OPEN ACCESS
EURASIA Journal of Mathematics Science and Technology Education
ISSN: 1305-8223 (online) 1305-8215 (print)
2017 13(7):3283-3300
DOI 10.12973/eurasia.2017.00717a

Assigning the Appropriate Works for Review on Networked Peer Assessment

Chien-I Lee
National University of Tainan, TAIWAN

Received 29 September 2016 ▪ Revised 9 November 2016 ▪ Accepted 29 November 2016

ABSTRACT
Peer assessment can expand the cognitive schemas of students, facilitate knowledge construction, and promote discussion and cooperative learning among students and their peers. In recent years, the application of the internet to conduct peer assessment activities has been widely implemented. The advantages of networked peer assessments over traditional paper assessments include greater anonymity, less paper consumption, and greater convenience for teachers in terms of monitoring student progress. However, students must possess adequate assessment professionalism in order to provide their peers with meaningful and constructive feedback. This study therefore introduced a mechanism to assign works to peers based on assessment professionalism. Under this mechanism, students review the work of their peers within the range of their assessment capabilities. This maintains students' motivation to learn as they assess and observe the works of their peers and improves their learning effectiveness.
Keywords: networked peer assessment, assessment capability, learning effectiveness

INTRODUCTION

Research during the last decade has proved that peer assessment is an effective learning strategy that can expand the cognitive schemas of students, facilitate knowledge construction, and promote discussion and cooperative learning among students and their peers (Boud, Cohen & Sampson, 2001; Paulin & Haythornthwaite, 2016; Sung, Chang, Chang & Yu, 2010). In a peer assessment activity, students with similar backgrounds (e.g. same grade or class) are asked to assess one another's works or learning achievements (Bostock, 2000; Topping, 1998; Topping & Ehly, 2001).

With the flourishing of the internet, an increasing number of peer assessment activities are being conducted via the internet or online systems, thereby forming networked peer assessment. The advantages of networked peer assessments over traditional paper assessments include greater anonymity, less paper consumption, and greater convenience for teachers in terms of monitoring student progress (Lin, Liu, & Yuan, 2001). Networked peer assessment platforms also make it convenient for students to make assessments, give feedback, and correct and improve their assignments. With anonymity, peer interactions can become

Correspondence: Chien-I Lee, *National University of Tainan, Taiwan.*
leeci@mail.nutn.edu.tw

State of the literature

- In a peer assessment activity, students with similar backgrounds (e.g. same grade or class) are asked to assess one another's works or learning achievements and thereby observe and learning from one another.
- High quality feedback can promote learning; in contrast, poor quality feedback can hinder learning and even make students less willing to learn.
- Means of assigning works to peers based on their assessment professionalism is a crucial research issue. It allows students to review peer works within the range of their assessment capabilities, avoid negative emotions, and maintain their motivation to learn.

Contribution of this paper to the literature

- This study developed an appropriate level recommendation mechanism that assigns students peer works within the range of their assessment capabilities.
- Before implementing networked peer assessment activities, teachers should provide students with detailed grading standards and instruct them on how to give grades so that they fully understand the assessment scale.
- Incorporating the proposed mechanism into networked peer assessment activities can enhance the learning effectiveness of students. Training the students in assessment beforehand increases the quality of their assessments so that they are moderately or highly consistent with those of experts.

more pleasant, and as they interact with and give feedback to one another, they can learn from those that are better than themselves, reflect on their shortcomings, correct their mistakes, and enhance their learning effectiveness.

The feedback information that students provide as they assess the works of their peers, including identifying problems, suggestions, detailed explanations of the shortcomings that they have found and the suggestions they give, and negative and positive comments, is significantly and positively correlated to their interest, self-efficacy, and performance in their own work (Lu & Law, 2012). Van Zundert, et al., (2012) also pointed out that training the assessment capabilities of students can effectively enhance their peer assessment skills, improve their learning effectiveness, and even motivate them in learning. Yang and Tsai (2010) further indicated that valid feedback information in peer assessments helps students become better at correcting and reflecting on their work. Li, Liu, and Zhou (2012) found that peer feedback, regardless of whether it is good or misleading, has a positive correlation with performance. Thus, incorporating networked peer assessments into student learning processes can enhance student learning effectiveness, provide students with the opportunity to observe the work of others and reflect on their own work, and hone their critical thinking skills.

During peer assessment activities, each student's work is distributed to several peers who assess the work and offer suggestions on how it can be revised. Suggestions are then given to the author of the work, who revises and improves it. This process is referred to as a

round. A typical peer assessment activity generally requires at least three rounds (Tseng & Tsai, 2007). With the feedback from their peers, students contemplate how to make their work better, and by repeating this process, they increase their skill (Topping, 1998; Topping & Ehly, 2001). With mutual feedback, students can discover the mistakes or shortcomings in their work. Thus, the quality of feedback exerts significant influence on the effectiveness of peer assessment activities. Obviously, peer feedback can effectively enhance the performance of students in their work. Relevant research has also indicated that improving the quality of feedback makes students more willing to accept peer assessments, enhances their evaluation capabilities, and promotes fairness and professionalism in mutual assessment (Ng, 2016)

However, when students are unable to offer comments and opinions on the works of their peers, they often feel anxious and confused (Sutherland-Smith, 2002). Even if they are able to come up with some sort of a response, it generally lacks validity, is of no substantial help to the student whose work is being assessed, and may even be misleading.

We therefore developed an appropriate level recommendation mechanism in this study that enables students to review peer works within the range of their assessment capabilities. This helps maintain students' motivation to learn as they assess and observe the works of their peers and improve their learning effectiveness.

Based on the research background and motives described above, the specific research questions that guided this study were as follows:

(1) In networked peer assessment activities, does the proposed mechanism influence the validity of assessments among peers?

(2) In networked peer assessment activities, does the proposed mechanism exert significant influence on learning effectiveness?

THEORETICAL FRAMEWORK

One of the most important factors influencing the effectiveness of peer assessment activities is the quality of peer comments and opinions. By giving comments and opinions on each other's works, students can uncover the mistakes in their works and improve their performance. Studies have found that for students, finding mistakes in other people's work is easier than finding those in their own. In addition, works that have undergone multiple revisions generally have higher quality than those marked and corrected by a single teacher (Hull, 1984; Cho & MacArthur, 2010; Lu & Law, 2012; Yang, Badger, & Yu, 2006). High-quality feedback can promote learning; in contrast, poor-quality feedback can hinder learning and even make students less willing to learn (Liang & Tsai, 2010; Mintzes, Wandersee, & Novak, 2005; Wen & Tsai, 2006). This shows that if students have inadequate assessment capabilities and professionalism, they will be unable to provide constructive suggestions on the works of others. Thus, the means of enhancing feedback quality is an issue that warrants further investigation.

The study conducted by Blain (2001) indicated that when students have been trained, they are more capable of giving their peers constructive feedback and benefiting from the feedback that they receive. This shows that training in textual comments helps students to give more effective and constructive feedback to their peers. Van Zundert et al. (2012) stated that assessment training effectively improves the peer assessment skills of students, helps students enhance their own learning effectiveness, and strengthens their motivation in learning. Yang and Tsai (2010) indicated that valid peer feedback and comments in peer assessments sharpen student skills in revision and reflection.

Most peer assessment activities in the general classroom are conducted in groups for the sake of convenience due to the greater numbers of students in a class, and these groups rarely change. In other words, the students are always reviewing the works of the same peers in each round. As students assess the same works in the same group over and over again, it is not surprising that they may feel that the task is tedious. After a few rounds, they can become impatient and make comments carelessly. This study therefore developed an appropriate level recommendation mechanism for networked peer assessment activities which incorporates a method of evaluating assessment professionalism to examine the quality of textual comments. The student whose work is being assessed gives peer reviewers different scores based on their comments. This score is the personal assessment professionalism score of the reviewer. The students are divided into groups based on these scores with the appropriate level recommendation mechanism, and then, they proceed to the next round of the peer assessment activity in their own group, respectively.

This study adopted a quasi-experimental design to determine whether the appropriate level recommendation mechanism influences the feedback quality and learning effectiveness of students during networked peer assessment activities. In the experiment, the students in the experiment group are regrouped based on their personal assessment professionalism score, and works are assigned using the proposed mechanism. In control group 1, an expert (a teacher) determines the assessment professionalism of the students and assign works of the appropriate level for review. Control group 2 involves a typical networked peer assessment activity without any attempt to match works to assessment ability.

Lin et al. (2001) discovered that a networked peer assessment activity with two rounds was not sufficient to significantly enhance the learning effectiveness of students. Tsai et al. (2002) observed significant improvements in learning effectiveness after a networked peer assessment activity of three rounds. Other relevant studies on networked peer assessment have shown that three rounds is optimal (Lin, Liu & Yuan, 2002; Liu, Lin & Yuan, 2002). A higher number of rounds for mutual assessment and revision does not enhance work quality or learning performance any further and can make students weary and impatient. Moreover, if students have too many works to assess, it can overburden them.

We therefore implemented a networked peer assessment activity with three rounds in this study. Due to the greater number of students in a class, regarding the class as one group

would mean that each student would have more than 20 peer works to assess. For the sake of convenience, we divided the students into groups of four, so each student was only required to assess the works of three other students during each round.

The primary variables in this study are as follows:

1) Independent variables:

(a) Experiment group: applying proposed mechanism

The students were grouped based on their personal assessment professionalism scores (Grades 1-4). During the first round, the students had not been assigned personal assessment professionalism scores, so they were divided into groups randomly. Starting from the second round, they were grouped based on the personal assessment professionalism scores.

(b) Control groups:

- applying recommendations of the teacher
  The students were grouped based on personal assessment professionalism scores (Grades 1-4) given by an expert. Again, the students were divided into groups randomly in the first round. Starting from the second round, they were grouped based on the personal assessment professionalism scores produced in the first round. Theoretically, Control group 2 should have the best performance than the others due to students were grouped by the expert with excellent professional knowledge and rich teaching experience. That is, Control group 2 served as a benchmark for comparison for the experiment group.
- typical networked peer assessment
  The students were divided into groups randomly in the first round and remained in the same groups in the second and third rounds. This group served as a basis for comparison for the other groups

2) Dependent variables

(a) Review quality

During the process of the networked peer assessment activity, peer feedback was divided into two portions: the assessed work and review comments; the review quality here refers to a quality score given to the textual content of the reviewer's comments and opinions.

(b) Peer assessment validity

In the networked peer assessment activity in this study, peer assessment validity refers to a comparison of the scores given by a teacher and students to the same work.

(c) Learning effectiveness

Learning effectiveness refers to the average grade of the student's work received from the peers who reviewed the work.

(3) Control variables:

(a) All of the groups were taught by the same teacher.

(b) All of the groups were taught for the same amount of time.

(c) All of the groups were taught using the same teaching materials.

METHODOLOGY

Research participants

Due to limitations in time and manpower and the need to cooperate with the school administration, and for the sake of convenience in the experiment and investigation, three seventh-grade classes containing a total of 96 students in a public junior high school in Tainan City were selected as the research participants. With a class as the unit, these three classes were randomly selected from the seventh-grade and randomly designated as the experiment group, control group 1, and control group 2. The participating students needed no special computer skills. Before the teaching experiment, a learning effectiveness pre-test was administered. Analyzed using an independent t test, the results showed no significant differences among the three groups of students in prior knowledge and entry behaviour.

Research instruments

(1) Assessment professionalism score scale

Before teachers implement peer assessment activities, they should first instruct students on how to make assessments. This will prevent low-quality feedback and widely varying assessment standards (Ploegh, Tillema & Seger, 2009; Rahimi & Hassani, 2012). Instructions on making assessments should include detailed grading standards (Smith, 2012; Sung, Chang, Chiou & Hou, 2005) and how to give grades. We referred to relevant research and conducted a qualitative analysis on the textual contents of meaningful comments and opinions. Positive and negative comments can be roughly divided into six categories:

(a) Positive:

- Pointing out shortcomings and giving concrete suggestions
  (For example: "These images are fuzzy and must be replaced with high resolution images")
- Pointing out shortcomings but not giving concrete suggestions
  (For example: "These images are fuzzy")

- Not pointing out shortcomings but giving positive praise
  (For example: "You did well")

(b) Negative:

- Giving meaningless and unspecific comments
  (For example: "The images are fuzzy")
- Not pointing out any strengths or weaknesses and being negative and unfriendly
  (For example: "The images are so bad")
- Not giving any textual comments.
  (For example: " … ")

After each round of peer assessment, the student whose work has been assessed will score the other three students in his or her group on their assessment professionalism based on the six major comment categories. The highest score is 5, and the lowest score is 0. We compiled this assessment professionalism scale to test the quality of student assessment reviews. The scale was discussed and adjusted by the teacher and three experts who were also teachers with more than 10 years for teaching computer experience to ensure expert validity.

Networked Peer Assessment system

We adopted Moodle (Modular Object-Oriented Dynamic Learning Environment) to construct the networked peer assessment system. Moodle is a free and open-source learning software platform and course management system. We also used XAMPP, which is a free and open-source installation instrument that integrates Apache webpage services with PHP, Perl, and MySQL and allows users to easily set up webpage servers on their own computers. After the completion of the environment for the networked peer assessment system, the teacher can create new courses on the system, including the name, theme, and time of the course. When a student logs in, the system displays the courses that he or she is taking and relevant information on said courses (**Figure 1**). The column on the right of the screen shows upcoming events to remind students of the due dates of their assignments or the time of peers' assessment.

When the teacher finished teaching a unit, the students were given assignments. Once completed, the works were uploaded to the system platform (**Figure 2**) for the peer assessment activity.

Once all of the students had uploaded their work, the peer assessment activity for student works began. For the grading standards, this study referred to an assessment scale applied to assess digital portfolios (Yen & Hsiao, 2011) and revised it based on the teaching scenario in the experiment. The main purpose of this scale is to evaluate the grades of student works. The work assessment scale included four items: overall aesthetics, creativity and functionality, expressive techniques, and subject relevance. Each item accounted for 25 points with the total score of 100 points. The feedback of each work was not only the average scores

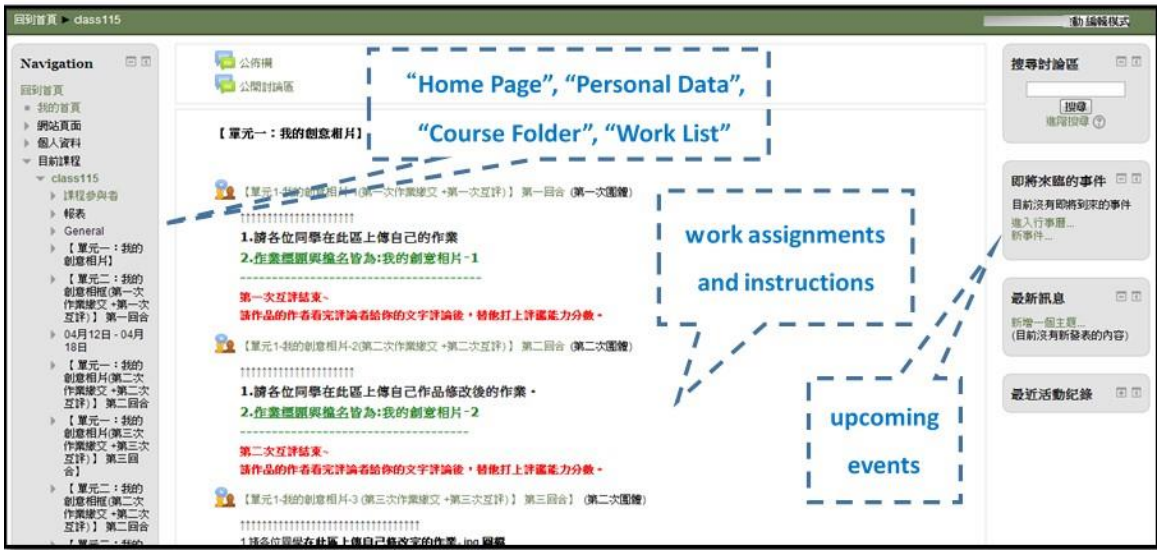

Figure 1. System screen after student login

Figure 2. Screenshot of student work uploading

of peers but also the comments of work from each peer, who was required to give textual comments in the last part (**Figure 3**).

Then, the student would receive all the three peers' scores and comments for his/her work, the student furtherly made assessments based on the six rating standards in the assessment professionalism score for each peer according to the peer's review quality, which refers to a quality score given to the textual content of the reviewer's comments and opinions. Such a score should be subjective only depending on the student's judgment of the usefulness for improving his/her work. After the above assessment process, students could see their

Figure 3. Peer assessment

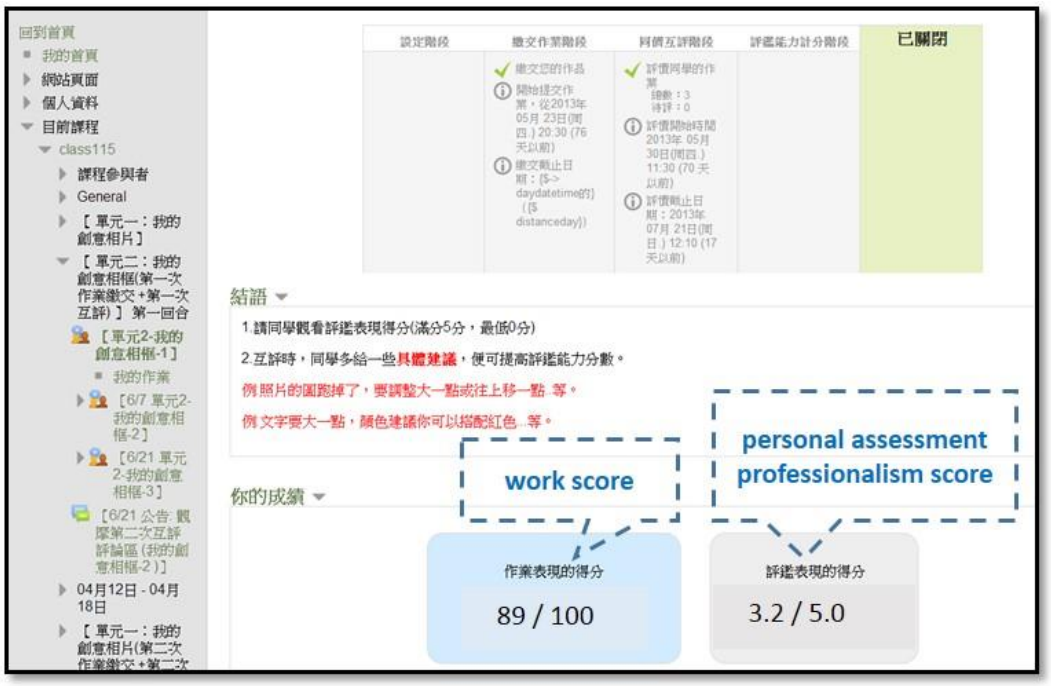

Figure 4. Image displaying work and personal assessment professionalism scores

works and their personal assessment professionalism score in the networked peer assessment system (**Figure 4**).

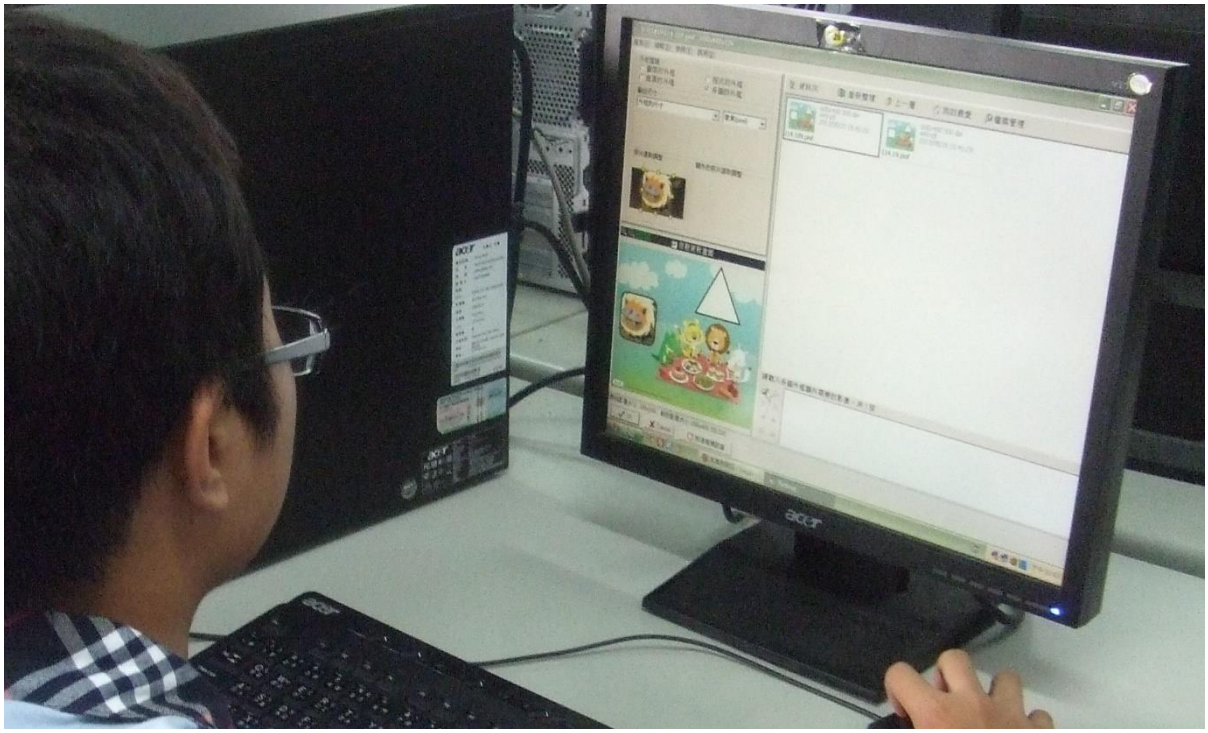

Figure 5. Student work in progress

Activity design and implementation process

The formal experiment was preceded by a preparatory phase, in which the teacher arranged the teaching activities for a lesson and then had the students upload their completed works to the system. This was followed by three rounds of anonymous peer assessment with multiple revisions and mutual assessments. The purpose of this phase was to familiarize the students with the system, train them in making assessments, and give them a clearer idea of the connotations of the grading standards.

After the preparatory phase, the formal experiment began, using nine class periods to perform three rounds of peer assessment. After teaching the lesson, the teacher had the students complete their works (**Figure 5**) and upload them to the system, where the students assess each other's works (**Figure 6**). Next, after each work was assessed by three other students, the author of the work evaluated the comments given by the three students and gave each reviewer an assessment professionalism score. Thus, each student would receive an assessment professionalism score from each of the students whose works they had assessed. The average of these three scores was their personal assessment professionalism score. In the experiment group, the personal assessment professionalism scores generated in the first round served as the basis for regrouping the students in the second round of peer assessment. In the third round, the students in the experiment group were regrouped again based on the personal assessment professionalism scores generated in the second round. The regrouping method of control group 1 was identical to that of the experiment, the difference being that the personal

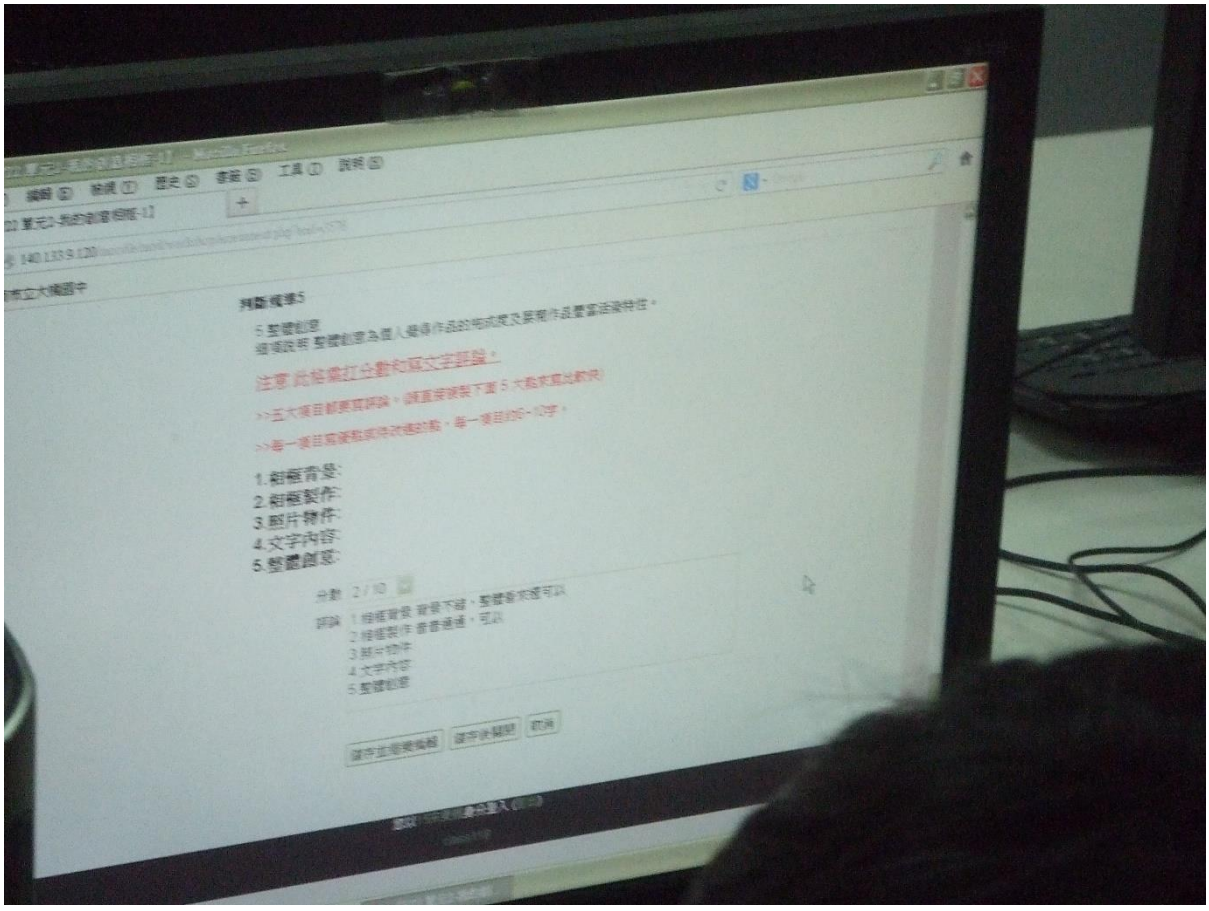

Figure 6. Peer assessment activity in progress

assessment professionalism scores in each round were determined by an expert (the teacher). In control group 2, the groups remained the same in all three rounds.

RESULTS

Analysis of review quality

In peer assessment activities, expert validity can serve as a suitable indicator of the appropriateness or professionalism of peer assessments, which makes it an external indicator. The use of criterion-related validity to obtain the correlation coefficient of expert and student assessments is called validity analysis. We therefore adopted the Pearson product-moment correlation coefficient to gauge the consistency between expert and student assessments of textual comments in the networked peer assessment activity. As shown in **Table 1**, the results of the analysis show a significant and positive correlation between expert and student assessments of textual comments with $p<0.01$, thereby indicating consistency between the two. Analysis of the expert and student assessments of textual comments in the second and third rounds revealed increased correlation coefficients, which mean an increasingly higher degree of consistency between expert and student assessments. The same phenomenon was exhibited

Table 1. Pearson product-moment correlation coefficient between the teacher and students assessments of textual comments for the experiment group

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	3.22	.6582	.667**
	students	32	3.32	.4270	
Second round	expert	32	3.61	.6132	.689**
	students	32	3.91	.4133	
Third round	expert	32	3.72	.5324	.735**
	students	32	3.79	.4254	

**p<.01

Table 2. Pearson product-moment correlation coefficient between the teacher and students assessments of textual comments for the control group 1

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	3.16	0.6112	.784**
	students	32	3.02	0.6566	
Second round	expert	32	3.73	0.5614	.947**
	students	32	3.52	0.8594	
Third round	expert	32	3.74	0.5533	.954**
	students	32	3.76	0.6679	

**p<.01

Table 3. Pearson product-moment correlation coefficient between the teacher and students assessments of textual comments for the control group 2

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	2.99	.7331	.653**
	students	32	3.14	.4533	
Second round	expert	32	3.23	.4839	.565**
	students	32	3.52	.4255	
Third round	expert	32	3.24	.6033	.833**
	students	32	3.38	.6063	

**p<.01

between assessments made by the expert and the students in control group 1, which indicates consistency between expert and student assessments of textual comments, as shown in **Table 2**.

In contrast, the analysis of assessments made by the expert and the students in control group 2 presented Pearson product-moment correlation coefficients equaling 0.653**, 0.565**, and 0.833** in the first, second, and third rounds, respectively. Although all three coefficients indicate positive and significant correlation, the correlation coefficient in the second round is somewhat lower, while that in the third round is higher. This means that the ratings given by students in control group 2 are unstable, as shown in **Table 3**.

Table 4. Pearson product-moment correlation coefficients of the assessments in the three rounds for the experiment group

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	56.14	11.3465	.689**
	students		63.76	13.2781	
Second round	expert	32	68.56	7.6758	.712**
	students		74.23	10.4362	
Third round	expert	32	78.98	7.6892	.724**
	students		82.98	10.3026	

**p<.01

Table 5. Pearson product-moment correlation coefficients of the assessments in the three rounds for the control group 1

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	56.35	14.9321	.539**
	students		60.89	10.4256	
Second round	expert	32	68.86	9.4433	.879**
	students		70.39	8.4532	
Third round	expert	32	77.04	6.1256	.877**
	students		78.02	6.6488	

**p<.01

Learning effectiveness analysis

(1) Validity analysis of student and expert assessments

As can be seen in **Table 4**, the Pearson product-moment correlation coefficients of the assessments made by the expert and the students in the experiment group in the three rounds were 0.689**, 0.712**, and 0.724**, respectively. This means that significant and positive correlations exist in all three rounds and that the expert and student assessments are relatively consistent. Starting from the second round, the students were grouped based on the proposed mechanism for the peer assessment activities. The increase in the correlation coefficient shows that the expert and student assessments became increasingly consistent. Similarly, the results in **Table 5** show consistency between the assessments made by the expert and the students in control group 1. The correlation coefficients show moderate to high degrees of correlation.

However for control group 2, **Table 6** shows that while a positive and significant correlation exists between expert and student assessments in the first round, the correlation coefficient began to decrease in the second round, indicating a declining degree of consistency between expert and student assessments. In the third round, no significant correlation existed. In talks with the students afterwards, they revealed that assessing the same works repeatedly was boring. In the beginning, they wanted to point out weaknesses and give concrete suggestions, but some students whose works were being assessed did not take the suggestions to heart or make any serious improvement. No longer wanting to review the works in earnest, the students making the assessments therefore gave grades and opinions at random. This

Table 6. Pearson product-moment correlation coefficients of the assessments in the three rounds for the control group 2

Assessment	*Commentator*	*N*	*Mean*	*SD*	*r*
First round	expert	32	57.69	10.9453	.618**
	students		79.28	11.5984	
Second round	expert	32	61.87	8.5031	.239
	students		80.45	10.1879	
Third round	expert	32	70.67	2.8930	.096
	students		83.43	10.8896	

**p<.01

Table 7. Paired samples t-test results of learning effectiveness increased in all three groups during the three rounds

Group	*N*	*Assessment*	*Mean*
Experiment group	32	First round	65.66
		Second round	74.22
		Third round	82.96
Control group 1	32	First round	60.24
		Second round	70.88
		Third round	78.07
Control group 2	32	First round	79.64
		Second round	80.78
		Third round	82.22

group of students remained in the same groups during all three rounds, so they were assessing the same works in each round. Repetition and monotony made the students lose patience, which gradually reduced the validity of their assessments.

(2) Differences in learning effectiveness within experiment group and control groups

A paired-samples t-test was used to determine whether the learning effectiveness of the students in the experiment group and the control groups increased significantly. The results in **Table 7** show that learning effectiveness increased in all three groups during the three rounds. Nevertheless, the students in the experiment group and control group 1 displayed significantly greater progress than those in control group 2, which means that applying the proposed mechanism to peer assessment activities results in much greater learning effectiveness and motivation in students.

(3) Differences in learning effectiveness among experiment group and control groups

Using a one-way ANOVA to perform a post-hoc analysis on the learning effectiveness of the students in the experiment group and control groups revealed significant differences in the first round. As the students in all three groups were randomly divided into groups during the first round, this shows that the three groups had different starting points. We therefore eliminated the grades of the first round, using it as a covariate for the three groups. With the

Table 8. The regression coefficient homogeneity test summary table for the second round

Source	*SS*	*df*	*MS*	*F*	*p*
Covariate	2786.346	1	922.886	16.546	.000
Between groups	83.876	2	43.024	.757	.396

Table 9. The regression coefficient homogeneity test summary table for the third round

Source	*SS*	*df*	*MS*	*F*	*p*	*posteriori comparison*
Covariate	1676.458	1	1676.458	24.898	.000	Experiment group > Control group 2
Between groups	536.435	2	259.546	3.842	.026	

three groups as independent samples, we performed a one-way ANCOVA. **Table 8** displays the results of a regression coefficient homogeneity test for the second round. The F statistic equals 0.757 and $p = 0.396 > 0.05$, which means that the results did not reach the statistical level of significance and indicates that while the slopes of the regression lines of the three groups are identical, the students in the experiment group presented significantly greater learning effectiveness than those in control group 2 during the third round (**Table 9**).

DISCUSSION AND CONCLUSION

In networked peer assessment activities, students must have adequate assessment professionalism in order to provide their peers with meaningful feedback. It is therefore necessary to teach students how to give meaningful and constructive comments before peer assessment activities so as to enhance review quality, improve student performance, and increase their willingness to learn. Based on the empirical analysis of the teaching experiment results in this study, we arrived at three conclusions as follows.

Expert and student assessments of works display a certain degree of consistency

With or without an appropriate level recommendation mechanism, the assessments made by students in the three rounds of the peer assessment activity presented moderate to high correlation with the assessments made by experts. This indicates a certain degree of consistency between expert and student assessments.

The degree of consistency between expert and student assessments gradually declined

The results of this study show that using an appropriate level recommendation mechanism resulted in significant correlation between expert and student assessments in every round. During the first round, the assessments made by experts and students in control group 2 displayed moderate correlation. However, the degree of correlation gradually declined starting from the second round. We speculate that this is because the students in control group 2 reviewed the same works in every round, and sometimes suggestions were not adopted. This bored and displeased the students making assessments, causing them to

make comments at random and reducing the coefficient of correlation between expert and student assessments.

The proposed mechanism can enhance the learning effectiveness of students

Strengthening the personal assessment professionalism of students during peer assessment activities through training gives them the ability to review works, identify weaknesses, and give constructive suggestions, which provides the students whose works are being assessed with meaningful feedback with which to revise and perfect their work. This is consistent with the views of Van Zundert et al. (2010); they believe that training assessment capabilities can effectively enhance the peer assessment skills of students, which in turn improves their personal academic achievements and even generates greater motivation to learn.

Suggestion

Although the results of this study indicate that networked peer assessment activities aided by an appropriate level recommendation mechanism can make the assessment capabilities of students highly consistent with those of experts, teachers cannot leave the task of assessment to students entirely. Full participation is still required of teachers as well as their assistance and timely guidance to students. This study only investigated a junior high school practical course on information technology. It is suggested that teachers employ the approach used in this study to other subjects. We believe that not only will an appropriate level recommendation mechanism enhance the assessment professionalism of students, but the peer assessment learning experience will also greatly benefit students in the future.

REFERENCES

Blain, S. (2001). Study of Verbal Peer Feedback on the Improvement of the Quality of Writing and the Transfer of Knowledge in Francophone Students in Grade 4 Living in a Minority Situation in Canada. *Language Culture and Curriculum*, *14*, 156-170.

Bostock, S. (2000). Student peer assessment. *Learning Technology*.

Boud, D. J., Cohen, R., & Sampson, J. (2001). *Peer Learning in Higher Education: Learning from & with Each Other*. London: Kogan Page, 2001.

Cho, K., & MacArthur, C. (2010). Student Revision with Peer and Expert Reviewing. *Learning and Instruction, 20*, 328-338.

Hull, G. A. (1984). The Editing Process in Writing: A Performance Study of Experts and Novices. *The Annual Meeting of the American Educational Research Association*, New Orleans

Lu, J., & Law, N. (2012). Online Peer Assessment: Effects of Cognitive and Affective Feedback. *Instructional Science*, *40*, 257-275.

Liang, J. C., & Tsai, C. C. (2010). Learning Through Science Writing via Online Peer Assessment in a College Biology Course. *The Internet and Higher Education*, *13*, 242-247.

Lin, S. S. J., Liu, E. Z. F., & Yuan, S. M. (2001). Web-based Peer Assessment: Feedback for Students with Various Thinking-styles. *Journal of Computer Assisted Learning*, *17*, 420–432.

Lin, S. S. J., Liu, E. Z. F., & Yuan, S. M. (2002). Student attitudes toward networked peer assessment: Case studies of undergraduate students and senior high school students. *International Journal of Instructional Media, 29*(2), 241-254.

Liu, E. Z. F., Lin, S. S. J., & Yuan, S. M. (2002). Alternatives to instructor assessment: A case study of comparing self and peer assessment with instructor assessment under networked innovative assessment procedures. *International Journal of Instructional Media, 29*(4), 1-10.

Li, L., Liu, X., & Zhou, Y. (2012). Give and Take: A Re‐analysis of Assessor and Assessee's roles in Technology‐facilitated Peer Assessment. *British Journal of Educational Technology*, *43*, 376-384.

Mintzes, J. J., Wandersee, J. H., & Novak, J. D. (2005). *Assessing Science Understanding: A Human Constructivist View*. Elsevier Academic Press.

Ng, E. M. (2016). Fostering pre-service teachers' self-regulated learning through self-and peer assessment of wiki projects. *Computers & Education, 98*, 180-191.

Paulin, D. & Haythornthwaite, C. (2016). Crowdsourcing the curriculum: Redefining e-learning practices through peer-generated approaches. *The Information Society, 32*(2), 130-142.

Ploegh, K., Tillema, H. H., & Segers, M. SR. (2009). In Search of Quality Criteria in Peer Assessment Practices. *Studies in Educational Evaluation, 35*, 102-109.

Rahimi, M., & Hassani, M. (2012). Attitude towards EFL textbooks as a predictor of attitude towards learning English as a foreign language. *Procedia-Social and Behavioral Sciences, 31*, 66-72.

Smith, M. (2012). Can Online Peer Review Assignments Replace Essays in Third Year University Courses? And If So, What Are the Challenges? *Electronic Journal of e-Learning, 10*, 147-158.

Sutherland-Smith, W. (2002). Weaving the Literacy Web: Changes in Reading from Page to Screen. *The Reading Teacher, 55*, 662-669.

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.

Sung, Y. T., Chang, K. E., Chang, T. H., & Yu, W. C. (2010). How Many Heads are Better than One? The Reliability and Validity of Teenagers' Self-and Peer Assessments. *Journal of Adolescence, 33*, 135-145.

Topping, K. (1998). Peer Assessment between Students in Colleges and Universities. *Review of Educational Research*, *68*, 249-276.

Topping, K. J., & Ehly, S. E. (2001). Peer.-assisted Learning. *Journal of Educational and Psychological Consultation*, *12*, 113-132.

Tseng, S. C., & Tsai, C. C. (2007). On-line Peer Assessment and The Role of The Peer Feedback: A Study of High School Computer Course. *Computers & Education, 49*, 1161-1174.

Tsai, C. C., Lin, S. S. J., & Yuan, S. M. (2002). Developing Science Activities through a Networked Peer Assessment System. *Computer & Education, 38*, 242-252.

Van Zundert, M. J., Sluijsmans, D. MA., Könings, K. D., & van Merrienboer, J. JG. (2012). The Differential Effects of Task Complexity on Domain-specific and Peer Assessment Skills. *Educational Psychology*, *32*, 127-145.

Wen, M. L., & Tsai, C. C. (2006). University Students' Perceptions of and Attitudes toward (online) Peer Assessment. *Higher Education*, *51*, 27-44.

Yang, Y. F., & Tsai, C. C. (2010). Conceptions of and Approaches to Learning through Online Peer Assessment. *Learning and Instruction, 20*, 72-83.

Yang, M., Badger, R., & Yu, Z. (2006). A Comparative Study of Peer and Teacher Feedback in a Chinese EFL Writing Class. *Journal of Second Language Writing, 15*, 179-200.

Yen, J., & Hsiao, Y. C. (2011). Using peer review in the instruction of computer graphics. *Bulletin of Japanese Society for the Science of Design (JSSD)*, *58*(4), 49-58.