these processes, the diversified thinking processes and language knowledge from peers were externalised for students to examine, integrate and transfer into their writing. The visible process of decision making in text revision shown in the system also fostered students’ collaborative writing and enhanced interpersonal relationship when mutual concerns were addressed. As a result, students are willing to dedicate their time and effort to improve peers’ texts.

Although students’ peer review is supported by the system described in this paper, there are some limitations in this study. First, knowledge transfer in peer review is not discussed in this study. There is evidence that some students pass on the knowledge from peers to other students (Baird, 2004; Kay, 2007). Future studies could be carried out over a longer time period to observe students’ knowledge transfer in peer review. Second, in addition to the support of peer review, teachers’ interventions might also facilitate students’ writing processes. Jarvela (1995) suggests that teachers can provide strategies for problem-solving activities and gradually transfer responsibility to students. With externalised and visible writing processes presented in the system, future studies could probe further into the timing and fading of scaffolding in teacher intervention.

**Acknowledgements**

My heartfelt thanks go to the two anonymous reviewers for their helpful comments on the earlier drafts of this paper. This paper was supported by the National Science Council in the Republic of China, Taiwan (NSC 97-2410-H-224-016-MY2). The research grant made the continuation of this study possible.

**References**


