



The effect of peer assessment on problem solving skills of prospective teachers supported by online learning activities



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ABSTRACT

This study examined the effect of peer assessment on prospective teachers' performances in complex problem solving. This study also investigated how feedback functions, agreement with peer feedback, and feedback direction affected the use of feedback. The participants included 68 prospective teachers enrolled in the Teaching Methods-2 course during 2012–2013 spring semester and 14 prospective teachers pursuing MA studies on Computer Education and Instructional Technology. The data included prospective teachers' case solutions and MA students' feedback reports. The results indicated that groups in both feedback and non-feedback conditions improved on developing solutions for the problems. Additionally, the results showed that while feedback function and feedback direction predicted the use of feedback, prospective teachers' agreement with feedback was not related to the feedback use. Suggestions were made for further research in line with the findings.

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Introduction

The role of feedback in pedagogy has been associated with numerous positive outcomes of learning including correcting misconceptions, reconstructing knowledge, supporting metacognitive processes, improving academic achievement, gaining self-efficacy, and enhancing motivation (Clark & Dwyer, 1998; Driscoll, 2000; Foote, 1999; Ge & Land, 2003; Wang & Wu, 2008; Warden, 2000). Peer assessment, which is a critical concept in feedback research and the participatory culture of learning (Kollar & Fischer, 2010), can empower users to take control of their own learning and, in the process, transform the educational process (McConnell, 2002; Wasson & Vold, 2011). Noonan and Duncan (2005) also maintain that the focus of instruction within peer feedback environments is not only on the end product(s) but also on the process, and it highlights the value of collaboration and social interaction. A part of the existing literature underlines the improvements in prescribing the feedback methods (Hattie & Timperley, 2007; Shute, 2008) though, there are still many aspects to be explored related to the effect of feedback on learning (Mory,

2004; Shute, 2008). The current study sets out to determine the effect of peer assessment on prospective teachers' performance in an online case-based environment focusing on solving ill-structured problems. Additionally this study also investigates how feedback functions, agreement with peer feedback, and feedback direction affected the use of feedback.

Critical notions in peer assessment research

Despite numerous advantages of peer assessment mentioned within the pedagogical discourse, studies have reported that its success (*the extent to which students utilize feedback to improve their work and ultimately their learning*) is conditioned to a number of interrelated factors including; (a) the type of feedback, (b) the source of feedback, and (c) students' perceptions of the usefulness and importance of feedback (Dochy, Segers, & Sluijsmans, 1999; Hanrahan & Isaacs, 2001; Narciss, 2008; Shute, 2008; Topping, 2005; van Gennip, Segars, & Tillema, 2009; van Zundert, Sluijsmans, & van Merriënboer, 2010).

The type of feedback

Two common issues that have been discussed about the type of feedback include: (a) the content of feedback and (b) the direction of feedback. In terms of the content of feedback, an extensive body of research has reported that feedback that contains elaborated and specific comments have better quality and more positive learning

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effects than simple and general comments (Bitchener, Young, & Cameron, 2005; Cho & MacArthur, 2010; Gielen, Peeters, Dochy, Ongheena, & Struyven, 2010; Hattie & Timperley, 2007; Kim, 2005; Kluger & DeNisi, 1996; Mory, 2004; Narciss, 2008; Shute, 2008; Tseng & Tsai, 2007). Nelson and Schunn (2009) propose that good feedback should include a summary of what the assessee has done, specific comments relating with the problems identified and the solutions to those problems, and clear and concise explanations supporting the feedback. Dominguez, Cruz, Maia, and Pedrosa (2012) noted that feedback that lacked these features was mostly neglected by students. Some researchers further described specific functions of feedback according to its content. Based on Flower, Hayes, Carey, Schriver, and Stratman (1986) model of the functions of feedback in review process, van den Berg, Admiraal, and Pilot (2006) identified four functions of feedback on writing including analysis, evaluation, explanation, and revision, which were also utilized in the current study to examine the effects of each function on the use of feedback. Analysis refers to understanding of what the text is about, evaluation indicates judgment about the quality of the text, explanation specifies any argument supporting the evaluation, and revision contains explicit suggestions for the improvement of the text. In a later study, van der Pol, van der Berg, Admiraal, and Simons (2008) found out that analytical and evaluative feedback comments were positively related to the use of feedback only if they were more task-oriented and asked objective questions for elaboration. The researchers also illustrated that the more feedback contained concrete suggestions for revision the more receivers made corresponding changes in their writings. This finding is similar to those reported by both Kim (2005) and Tuzi (2004). Furthermore, Li, Steckelberg, and Srinivasan (2008) showed that students demanded for more constructive feedback that included concrete suggestions, supported with sound reasons, for how to improve their work. In a recent study, Lu and Law (2012) also reported that feedback including problem identification and suggestions improved assessee's performance.

As indicated earlier, the second issue concerning the type of feedback is the polarity of feedback (positive versus negative feedback). Some researchers argued that positive feedback is beneficial only if it incorporates task-related information rather than just affective comments (Cho & Cho, 2011; Hattie & Timperley, 2007), while others reported that positive affective feedback helped enhance the motivation, performance, and confidence of assessee (Lu & Law, 2012; Tseng & Tsai, 2007). Hattie and Timperley (2007) further argue that the learning effects of positive and negative feedback vary depending on the level of students' task commitment. Students who have high task commitment are more likely to learn from positive feedback for self-confirmation, while students having low task commitment are more likely to learn from negative feedback as a motivating factor to improve themselves. Hattie and Timperley (2007) state that, "when we are committed to a goal, we are more likely to learn as a function of positive feedback, but when we undertake a task that we are not committed to (and hence have to do), we are more likely to learn as a function of negative feedback (we need to be driven, in the older motivation terminology)" (p. 99).

Based on the aforementioned research results, we assume feedback that incorporates concrete suggestions for revision and elaborative explanations pointing to the sources of the problems or errors associated with student responses will more likely to lead to the use of feedback than general and unsupported feedback. Additionally, we expect that while positive feedback can boost students' motivation, the learning effects of positive-negative feedback will vary depending on students' level of task commitment.

The source of feedback

Topping (2009) defines peer assessment as "...an arrangement for learners to consider and specify the level, value, or quality of a

product or performance of other equal-status learners". She goes on explaining that "Equal-status can be interpreted exactly or with flexibility; in the latter case, a peer can be anyone within a few years of schooling" (p. 21). In a similar vein, Harris and Brown (2013) stated that "this [peer assessment] was a student-led assessment process; whether a student assessed his/her fellow student's work or a more experienced student assessed another student whom he/she does not know well". In this study, we utilized feedback from more experienced students to eliminate or at least minimize some of the pitfalls of peer assessment indicated in the literature. One of the main concerns about peer assessment is students' negative perceptions relating with the fairness and reliability of assessment provided by a peer. Studies have identified that students were doubtful about and even criticized the quality and objectivity of feedback that they received from peers (Dochy et al., 1999; Li et al., 2008; Orsmond, Merry, & Reiling, 1996; Wen & Tsai, 2006). In fact, a number of studies have revealed that subjective biases (i.e., friendship-marking and free-riding) occurred due to social relations among peers (Carvalho, 2012; Maiden & Perry, 2011; Sluijsman, Moerkerke, van Merriënboer, & Dochy, 2001; Vu & Dall'Alba, 2007). Nelson and Schunn (2009) further showed that students were less likely to use feedback if they did not trust their peers' competencies. Researchers also propose that students, who are involved in peer assessment, often do not perform well in providing constructive and elaborated feedback unless they have high level of subject matter knowledge and experience in peer assessment (Lu & Law, 2012; Sluijsman et al., 2001; Topping, Smith, Swanson, & Elliot, 2000; van Zundert, Sluijsmans, Könings, & van Merriënboer, 2012). Another important challenge related to peer assessment is students' unwillingness to criticize the work of their peers. Studies have reported that students often are reluctant to assess fellow students' work and perceive themselves to be unqualified for peer assessment (Kaufman & Schunn, 2011; Liu & Carless, 2006; Papinczak, Young, Groves, & Haynes, 2007; Sluijsman et al., 2001).

By utilizing feedback from more experienced students whom the participants of the current study do not know well, we expected that the assessors' high level of subject matter knowledge and experiences in teaching would increase prospective teachers' trust to their peers' competencies in peer assessment while maintaining the objectivity of feedback.

The usefulness and importance of feedback

Students' perceptions of the usefulness and importance of peer feedback influence the extent to which they utilize feedback for revision. Van der Pol et al.'s (2008) study revealed that the more students perceived the feedback as important, the more they agreed with it and in turn showed a higher level of use of the feedback. However, perceived usefulness of the feedback did not relate to use of the feedback for revision, and the researchers suggested that qualitative analyses should be conducted to improve our understanding of the reasons underlying students' ratings of feedback usefulness or importance and how these ratings were related to decisions regarding subsequent revisions. Some scholars argue that if students do not agree with the assessor's ideas, they will be unwilling to make any changes based on feedback (Cho & MacArthur, 2010; Topping, 2010). Similarly, Hattie and Timperley (2007) state that "students who wish to confirm positive self-belief rather than focus on learning goals are more likely to adopt or seek feedback that maximizes positive self-evaluations and/or minimizes negative self-evaluations" (p. 103). Accordingly, feedback can be largely ignored when individuals have too much confidence in the correctness of their responses (Hattie & Timperley, 2007).

Research has demonstrated that students' perceptions of feedback usefulness and importance are closely related to the

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