Assessor or assessee? Investigating the differential effects of online peer assessment roles in the development of students' problem-solving skills

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ABSTRACT

The purpose of this study is to examine the relative effects of two online peer assessment roles (assessor and assessee) on students' performances in problem-solving. The participants included 70 students enrolled in the Special Teaching Methods II course, offered during the 2013–2014 spring semester. Participants engaged in a number of learning activities in an online learning environment during the six-week intervention process. Results indicated that both assessors and assessees improved their problem-solving skills. Additionally, assessors, compared to assessees performed better on justifying their problem-solving with sound reasoning.

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1. Introduction

Peer assessment is defined as an assessment process in which students make judgments to each other about the quality of their work performances (Topping, 2009). Studies have revealed that peer feedback and assessment allow students to gain different ideas, perspectives and strategies (Hattie & Timperley, 2007; Mory, 2004; Shute, 2008), increase motivation (Hanrahan & Isaacs, 2001; van den Boom, Paas, & van Merriënboer, 2007) and to help develop metacognitive awareness (Falchikov, 2003). Also, it is underlined that peer assessment has an emphasis on cooperation, social interaction and learning process, and contributes to the transformation of the learning environment in which the teacher is solely responsible for assessment, and it also supports the formation of a participative learning culture (Kollar & Fischer, 2010; Wasson & Vold, 2011). The implementation of online peer assessment is particularly recommended, as peer assessment activities can be a useful instructional strategy in facilitating learners' participation in the learning process, particularly with online environments where the element of face-to-face communication is missing. In fact, thanks to peer assessment, it has been found that students' participation and the cohesiveness between them increased during online discussion activities (Xie, 2013). The effectiveness of implementing peer assessment in online environments has been supported by other studies as well (i.e., Cheng & Hou, 2013; Lu & Law, 2012; Tseng & Tsai, 2007; van der Pol, van der Berg, Admiraal, & Simons, 2008; Yang & Tsai, 2010). Also in the present study, peer assessment has been performed in an online environment.

Although many studies have focused on the effectiveness of peer feedback as pedagogical methods in face-to-face or online environments, it is noteworthy that there has been insufficient study as to whether or not providing or receiving feedback contributes to students' learning. There is some research evidence indicating that assessing the work of peers and providing feedback to them is more beneficial than the receiving of feedback from peers (Cho & Cho, 2011; Cho & MacArthur, 2010; Li, Liu, & Steckelberg, 2010). On the other hand, as some researchers have put forth, peer assessment, which can be characterized as a form of collaborative learning, can result in learning effects for both the givers and receivers of feedback (Li, Liu, & Zhou, 2012; Nicol, 2010; van der Pol et al., 2008). Additionally, in many peer assessment models, students perform both the roles of assessor and assessee, therefore it cannot be determined which role will be more effective in learning. As we have seen, studies have provided contradictory findings as to whether providing feedback or receiving feedback is more effective and it has revealed the need for more research related to the subject. For this purpose, this study is an experiment designed to examine the effects of students' role of feedback receiver or provider on their problem-solving skills during online peer assessment.

In the following sections, the relative effects of providing and receiving feedback on learning are revealed, followed by the results of studies examining students' views related to the subject. Later on, the use of peer assessment in problem-solving processes and its potential on the development of problem-solving skills are described. Finally, the methods and results of the study are

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presented; examining the relative effects of providing and receiving feedback in an online environment on the development of students' problem-solving skills.

1.1. Assessor or assessee?

Some researchers argue that the peer assessment process should be defined as a two-way communication process between assessors and assessees, not a one-sided transfer process (Brinko, 1993; Kollar & Fischer, 2010; Liu & Tsai, 2008; Nicol, 2010). According to Brinko (1993), during this [peer assessment] dialog process, the roles of those providing and receiving feedback are different from each other. To give an example, the person providing feedback performs the cognitive activities such as reviewing, explaining, providing feedback, debugging, and revealing the missing information. The person receiving the feedback is expected to review the feedback, make comparison with their own performance, to decide if the feedback should be acted upon and if necessary, to explain their reasoning. During such an interaction, it can be said that students use both cognitive and metacognitive skills, and that both the providing and receiving of feedback are valuable. On the other hand, it seems important to research what kind of learning benefits are provided for both groups (assessee and assessor) in the peer assessment process and as to whether or not providing or receiving feedback is effective in enhancing their performance. Consequently, these study results may guide how the peer assessment process, which is ever increasing in the online environment, will be designed. Also, if one role (either assessee or assessor) results in more meaningful learning outcomes over the other, its reasons may be determined and the learning processes, from which students will gain knowledge and develop skills, can be designed accordingly to aid their success in this role.

The need for new studies related to the relative effects of providing and receiving feedback has also been highlighted by other researchers (Li et al., 2010, 2012; Topping, 2010; van Zundert, Sluijsmans, & van Merriënboer, 2010). In response to this need, it is noteworthy that some recent studies have been undertaken on this subject. To illustrate, Li et al. (2010) found that there was a positive correlation between the quality of providing feedback and the performance of an individual, but that there was no correlation between performance and the receiving of feedback. So, it has been determined that the providing of feedback led to performance gains, but the receiving feedback had none. Similarly, Cho and Cho (2011) demonstrated that the providing of feedback increased the writing performance of students more than for the receiving of feedback. However, in these two studies, the peer assessment process was based on the mutual providing and receiving of feedback by students. Therefore, the effect of providing feedback has not been examined independently other than receiving feedback. But Cho and MacArthur (2010) found that providing feedback had an independently positive impact on the written paper compared to receiving feedback as a result of a controlled study. In the study, researchers divided students into three groups; reviewing, reading, and control. Students in the reviewing group evaluated and commented on the quality of work that had been previously written by their friend's on a similar course. Students in the reading group only read the work previously written, while students in the control group read from irrelevant material. Then, the students were asked to write about a different, but relevant topic. As a result of the study, it was determined that the students in the reviewing group produced a higher quality paper than students from the other two groups.

Positive impacts of being an assessor on the learning process were connected with the following reasons by researchers. First, while students are evaluating their friends' (peer) work according to certain criteria (usually determined by the teacher), both their assessment skills develop, and they can get the chance to see and correct deficiencies in their own work (Cho & Cho, 2011; Cho & MacArthur, 2010; Nicol, Thomson, & Breslin, 2014). Second, they find an opportunity to self-assess their own work by comparing their peers' work with their own, which may result in them gaining a different point of view (Nicol et al., 2014; Snowball & Mostert, 2013). Third, students providing feedback work under problem-solving processes such as analyzing, problem representation, solution development, solution justification, and evaluating solutions, and these high-level mental processes can help to deepen their understanding about the subject and to thus create more high-quality works (Cho & Cho, 2011; Cho & MacArthur, 2010; Nicol et al., 2014; Snowball & Mostert, 2013). Besides, Nicol et al. (2014) stated that providing feedback had the potential to help students gain many skills not taught as part of the curriculum, but would be needed by students later on in their professional lives. These skills are "the ability to engage with and take ownership of evaluation criteria, to make informed judgments about the quality of the work of others, to formulate and articulate these judgments in written form and, fundamentally, the ability to evaluate and improve one's own work based on these processes" (p. 120).

Students' views as to whether providing feedback or receiving feedback is more beneficial for learning have supported the results obtained from experimental studies. For example, according to research by Foley (2013), students thought the peer feedback process to be more beneficial for those providing the feedback, because they stated that they had gained sufficient knowledge about assessment criteria while providing their feedback, and that they could apply it to their own studies. According to Snowball and Mostert's study (2013), it has been demonstrated that students found peer assessment effective in terms of learning, but the greater majority indicated that providing feedback had been more beneficial than receiving feedback. Similarly, in the study conducted by Mulder, Pearce, and Baik (2014) where the students' views were examined before and after the peer assessment process, the students, who did not expect that providing feedback would aid their learning at the beginning, had stated that learning had actually occurred when they provided feedback at the end of the process. Nicol et al. (2014) found that students had been aware that receiving feedback and providing feedback included different learning processes and benefits. Students stated that receiving feedback had been beneficial so in order that they could see errors and omissions in their studies and that they had gained a perspective on how their writings had been received. They also stated that providing feedback had been beneficial because they engaged with processes such as problem-solving and critical thinking, and that these processes had improved their learning. However, the students said that they entered a reflective period when they were reviewing their friends' studies, that they compared their own work with their friends' work, and also that they in turn used the feedback which they provided in order to update their own work – in a sense, a sort of internal feedback. They emphasized that this reflective process provided more control in learning during the feedback process, and by this control, the need for receiving feedback from their friends or teachers could decrease.

Consequently, in general, through emphasizing the benefits of peer assessment in the studies, it is noteworthy that strong positive effects of providing feedback on learning and performance come to the fore. However, the effect of providing feedback on performance has not been examined independently of the effect of receiving feedback in any study, except for Cho and MacArthur (2010). In addition, there are no studies examining the relative effectiveness of providing and receiving feedback in achieving an important skill such as problem-solving. In the next section, the use of peer assessment in problem-solving, and its potential in improving problem-solving skills is described.