

## Why Web-based Peer Assessment is Needed?

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As student-centered learning grows, formative peer assessment practices have been universally used in various fields. According to the review of traditional peer assessment practices, the formative peer assessment has five common stages: planning, assessing (giving feedback), receiving feedback, reflection, and revising. As the each stage of traditional formative peer assessment has some weaknesses, the study discusses solutions that are recommended for dealing with the problems by introducing the potential benefits of web-based peer assessment. Then, desirable future trends of web-based peer assessment are suggested. The author hopes that understanding the potential benefits of web-based formative peer assessment will promote the proper use of peer assessment and render positive effect on student learning.

*Keywords : web-based peer assessment , formative peer assessment*

### Introduction

There is an increasing effort to develop appropriate assessment toward more student-centered learning, which requires students to be more responsible for their own learning process and to be regarded as active participants in instructional activities. In student-centered learning environment, assessment has no longer purely the function of crediting students with recognized certificates, but is above all valuable for the monitoring of students' progress and to support them in improving their learning activities (Sluijsmans, Brand-Gruwel, vanMerriënboer, & Bastiens, 2003). Given this emphasis, interest has

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grown in formative purpose peer assessment.

Peer assessment can be defined differently by its purpose. To determine the success or failure only after the event, peer assessment can be used as a summative assessment. Peer assessment can also be used as a formative assessment to improve learning while it is happening in order to maximize success. Thus, formative assessment seems likely to be most helpful if it provides rich and detailed qualitative feedback information about strengths and weaknesses, not merely a quantitative mark or grade (Topping, Smith, Swanson, & Elliot, 2000). Due to the characteristics, formative peer assessment has been used as a learning tool rather than an assessment tool (Arter, 1996; Boud, 1990, 1995; Dochy & McDowell, 1997).

While there is a lot of literature on the general ideas of formative peer assessment (Keig, 2000; Orsmond, Merry, & Reiling, 2002; Topping et al., 2000), there is no investigation about the process model of formative peer assessment. In addition, although various topics of how to apply web-based learning environment for the pedagogical issues have emerged and developed, little attention has been paid to web-based formative peer assessment. Therefore, this study examines why web-based formative peer assessment is needed through the investigation of ordinary (traditional) formative peer assessment.

This study is organized into four sections. First, the first section provides a broad definition of formative peer assessment and common stages of formative peer assessment. Next, the second section presents issues, problems, and controversies that are related to formative peer assessment. Then, the third section discusses solutions that are recommended for dealing with the problems stated in the preceding section by introducing current web-based peer assessment systems. In the fourth section, desirable future trends of web-based peer assessment are suggested. Finally, the study is concluded in the last part.

## **Background**

One of the topics in the peer assessment that has been paid much attention is formative peer assessment. As much attention on formative peer assessment is dramatically increasing, many studies focus on strategies and techniques used in developing formative peer assessment practices. Nevertheless, formative peer assessment has not been thoroughly examined. Lack of understanding of formative peer assessment can cause obstacles to the practices trying to use peer assessment as a learning tool. Therefore, this section provides common stages of formative peer assessment and differentiates formative peer assessment

from summative peer assessment.

### Common Stages of Formative Peer Assessment

There is no explicitly identified model expressing a common process of peer assessment as learning tool because every individual study has its own uniqueness in terms of assessment task, task level, product, and subject area. However, most of peer assessment literature agree that peer assessment follows the following stages when it is used as a learning tool to improve students' learning (Kim & Ryu, 2004).

#### ***Preparation/Planning***

At the beginning stage, formative purpose peer assessment encourages students to consider the objectives and purposes of the assessment task as well as the course itself (Boud, 1995; Topping et al., 2000). During the process of planning, assessors set their assessment goal based on the identified objectives and purpose of the assessment. Then, they organize their ideas and set procedural and substantive goals.

One of the important things in the planning stage is preparing and understanding assessment criteria. Assessment criteria are very important because they are tools to clarify tacit knowledge to others (Rust, Price, & O'Donovan, 2003) and a way to improve the quality of peer feedback. In addition, they let students be aware of their achievement and ability to understand assessment feedback (Bloxham & West, 2004). In these days, some researches are reporting the use of student derived marking criteria and its effectiveness in peer assessment (Orsmond, Merry, & Reiling, 2000; Orsmond et al., 2002). As students derived criteria helps students to be involved more actively in learning, it is a good trial to use peer assessment as an effective formative assessment tool.

#### ***Conducting (assessing peer's work)***

When students conduct actual peer assessment, it enables students to view and critique peer's work, techniques, ideas and abilities. Conducting peer assessment encourages students to learn from both the mistakes and exemplary performances of their peers. In addition, students may also improve their own skills in critiquing or evaluating their own work (self-assessment) as a results of the experience of peer assessment (Towler & Broadfoot, 1992). They may acquire new strategies or knowledge for task performance or fine-tune existing strategies or knowledge. This concept is on the same line with the idea of

'learning by design' in that students use actively their prior knowledge to assess a peer's work and they construct new knowledge structure based on the peer assessment experience.

### ***Receiving peer feedback***

After conducting assessment, students usually receive peer's feedback. Peer feedback is peer-monitored data that can be a time-efficient and resource-efficient procedure used to collect data more frequently (Topping & Ehly, 1998). In spite of the characteristic, peer feedback has some limitations in terms of its validity and reliability. One of the most common issues on peer feedback is the quality of peer feedback. A lot of peer assessment studies have dealt with the validity or reliability issues of peer feedback by comparing peer feedback with instructor feedback (Falchikov, 1995; Lin, Liu, & Yuan, 2001; Orsmond et al., 2000). Most of these studies are considering peer assessment as an alternative assessment tool rather than a learning tool. In other words, the studies are focusing more on peer-marked scores or grades in order to use it instead of instructor-marked scores and grades than how or what students learn through peer assessment. For this reason, they consider the reliability and validity of peer assessment as the most important factors.

The quality of peer feedback is still important when peer assessment is used as a learning tool. However, peer assessment as a learning tool emphasizes the role of feedback as a scaffolding tool, not as an assessment itself. Therefore, formative purpose peer assessment often uses qualitative feedback rather than scores or grades. Even though it uses scores or grades, it tries to give formative information for students' learning - what is weakness/what should be improved – rather than simple scores or grades.

### ***Reviewing***

After finishing an assessment task, peer assessment encourages students (Assessors) to reflect on their own approaches to assessment task (Dochy, Segers, & Sluijsmans, 1999). At the same time, peer assessment enables students (Assessee) to appreciate why and how marks are awarded (Brindley & Scoffield, 1998). The reviewing stage emphasizes on self-assessment through reflection. Many studies have been reporting that peer assessment is highly associated with self-assessment (Blom & Poole, 2004; Dochy et al., 1999; Lejk & Wyvill, 2001).

The reviewing stage is the key feature that differentiates between peer assessment as an assessment tool and peer assessment as a learning tool. It means peer assessment is not a

linear learning process but a number of iterative learning processes based on the feedback system. Specifically, students set goals for the assessment or their own learning and identify strategies or tactics help them achieve the goals. Then, they monitor their own progress toward those goals, and adjust their strategies or even their goals based on feedback.

**Revising**

If peer assessment is completed directly following the reviewing stage without additional action, we can not know what is improved and what still weak point is. Formative peer assessment emphasizes the adjustment of learning strategies or goals based on feedback. Such an iterative characteristic is a key feature of peer assessment as a learning tool.

The following picture (Figure 1) shows the common stages of peer assessment and the sequence of the process. As the Figure 1 shows, peer assessment as a tool has iterative process. Unlike summative peer assessment, formative peer assessment starts from the planning stage but receiving feedback is not the final stage. Learners (both Assessors and Assesseees) are supposed to reflect their own learning and assessment processes. Then, they have another chance to revise their original task or even goals based on internal and external feedback. These processes of formative peer assessment as a learning tool are very similar to a self-regulated learning process.

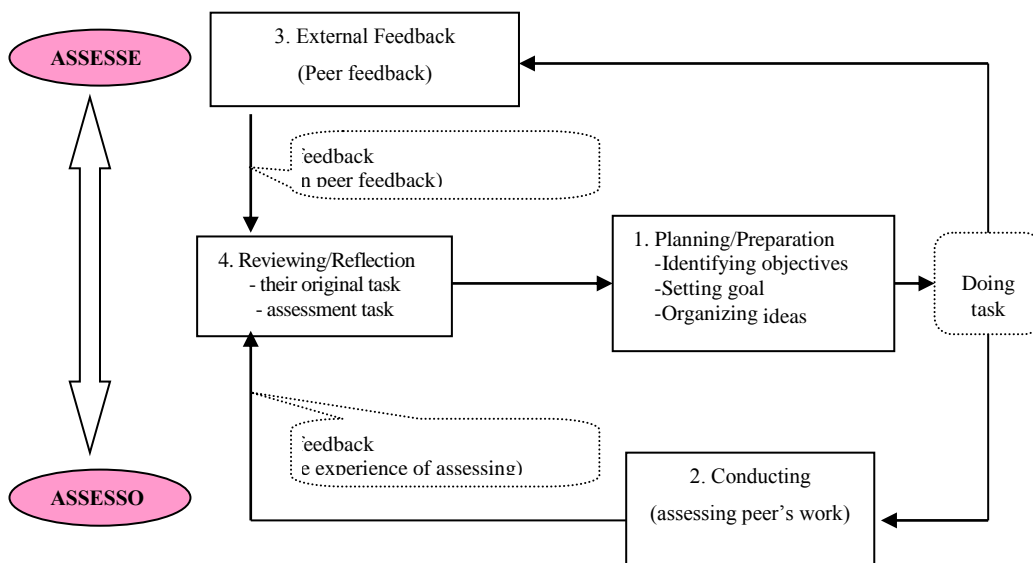


Figure 1. General Process Model of Peer Assessment as a Learning Tool  
Formative vs. Summative

Peer assessment as a learning tool is usually used for formative purpose rather than summative grading or scoring. Therefore, it prefers open or qualitative feedback to simply quantified score. However, as too general feedback is not very helpful for students, well-developed criteria are often used for structured formative feedback generation. Another difference between peer assessment as a learning tool and peer assessment as an assessment tool is in assessment process. Peer assessment as a learning tool is starting from planning stage and has conducting stage, receiving feedback stage, reflection stage, and revising stage iteratively. On the contrary, peer assessment as an assessment tool is usually finished at receiving feedback. These characteristics of formative peer assessment and summative peer assessment are summarized in Table 1.

Table 1. Different Type of Peer Assessment

	Summative Peer Assessment	Formative Peer Assessment
Purpose	Assessment tool	Learning tool
Commonly Expressed type	Score, grade	Open feedback, score or grade with specific criteria
Stage	1. Planning	Instructor's role
	2. Conducting	Grade-oriented assessment
	3. Receiving	Final stage
	4. Reflection	X
	5. Revising	X
Structure	Linear	Iterative

### Issues and Concerns

This section raised several issues and concerns regarding current formative peer assessment and discuss. First, it diagnoses the weakness of current formative peer assessment on the basis of the common stages of formative peer assessment. Then, it identifies general weakness of formative peer assessment by reviewing literatures. The purpose of this section is to provide a better understanding of the weakness of current

formative peer assessment and the necessity of solutions by web-based technologies.

### Weaknesses of Each Stage of Formative Peer Assessment

#### ***Lack of Supporting for Assessment Planning***

Although current model of peer assessment recognize the importance of planning stage, so far not much efforts were devoted to this stage. At the planning stage, students are supposed to identify the objectives and purposes of the assessment task as well as the course itself to set their own goal. As assessors set their assessment goal based on the identified objectives and purpose of the assessment, identifying objectives and purposes of the assessment and course is very important. However, identifying objectives and purpose of the assessment and course is not always easy to every student. Some students may be able to do independently, but some students might need some support for the identification.

Therefore, the major drawback of the planning stage is that current planning stage rarely provides students with support to identify the objectives and purpose of the assessment. In other words, while many studies and practices suggest some key activities such as goal setting and organizing information for the planning stage, real practices using specific guidelines or tools are very rare.

#### ***Lack of Training for Conducting Assessment***

According to Sluijsmans and his colleagues' study (2001), one of the assumptions for implementation of peer assessment is that conducting peer assessment is a complex skill which involves more than giving scores to peers. Before they are put into the role of assessor, students must understand which skills are involved in judging of themselves or peers. Students need explicit training in assessment techniques to make reliable and acceptance assessment reports (Boud, 1990; Hanrahan & Isaacs, 2001). During the assessment training, three main skills are emphasized that students have to acquire: 1) defining assessment criteria; 2) giving feedback; and 3) writing a qualitative assessment report (Sluijsmans et al., 2003).

A variety of studies are reporting that training is necessary to conduct reliable and acceptable assessment (Sluijsmans, Brand-Gruwel, & vanMerriënboer, 2002; Sluijsmans et al., 2003). Nevertheless, not many current studies and practices provide students with training before conducting to actual peer assessment. It is the major drawback in conducting stage in current formative peer assessment.

### ***Receiving Low Quality Peer Feedback***

It is not necessary to mention that doing/conducting peer assessment can be a good learning tool or learning activity for assessors in terms of cognitive and metacognitive gains. However, the reliability or quality of peer assessment is a still big issue (Cho & Schunn, 2003; Falchikov & Goldfinch, 2000; Topping, 1998; Topping et al., 2000). Although formative peer assessment is likely to less focus on the precision of peer feedback than summative assessment, the quality of peer feedback is still important because feedback serves the role of scaffolding in formative peer assessment.

Low quality peer feedback causes a few problematic issues. The major problem is that low quality peer feedback may not serve as the role of scaffolding. In addition, the low quality peer assessment can cause assesseees (being assessed person)' negative attitude towards peer assessment and peers. A lot of studies have been reporting these issues (McDowell, 1995; Orsmond, Merry, & Reiling, 1996). Sometimes instructors try to compensate the low quality of peer assessment by re-marking, but it raises another issue of instructors' extra workload.

### ***Lack of Supporting for Reflection***

Formative peer assessment can be a reflection tool for both assessors and assesseees. Especially in reviewing stage, student has to employ reflection skills to recognize strengths and weaknesses of their own learning and peer feedback. Therefore, reflection skills are a prerequisite for conducting reliable peer assessment (Sluijsmans et al., 2003). Though reflection skill is a prerequisite for peer assessment, every student does not always have enough reflection skill. Nevertheless, little effort was devoted to enhancing students' reflection skill in the practices and studies of current formative peer assessment.

In addition, while some studies have been focusing on 'reflection on action,' which refers to thinking about an activity before and after, rare studies have been focusing on 'reflection in action,' which refers to the thinking that occurs during the activity. Reflection should be utilized at most of stages of peer assessment to be used as an effective learning tool.

## **General Weaknesses of Formative Peer Assessment**

While all above weaknesses are based on the common stages of formative peer



assessment, the following weaknesses are based on the general characteristics of current formative peer assessment.

***Not Sufficient Formative Aspects***

The purpose of formative peer assessment is to diagnose the weaknesses and strengths of a student's learning and to provide helpful information for improvement. For the improvement, revision and reimplementation are needed. Thus, formative peer assessment is starting from planning stage and has conducting stage, receiving feedback stage, reflection stage, and revising stage iteratively. However, most of current practices and studies do not show the iterative characteristics of formative peer assessment, although they recognize the importance of the revision and reimplementation. In other words, most of practices and studies of peer assessment have been finished as a one-time practice without any revision and reimplementation. This is a big drawback of current formative peer assessment.

***Time-Consuming for Instructors & Students***

Formative peer assessment in large classes is by default problematic since it creates unbearable administrative burden on the instructor coordinating the peer assessment process. For the reason, time-consuming issue is very common in actual peer assessment practice. Time-consuming issue is a complaint not only by instructors but also by students. Students also generally admit the benefit of formative peer assessment as a learning tool, but they express negative attitude toward peer assessment activities in that peer assessment requires much more efforts and time than other learning activities (Ballantyne, Hughies, & Mylonas, 2002; Blom & Poole, 2004; Tsai, Lin, & Yhan, 2002). It is also a drawback that should be solved in implementation of peer assessment.

***Cognitive and Emotional Challenge for Students***

Falchicov (1995) and Mowl & Plain (1995) reported that the majority of their students found assessing peer's work is difficult. Topping and his colleagues (2000) found the same thing that students rated the cognitive challenge and strain of peer assessment as one of its least like features. The challenge that students experience during peer assessment is not only about cognitive things. Emotional challenge is another big issue. Many studies have been reporting that students often feel their lack of confidence in their own abilities as

assessors (Ballantyne et al., 2002). Furthermore, students usually feel uncomfortable in getting negative peer feedback.

Learner-centered learning environment does not mean that learner should be responsible for everything for their learning. It means that learners should be supported to be responsible for their own learning. They can do their best when they can be supported properly in terms of cognitive and emotional. Therefore, proper support to reduce students' cognitive and emotional challenge is required.

### ***Lack of Peer Interaction***

In many case, peer assessment has been used in collaboration learning situation. For the reason, people are likely to think peer assessment has strong aspects of peer interaction. However, if we look into thoroughly the process of peer assessment, we can find that it is difficult to find peer interaction aspects in peer assessment. For instance, many examples of peer assessment activities show that there is no more interaction among peers after the result of peer assessment were delivered to the original author (assessee). Simple giving and receiving feedback is not likely to be considered as a strong peer interaction because it does not include any kind of discourse and discussion leading shared cognition. Thus, current formative peer assessment practices and studies have been missing peer interaction aspects of peer assessment.

## **Solutions Based on Current Web-Based Peer Assessment Systems**

Computer technology is a cultural tool that students can use to mediate and internalize their learning. Recent research suggests changing the learning contexts with technology is a powerful learning activity (Crawford, 1996). Supporting teaching, learning and assessment by some kind of web-based technology is now commonplace. Nonetheless, not much attention has been paid to using web-based learning technology for formative peer assessment. In this section, the author tries to provide the solutions for some problems discussed above through the investigation of the benefits of current web-based peer assessment.

### **On-time Information & Monitoring students' records**

Web technology can provide prompt and critical information for a specific task and period. In addition, it can provide perfect monitoring data by storing student records at each stage and retrieving the stored data whenever we request. The student records are very useful to monitor students' learning progress. Even web-based technology can catch what human instructors are likely to miss in monitoring student progress. Monitoring is meaningful in that instructors can determine how well assessors or assessees perform. Monitoring also lets instructors have completed understanding what should be supported to improve the student. In addition, web-based system can give accumulated records showing students' long-term progress. It is also very useful aspect of web-based peer assessment.

### Peer Feedback Quality Assurance Systems

Some of web-based peer assessment practice tries to increase peer feedback quality by using various web-based technologies. For example, SWORD system (Scaffolded Writing and Rewriting in the Discipline), developed Cho and Schunn (2003) supports inaccurate peer feedback by comparing individual students' ratings with the other students' ratings on a same set of writings. The assessment scores are separately computed in each of the three assessment dimensions (flow, logic, insight), producing nine accuracy measures (refer to Figure 2). Finally, the nine numbers are used to weight each student's accuracy of ratings.

Another trial to increase peer feedback quality is using rubric technique. In a rubric, there is a clear list of assessment criteria that the course intends to measure and a numerical score associated with each criterion (Born, 2003). Providing rubric including assessment criteria is also common technique in traditional peer assessment setting to increase the quality of peer feedback. However, web-based learning environment can use the rubric technique more effectively than traditional environment because it can present the rubric to students on time.

Task	Type	Flow	Logic	Insight	Total
Writings	Scores	2.78	3.26	3.25	9.29
Reviews	Systemic Difference(SysDif) <small>MORE →</small>	0.81	0.70	0.78	2.29
	Consistency(CS) <small>MORE →</small>	0.66	0.59	0.73	1.98
	Sensitivity(SS) <small>MORE →</small>	0.69	0.71	0.61	2.01
Back Eval	Scores	0.00	1.00	0.00	1.00

Figure 2. An Example of Accurate Measuring Peer Feedback: from SWoRD (Cho & Schunn, 2003)  
Supporting for Reflection in action

Formative peer assessment process may be is considered as a self-regulated learning process. Students select goals to pursue and they work on a variety of tasks such as assessing peer’s work, giving feedback, receiving feedback, and revising their work on the basis of peer feedback. During the process, reflection and self-monitoring are the key factors for the self-regulated learning process.

However, in many practices of peer assessment, reflection is emphasized only after finishing the assessment task. Reflection should be emphasized during peer assessment as well as after peer assessment to maximize the characteristics of self-regulated learning of formative peer assessment. In traditional learning environment, it is not easy for an instructor to give every student reflection opportunity at every moment, but it is possible in web-based learning environment by using prompt peer feedback instead of delayed instructor feedback. In addition, web-based peer feedback provides more reflection opportunities by articulating peer feedback process and type. For example, SWoRD system provides feedback on feedback opportunity to support students’ reflection (see Figure 3).

Read your review on the version 1. Cognitive Psychology: Attention		
Dimension	Your Comments	Reviewee's Feedback
Flow	Good (4) This paper focused on the interferences with attention, such as ironic process. The transitions are natural and the paper flows well. Nothing really grabs the reader so maybe a more creative approach would heighten the interest of the reader.	Very helpful I added more examples to try and grab the reader's attention and also outside sources. I tried to tie everything together and apply the attention concepts to the real world.
Logic	Good (4) Supporting arguments were made but more examples would have helped. No counter-arguments were examined. A lot of information is speculated because psychologists have conflicting theories. Different view points would be beneficial to the reader's understanding of attention.	Very helpful I added more examples this time. I tried to add different viewpoints but in some cases I thought it may confuse the reader. Thank You
Insight	Good (4) More outside information would be interesting. I would like more insight of the author and how further studies on attention would help.	Helpful I did add more outside information this time and how further studies on attention would help. It seemed to make the paper flow better and also it made it more interesting. Thank you.

Figure 3. An example of review and back-review: from SWoRD (Cho & Schunn, 2003)

### Reusable Systems for Iterative Process

Formative peer assessment is starting from planning stage and has conducting stage,

receiving feedback stage, reflection stage, and revising stage iteratively. Through the iterative process, learning can be improved. Although general agreement on the beneficial aspects of formative peer assessment is set, most of current peer assessment practices do not reflect the beneficial aspects formative peer assessment. One of the reasons is formative peer assessment requires a lot of efforts, time and resources for preparation and actual conducting.

In traditional peer assessment setting, if an instructor wants to implement iterative peer assessment process in his class, he has to spend continuously his time and efforts in preparation and administration for the peer assessment. However, web-based environment may help instructors save their efforts and resources for peer assessment by providing proceduralized system for the iterative process. Designing and developing web-based system are expensive at initial stage, but it could be more economic in the long run due to the characteristic of reusability.

### Saving Time and Efforts

According to review of literature on peer assessment, one of the most common complaints is about time-consuming issue. However, it can be easily solved by implementing technology helping instructor and student cut down their efforts and time on

Types of assignment	<input checked="" type="radio"/> Group assignment, with the students setting the criteria <input type="radio"/> Group assignment, with the teacher setting the criteria <input type="radio"/> Individual assignment, with the teacher setting the criteria
Types of scoring	<input type="radio"/> Six-point scale <input checked="" type="radio"/> Percentage <input type="radio"/> Observing (no scoring)
Assessment activities and procedures	<input type="checkbox"/> Proposing personal criteria <input checked="" type="checkbox"/> Proposing group criteria <input checked="" type="checkbox"/> Discussion required <input checked="" type="checkbox"/> Self-evaluating the work from one's own group <input checked="" type="checkbox"/> Peer-evaluating <input checked="" type="checkbox"/> Viewing the evaluating results of within-group members <input type="checkbox"/> Discussion required <input checked="" type="checkbox"/> Viewing the evaluating results of inter-group members <input checked="" type="checkbox"/> Discussion required <input type="checkbox"/> Inter-group discussion
Random grouping	Number of groups: <input type="text" value="5"/> <input type="button" value="OK"/>
Display nicknames	<input type="checkbox"/>
URL address for downloading works (by system)	<input type="text" value="http://203.71.150.57"/>
<input type="button" value="Save"/> <input type="button" value="Exit"/>	

Figure 4. Class Parameter Setup Interface: from Web-SPA (Sung, Chang, Chiou, & Hou, 2005)

peer assessment. Instructors can decrease their time for administration such as assigning peers, guiding procedure, correcting and distributing resources (see an example, Figure 4 ). Students can also diminish their time for looking resources, submitting, and delivering their feedback by using various web-based technologies.

### Increasing Student Motivation

Web-based peer assessment can be a good motivator to students by providing new learning environment. New media and learning systems can attract students' attention and maintain their interest by inducing in-depth involvement. Through the involvement, students can have relatively high motivation and confidence level. Thus, students may have more positive attitude toward peer assessment in web-based environment.

### Increasing Peer Interaction

Peer interaction is the most prominent aspect that web-based peer assessment outperforms ordinary (traditional) peer assessment. So far, peer interaction in peer assessment has not been focused because people do not think assessment is negotiable. However, when peer assessment is used as a learning tool, peer interaction can be an important factor facilitating students learning.

In web-based learning environment, peer interaction can be happen synchronously or asynchronously. Synchronous peer interaction can provide immediate feedback and get rapid response while asynchronous peer interaction can provide a little bit delayed but in-depth feedback based on reflection. There are a few examples that are actively using asynchronous peer interaction in web-based peer assessment (see, Figure 5).

The problems of traditional peer assessment and their solution by web-based peer assessment can be summarized in Table 2. Although most of problems of traditional peer assessment seem to be supported by web-based peer assessment systems, a few problems are still remaining. Specifically, current web-based peer assessment systems do not have any kind of supporting systems to help students plan their own learning through peer assessment, while almost web-based peer assessment systems have some supporting systems to help teachers plan peer assessment procedure. In addition, current web-based peer assessment systems do not have any evidence supporting lack of training for peer assessment, and cognitive & emotional challenge that students face during peer assessment.

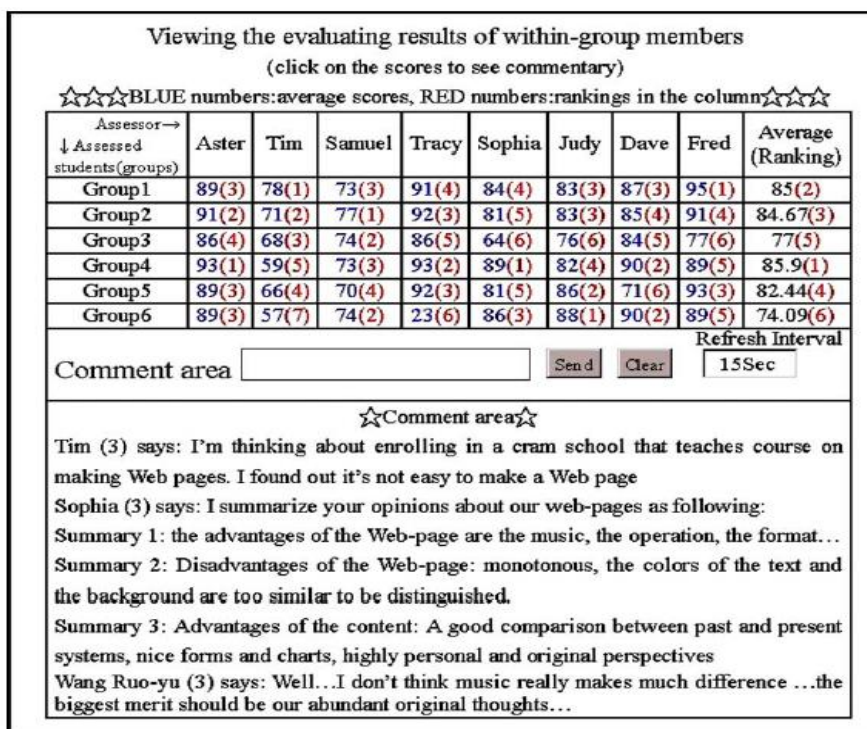


Figure 5. Sample of the Evaluation Results and Discussion: from Web-SPA (Sung et al., 2005)

Table 2. The problems and solutions of formative peer assessment

Problems in traditional peer assessment	Solutions by current web-based peer assessment
• Lack of supporting for assessment planning	•
• Lack of training for conducting assessment	•
• Receiving low quality peer feedback	• Using peer feedback quality assurance systems
• Lack of supporting for reflection	• Supporting reflection in action
• Not sufficient formative aspects	• Monitoring by students' records • Using reusable systems for iterative process
• Time-consuming	• Using technology for administrative works
• Cognitive & emotional challenge	•
• Lack of peer interaction	• Providing various peer interaction systems

## **Suggestions for Future Trends**

Assessment is changing, mainly because today's organizations require workers who possess not only knowledge but also abilities to think critically and solve problem quickly. According to the previous section, web-based peer assessment has a variety of potential benefits as a learning tool that is likely to enhance critical thinking and problem solving skills. For the potential benefits, there are some issues to be considered in implementation of web-based formative peer assessment. In the rest of this section, the desirable future trends of web-based peer assessment and its implementation issues will be discussed.

### **Trend 1: Perspective Change on Peer Assessment**

Perspectives on web-based peer assessment have been gradually changing. An emerging trend of web-based peer assessment is a trial to use web-based peer assessment as a learning tool by focusing on formative learning process. In this case, student assessors are supposed to give feedbacks for their peer's learning improvement and student assesseees are expected to improve their own learning based on the peer feedbacks. For the successful implementation of this formative peer assessment idea, a few things should be complemented. As we saw in previous section, current web-based peer assessment systems have missed some important points, such as lack of supporting planning stage, no training session for peer assessors, and no consideration for cognitive & emotional challenge that students face during peer assessment.

### **Trend 2: Changed Instructor's Role**

As learner-centered learning is emphasized in web-based peer assessment, changed instructor's role has been expected. In traditional peer assessment, instructor controls every administrative thing, but, in web-based peer assessment, most of tedious administrative works are managed by systems. Therefore, the expected role to instructor is not about administrative work, but about facilitation of students' learning through monitoring and scaffolding. No doubt when peer assessment is used as a learning tool, instructor's commitment and involvement as a facilitator is a key for successful web-based peer assessment. However, so fare there is no example showing instructor's facilitation role in



web-based peer assessment. It might be explained by lack of formative characteristics of current web-based peer assessment. Hence, it is recommended that more attention be paid to instructor's facilitation role.

### Trend 3: Toward Various Contexts

Most common task of formative peer assessment is writing because the writing process (writing-review-revising) is very similar to the process of formative peer assessment. This tendency is the same in web-based peer assessment. However, new practices and studies are expected to be increased in various fields to utilize the beneficial aspects of web-based peer assessment. For the implication of web-based peer assessment in various fields, systematic consideration for the nature of web-based peer assessment and learning context of a specific field should precede development of web-based peer assessment systems.

### Trend 4: A Variety of Assessment Technique

Web-based peer assessment has spread in various fields. However, assessment techniques of web-based peer assessment are not well developed. For example, grading, scoring and giving simple feedback on peer's product are still most frequently used in web-based peer assessment. These types of assessment techniques do not reflect formative characteristics of peer assessment. For the reason, new assessment techniques (such as electronic portfolio technique) to monitor the growth of a student's knowledge, process skills, logical thinking, reflection skill, and attitudes are recommended to maximize the benefits of formative peer assessment.

### Trend 5: Focus on Peer Interaction

Final suggestion for the future web-based peer assessment is the emphasis on peer interaction. In web-based learning environment, peer interaction is important to improve learners' participation, reflection, and learning. During the peer interaction, students are expected to develop negotiation skills, critical skills, and reflection skills. For the reason, many systems have been designed and developed to support peer interaction in web-based peer assessment (Cho & Schunn, 2003; Sung et al., 2005; Trahasch, 2004). But, providing

system itself does not make any meaningful result. For successful use of peer interaction system, appropriate facilitation and systemic supports should be accompanied.

## Conclusion

The issue of formative peer assessment in web-based learning environment is relatively new and has not been discussed widely. As the area of learning technology grows rapidly, many people in educational fields have spent a lot of their time on choosing and implementing new technology. Most frequently happening mistake is a speedy adaptation of new technology in accordance with trends without thoughtful consideration of learning context. Thus, when we consider the implementation of web-based formative peer assessment, we should decide what we want and why it needs to be done based on students' learning needs in advance.

Two peer assessment types were explored in this study – traditional and web-based peer assessment – in an attempt to provide educators with ideas and suggestions to help them in implementing peer assessment as a learning tool. Note that it is not suggested that web-based formative peer assessment is the best than any other or there is a best way to implement web-based peer assessment in learning and teaching. On the contrary, the author encourages the consideration the potential benefits of web-based peer assessment as a learning tool to ensure all desired learning objectives are achieved.

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