# Design and Development of Web-based Peer Review System for Enhancing Students' Audience Awareness and Reflective Thoughts*

Tzu-Chien Liu[1], Maiga Chang[2], Hwa-Wei Ko [1],Yu Wang[1], Shiau-Ping Yeh[1]

[1]Institute of Learning and Instruction, National Central University, Taiwan, ltc@cc.ncu.edu.tw
[2]School of Computing and Information Systems, Athabasca University, Canada, maiga@ms2.hinet.net

**Abstract:** The major purpose of this study is to introduce the design and development of an on-line peer review system, named happy writing on-line workshop**,** to enhance students' audience awareness and reflective thoughts in writing courses. This on-line system includes tow subsystems, students' learning system and teacher's management system. Students' learning system can support several learning activities, including writing, self-reviewing and peer reviewing, revising, and emulation. The teachers' management system can support the writing assignment management as well as the learning process monitor and the performance evaluation. This paper uses a scenario to illustrate how this system can be used in the real classroom to enhance students' writing capabilities and teachers' instructional effects.
**Keywords:** web-based system, peer review, writing capabilities, audience awareness, e-learning

## Introduction

### The importance of audience awareness and reflective thoughts

Writing can help students develop the high-level cognitive thinking. How to increase students' writing performances is an important research issue in the recent years. However, there are three major problems of ordinary writing courses including: (1) teachers are often the only reader of their students' compositions; (2) teachers have heavy workloads of correcting students' compositions and then they can not give students feedbacks as soon as possible; and (3) teachers' comments on students' compositions are too difficult to understand. That students can not have enough audiences and can not get the suitable feedbacks very soon may make students lack the audience awareness and the reflective thoughts in their own writing process.

Audience awareness and reflective thoughts are important indexes to distinguish novice writers and expert writers (Carvalho, 2002). Kroll (1984) argues that developing students' audience awareness is important in a writing course. Bereiter and Scardamalia (1987) also point out that composing process likes a problem-solving process which reflects the writers' thinking flow, and good writers understand that writing is an interactive process between themselves and the audiences. Because audience awareness and reflective thoughts are very important capabilities of writing, helping students get the capabilities is a major goal in writing courses.

### The impacts of peer review:

Peer review may be a good way to solve the above-mentioned problems in ordinary writing courses. Some meta-analysis researches have pointed out that peer review can provide students the opportunities to read others' works and to reflect the problems in their own works (Falchikov & Goldfinch, 2000; Topping, 1998). The peers' feedback can make students think seriously about how to revise their own works. Some researches have applied peer review in writing courses and found that peer review can help students develop the audience awareness and the reflective thoughts in their writing processes (Kennedy-kalafatis & Dawn, 1996; Simmons, 2003; Zhu, 2001).

However, when teachers applying peer review in ordinary writing courses, they might need to solve several important issues. These issues are including ***the anonymity issue***, keeping double blind peer review; ***the delivery issue***, copying and delivering the works efficiently; and, ***the timing issue***, giving the students the feedbacks instantaneously. These problems make peer review pedagogies be difficult to be applied into writing courses.

Web-based peer review can solve the difficulties of applying the peer review pedagogy in ordinary writing courses. In recent years, some researches have tried to apply web-based peer review system to solve the inconvenience of the paper-based peer review: (1) the web-based peer review system can simple use either blind or double blind review to avoid the social factors' influences; (2) the web-based system can provide teachers a

* The authors would like to thank the Ministry of Education in Taiwan, for financially supporting this research under the Project of Promoting Academic Excellence & Developing World Class Research Centers.

management user interface to help them manage and monitor students' peer review processes very efficiently, the management user interface also can reduce teachers' work loadings; and, (3) the web-based system can use either emails or instant messengers to provide an instant information exchanges (Davies & Berrow, 1998; Lin et al., 2001; Liu et al., 2002; Sung et al., 2005; Wen & Tsai, 2006).

**Web-based peer review system for teaching writing:**

Web-based peer review system have applied into many different learning subjects (Davies & Berrow, 1998; Lin et al., 2001; Liu et al., 2002; Sung et al., 2005; Wen & Tsai, 2006). There are only few researches focus on developing the web-based peer review system for teaching writing (e.g. Cho & Schunn, 2007; Yang et al., 2005) and there is rare to see researches which focus on developing web-based peer review system for teaching elementary school level's writing course in a ordinary classroom. Elementary school is an important stage for learning writing and writing courses are often carried out in the classroom in this stage. Therefore, to analysis how a web-based peer review system can help students learn writing in the classroom and to develop such practical system for writing are worthy researches. The proposes of this paper are：

(1) developing a web-based peer review system for teaching elementary school level's writing in ordinary classroom.
(2) and, using a scenario to illustrate how this system can be used in the real classroom to enhance students' writing capabilities and teachers' instructional effects.

## Happy Writing Workshop

The study designs and implements the system, which is so-called "Happy Writing Workshop". Figure 1 shows the system framework. The framework has two parts: the students' learning system and the teachers' management system.

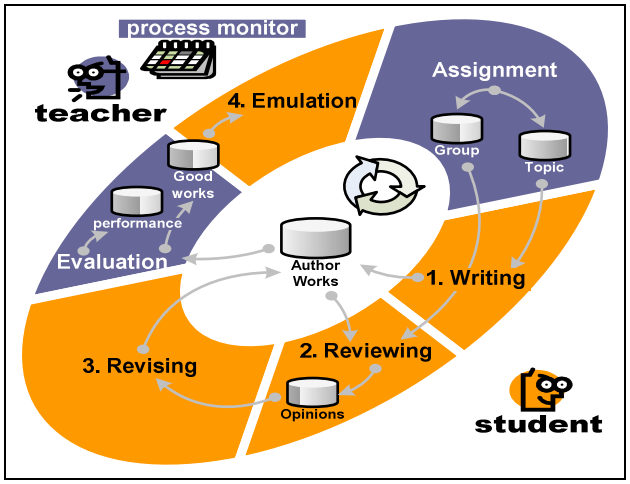



**Figure 1: The framework of "Happy Writing Workshop"**

***Students' learning system:***

The students' learning system has four parts that correspond to four phases of a peer-review activity in the study: the writing, the self-reviewing and peer reviewing, the revising, and the emulation. The system provides several functions in each part.

1. ***writing***
   This part has two functions, the learning information and individual writing desk. The *learning information* displays the writing topics and guidelines which the teacher provided. The *individual writing desk* has some tools like "Microsoft Word" software, and students can apply these tools to edit words and pictures easily that reduce their cognitive loads in writing.

2. ***self-review and peer review***
   This part provides four functions to support students' review, including the setting color, the note label, the

comments revise, and the anonymous review. The *setting color* allows students to choice the specific colors to mark the contents what they think important and input some comments there. The *note label* provides students a place to input their comments just close by the marked content. If students want to read the comments, they can simply move their mouse cursor on the label, the comments will popup. During reviewing, all labels will be represented by small icons to avoid any possible interrupts when read through the work. The *comment revise* allows students revise their comments. The *anonymous review* makes the peer review process be anonymous and be double blind review process. All reviewers don't have idea about who is giving the scores and the comments. This function reduces the influence of social relations.

3. ***revising***
   This part has only one but important function, the *reviewers' opinions integrated table*. The table displays scores and comments from every reviewer in the same peer review group. Moreover, the table color will change according to green if there are some variances among the author and reviewers' scores. This function pushes students paying attentions to different comments and scores about their works. This function helps students start to reflect their original writings, to think about peers' reviews, and to generate the ideas about the revisions of their writings.

4. ***emulation***
   This part has one function, *show the special works*. After students revise their works, teacher can show good, ascensive, and worthy discussed works, in the "Exhibition of Works". In the exhibition, students can read these works which the teacher has approved. All published works in the exhibition show the original edition and the revised edition simultaneously. This function helps students emulate various works and compare the differences between the original edition and the revised edition. Through the process, students have idea about how the good authors wrote and revised their works.

***Teacher's management system:***

The teachers' management system has two parts: the writing assignment management, the learning process monitor and the performance evaluation. Each part has several functions.

1. ***the writing assignment management***
   First part has four functions, the writing assignment designing, the peer review grouping, the reviewer designation, and the special work marking. The *writing assignment designing* function allows teachers to post the writing topics, starting and ending time, and other relevant information about the writing topics. The *peer review grouping* allows teacher to group students into several peer review groups. The *reviewer designation* allows teachers to assign peer review groups for individual student. The *special work marking* allows teachers to choose special works.

2. ***students' learning process monitor and their performance evaluation***
   Second part has two functions, the *learners' status* function allows teacher to monitor students' learning status. Teacher can provide appropriate helps to students in time with this function. The *score and comment* function allows teacher to evaluate the students' writing performance.

.

## Scenario – Sher's elementary school level's writing course

Here is a scenario about Sher and her two students, Mike and Jason. Sher is an elementary school teacher in Taiwan, and she teaching Chinese writing course. Mike and Jason are her two students who are currently take the writing course. Sher joins the project, Web-based Peer Review Enhanced Writing Instruction, and uses the Happy Writing Workshop system to teach writing. The scenario will display how the system can be used to enhance students' audience awareness and reflective thinking in their writing processes.

**Preparing for the course:**

Sher prepares all instructional tasks on the system such as writing assignment design and peer review grouping before the course. Sher first signs on the system and uses the *writing assignment design* function as Figure 2 shows, she inputs a writing topic and arranges the instruction schedule. The writing topic and the schedule then automatically appear on the first page of students' individual writing working room as Figure 3 shows.

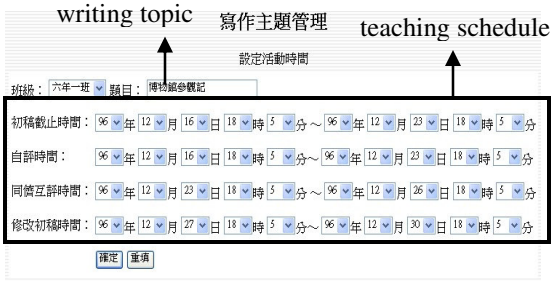



**Figure 2: writing assignment design**

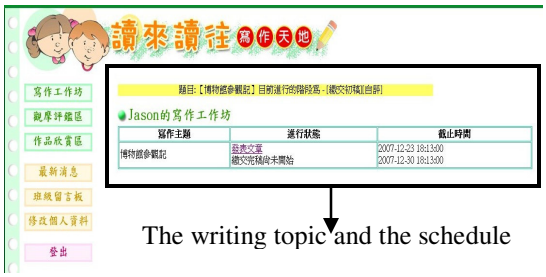



**Figure 3: Individual writing working room**

In order to apply the peer-review pedagogy into her writing course, Sher groups students into several heterogeneous peer review groups depending on their writing capabilities with the *peer review grouping* function as Figure 4 shows. Sher hopes that the heterogeneous reviewers can provide different viewpoints mutually when they are reviewing others' works. Furthermore, the students with high writing capabilities can offer group members the thinking scaffolding and also get the benefits from helping group members and reflecting about how a work is good.

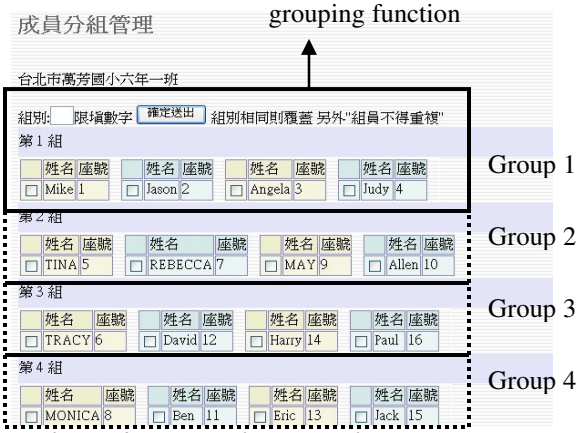



**Figure 4: Peer review grouping**




**Figure 5: Reviewer designation function**

The *reviewer designation* function as Figure 5 shows, can meet Sher's teaching needs at anytime. For example, Sher thinks the class might learn something from Jason's good work and Mike's works have some common mistakes which most of students may also have in their works. Sher then uses the reviewer designation function to assign the class to review Jason's and Mike's works. The designation not only used by the teacher to introduce students the important works, but also used by the teacher to initiate a class-wide discussion.

Sher feels that the system is quite easy and convenient for using to prepare the elementary school level's writing course, the system satisfies the **fifth rationale**, supporting teachers' instruction to her.

### In the Sher's class

***Instructional activity 1*: *Individual writing***

Sher's writing course carries out in the computer classroom. In the classroom, each student has a computer to finish the writing and reviewing activities for the course. When students sign on the system, they get into the individual writing working room as Figure 3 shows. Mike and Jason are good friends and classmates in Sher' writing course. They sign on the system and get into their own individual writing working room. In the room, they can finish all learning activities include reading the materials about the writing topic assigned by Sher; searching relevant information for the writing topic; doing the writing assignment; doing peer reviewing; and, revising their works according to reviewers' comments. The room will record all of their learning processes.

In the beginning, Sher explains the meanings of the writing topic for students and tries to elicit their experiences about the topic through a class-wide discussion. Mike and Jason use the *learning information* function to go through the whole system and read everything about the writing topic prepared by Sher in advance, and then searching for other useful information about the writing topic via Internet as Figure 6 shows.

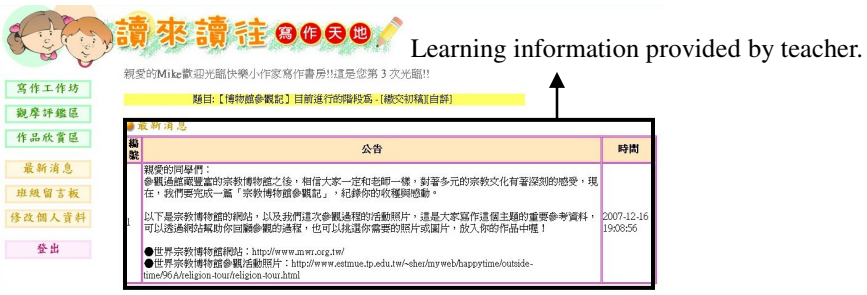



**Figure 6: Learning information function**

When the class-wide discussion has finished, Mike and Jason use the *individual writing desk* to write their works. Figure 7 shows the individual writing desk, which provides students an online word-like editor. The word-like editor helps Mike and Jason finish their works easily and efficiently. After two hours, Mike has finished his work and he reads his work repeatedly. He doesn't find out any mistakes in his work and feels very proud of it. Mike sends his works and begins to self-review his work. According to the review criterions, Mike gives his work scores and comments.

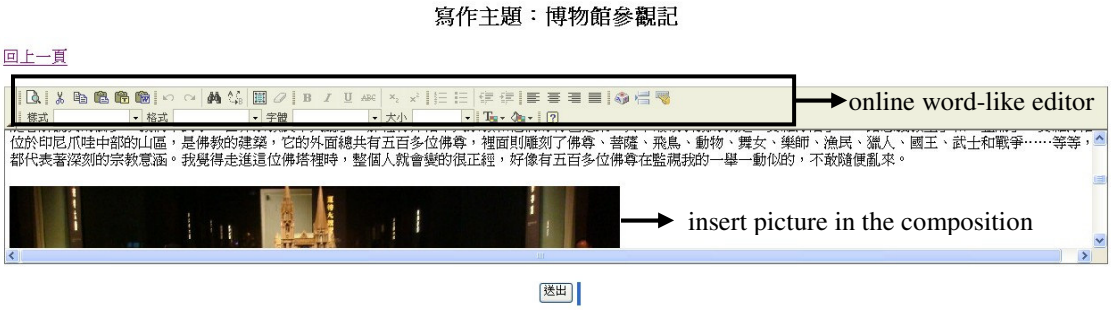



**Figure 7: Individual writing desk**

***Instructional activity 2*: *Peer review***

Sher groups Mike, Jason, Angela, and Judy as a peer review group, Jason and Angela have high writing capability, Mike's writing capability is average, and Judy's writing capability is low. However, because the system provides a double blind review, the four students don't know each others. Even Mike and Jason are good friends, they don't know where the scores and comments come from. The review comments then will not be affected by their social relations.

When Jason gets into the peer review room, he finds he has three works needed to review. Jason reads the criterions of writing evaluation and applies the criterions to review Mike's work. Jason finds out some problems about structure and content in the work. Jason uses the *setting color* function to mark the suspicious sentences and use the *note label* function to write his comments down. During reviewing, the labels will become small icons and will not influence the reading. Figure 8 shows the peer review room and its setting color (step 1) and note label (step 2) functions.

When the review is done, Jason wants to double check his comments again. He moves his mouse cursor on the label icons, the comments he input shows in the end of the work. Jason finds out there are some spelling mistakes in his comments, he uses the *comment revise* function to rewrite the comments (step 3 in Figure 8).

With these marks and comments, Jason has an overall understanding about Mike's work and problems. Jason then scores Mike's work according to the criterions of writing evaluation. After Jason sends the scores and comments out, Mike receives the information instantly.

The setting color, the note label, and the comment revise functions, help Jason a lot when reading and revising his comments for Mike's work repeatedly. The system provides the three functions to satisfy the **second rationale**, helping reviewers to understand the relations among scores, comments, and criterions, and the **first rationale**, providing "mind tool" for the processes of writing and peer reviewing.

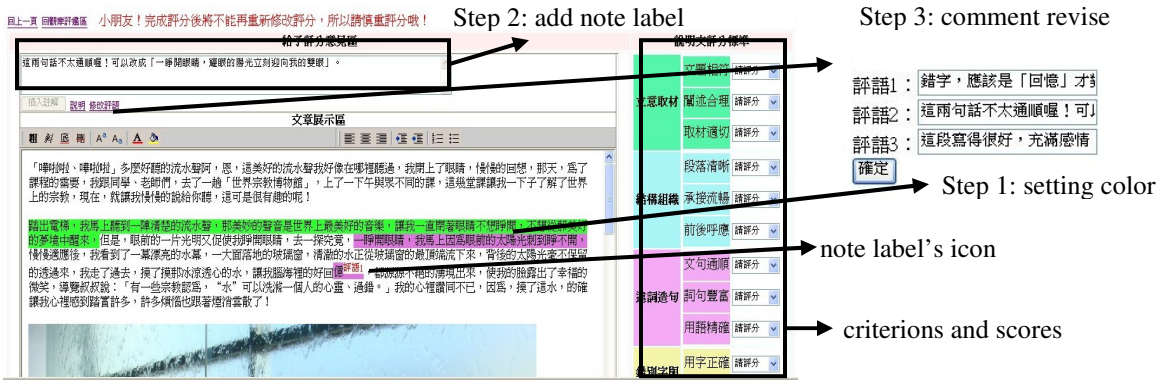



**Figure 8: Peer review room**

***Instructional activity 3*: *Revise composition***

When the review phase finished, Sher asks students to revise their works according to reviewers' scores and comments. Mike starts to revise his work. He first uses the individual writing desk and clicks on the *reviewers' opinions integrated table* as Figure 9 shows. Mike looks at the table and finds there are many cells marked with green color. The green color means there are some differences among his self-review scores and other reviewers' scores. Mike is very curious what makes other reviewers have different opinions from him. He opens a reviewer's results, which actually come from Jason, to look for the reasons. Mike finds that the reviewer (Jason) reminds him to modify some problems about the content and the structure, and these writing problems he has never thought about.

Mike is very happy because he knows a lot of different opinions and suggestions for his works from others via the reviewers' opinions integrated table. Now, he has some ideas about how to revise his work.

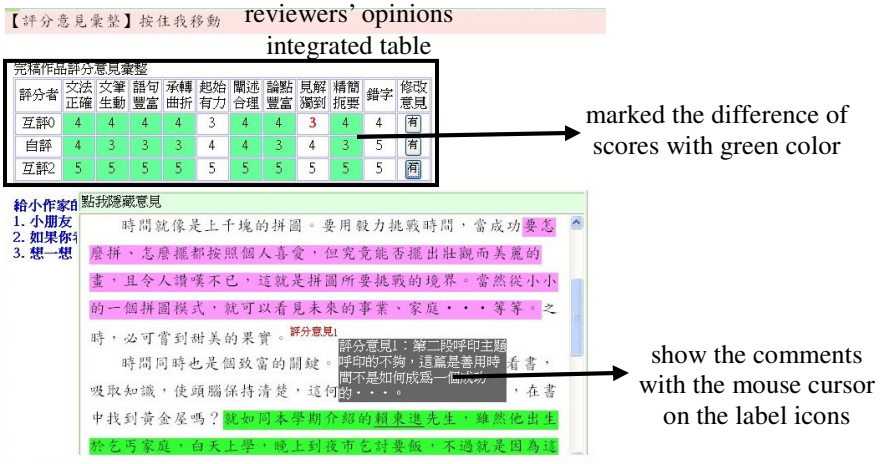
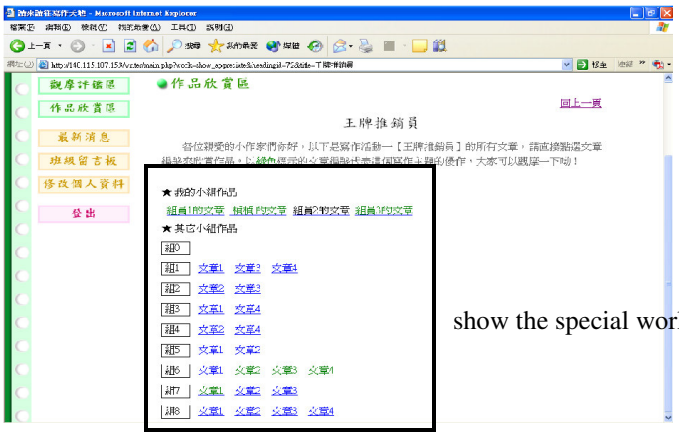



**Figure 9: The reviewers' opinions integrated table**

***Instructional activity 4*: *Showing the good compositions***

Looking good works can help students understand how good authors doing their work. Learning from the peers is the best way for the six grade students, and the student's learning motivation will increase. So, after the class finishes revising their works, Sher uses the special works marking function to pick up some works which are worthy to show the class. The chosen works will be transferred to the exhibition, and students can use the *show the special works* function to look at it as Figure 10 shows.




show the special works

**Figure 10: Show the special works function**

Mike and Jason want to read the good works chosen by Sher. When Mike and Jason use the show the special works function to get into the exhibition, they read the original edition and the revised edition of every works at the same time. Mike and Jason are surprised and feel happy, because their works are in the exhibition, too. Mike and Jason read other good works very carefully, and compare the differences between the original edition and the revised edition. They find out how other authors revised their works. The learning experience helps them aware peers' writing and thinking processes.

**During the course and at the end of the course**：

During the course, Sher uses the *learners' status* function to monitor students. Sher can provide appropriate helps to students in time and also control the teaching process as Figure 11 shows. At the end of the course, Sher uses the score and comment function to evaluate the students' performance. The evaluation results will also show on the reviewers' opinions integrated table as Figure 9 shows.




| 座號 | 姓名 | 暱稱 | 組別 | 初稿 | 第一次自評 | 第一次互評 | 第二次自評 | 完稿 | 第二次互評 | 上傳文章次數 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mike | Mike | 1 | O | X | O | X | X | X | 1次 |
| 2 | Jason | Jason | 1 | O | X | X | X | X | X | 1次 |
| 3 | Angela | Angela | 1 | O | X | X | X | X | X | 1次 |
| 4 | Judy | Judy | 1 | O | X | X | X | X | X | 1次 |
| 5 | TINA | TINA | 2 | X | X | X | X | X | X | 0次 |
| 6 | TRACY | TRACY | 3 | X | X | X | X | X | X | 0次 |
| 7 | REBECCA | REBECCA | 2 | X | X | X | X | X | X | 0次 |
| 8 | MONICA | MONICA | 4 | X | X | X | X | X | X | 0次 |
| 9 | MAY | MAY | 2 | X | X | X | X | X | X | 0次 |
| 10 | Allen | Allen | 2 | X | X | X | X | X | X | 0次 |
| 11 | Ben | Ben | 4 | X | X | X | X | X | X | 0次 |
| 12 | David | David | 3 | X | X | X | X | X | X | 0次 |

show the learners' status.

**Figure 11: learners' status function**

## Conclusions

This research developed a web-based peer review system, "Happy Writing Workshop" system, for teaching elementary school level's writing course. The course helped students review peers' work, think about the different opinions critically, and reflect how to improve their own work. The learning process promoted students' reflective thoughts and audience awareness. The experiment which involved four classes in the elementary school showed that the web based peer review writing course can improve the elementary school students' audience awareness and reflective thoughts much more than traditional writing course. In our future works, we will further develop more functions to help students' writing, and explore the factors how the web-based peer review system influences students' cognitive process.

## References


Berieter, C., & Scadamalia, M. (1987) The psychology of written composition, Hillsdale, NJ: Erlbaum.

Carvalho, J. B. (2002). Developing audience awareness in writing. *Journal of Research in Reading*, 25(3), 271-282.

Cho, K., & Schunn, C. (2007). Scaffolded writing and rewriting in the discipline: A web-based reciprocal peer review system. *Computers & Education*, 48(3): 409-426.

Davies, R., & Berrow, T., (1998). An evaluation of the use of computer supported peer review for developing higher-level skills, *Computers & Education*, 30(1-2), 111-115.

Falchikov, N., & Goldfinch, J. (2000). Student peer assessment in higher education: a meta-analysis comparing peer and teacher marks. *Review of Educational Research*. 70(3), 287-322.

Jonassen, D.H. (1996). *Computers in the classroom: Mindtools for critical thinking.* Columbus, OH: Merrill/Prentice-Hall.

Lin, S. J., Liu, Z. F., & Yuan, S. M.(2001). Web-based peer assessment: Feedback for students with various thinking-styles. *Journal of Computer Assisted Learning.* 17(4), 420-433.

Kroll, B. (1984). Writing for reader: Three perspective on audience. *College Composition and Communication*. 35(2). 172-185.

Kennedy, K. S., & Dawn, C., (1996). Encouraging Peer Dialogue in the Geography Classroom: Peer Editing to Improve Student Writing. *Journal of Geography in Higher Education*, 20(3), 323-341.

Liu, Z. F., Lin, S. J., & Yuan, S. M.(2002). Alternatives to Instructor Assessment: A Case Study of Comparing Self and Peer Assessment with Instructor Assessment Under a Networked Innovative Assessment Procedures. *International Journal of Instructional Media.* 29(4), 395-404.

Simmons, J., (2003). Responders Are Taught, Not Born. *Journal of Adolescent & Adult Literacy.* 46(8), 684-693.

Sung, Y. T., Chang, K. E., Chiou., S. K., & Hou, H. T., (2005). The design and application of a web-based self- and peer-assessment system. *Computers & Education*, 45, 187-202.

Topping, K. J., (1998). Peer assessment between students in colleges and universities. *Review of Educational Research***.** 68(3), 249-

Wen, M. L., & Tsai, C. C., (2006).University students' perceptions of and attitudes toward (online)peer assessment. *Higher Education*, 51, 27-44.

Yang, J. C., Ko, H. W., & Chung, I. L., (2005).Web-based interactive writing environment: Development and evaluation. *Educational Technology & Society*, 8(2), 214-229.

Zhu, W., (2001). Interaction and Feedback in Mixed Peer Response Groups. *Journal of Second Language Writing*, 10(4), 251-276.