



The validity and students' experiences of peer assessment in a large introductory class of gene technology



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ABSTRACT

Although studies have examined the validity of peer assessment, research including students' own experiences of peer assessment is scarce. The present study aims to improve assessment practices in a context with a highly traditional assessment culture. The aim is first to examine the validity of peer assessment by analysing the compatibility of student and teacher evaluation and explore the differences between minor and major students' evaluations. Second, the study examines students' experiences of peer assessment. Peer assessment was implemented in a large bioscience course with 79 student participants. After the peer assessment, the students provided feedback. The results indicate that student subject understanding can be supported through a proper assessment practice. Peer assessment was successful in an introductory class with minor and major students, and most students experienced it as supportive of their learning.

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Introduction

In recent decades, globalization, the rapid development of communications technology and growth in knowledge has challenged higher education. Nowadays, higher education is expected to produce generic skills, such as interaction skills, information literacy reading skills, and problem-solving skills (Tynjälä, Slotte, Nieminen, Lonka, & Olkinuora, 2006). The ability to evaluate one's own skills and knowledge has also become increasingly important as requirements in working life are constantly changing. Therefore, recent research has emphasised the role of assessment in serving purposes of lifelong development (Sluijsman & Prins, 2006; Davey & Palmer, 2012). Assessing student learning involves practices that mainly serve the purpose of ranking, as well as those that in essence serve to support student learning: namely, summative and formative assessment (Brown, Bull, & Pendlebury, 1997; Bryan & Clegg, 2006; Yorke, 2003; Nicol & Macfarlane-Dick, 2006). Research has long suggested that assessment culture must change from assessment of learning towards assessment for learning, in other

words, assessment should serve as a tool to monitor learning and to provide feedback for modifying learning as well as teaching (Black, Harrison, Lee, Marshall, & William, 2004; Boud & Falchikov, 2006; Stiggins, 2002).

In higher education, some have identified peer assessment as one optional assessment strategy for developing desired skills and capabilities by encouraging students to focus on constructing of knowledge and deep understanding (Somervell, 1993; Struyven, Dochy & Janssen, 2005; Lindblom-Ylänne, Pihlajamäki, & Kotkas, 2006; Davey, 2011; Davey & Palmer, 2012). Studies have shown that understanding the assessment process and criteria also helps students to evaluate their own learning (Nicol & Macfarlane-Dick, 2006). Thus, peer assessment aims to integrate learning and assessment by promoting the active engagement of learners in the assessment process, yielding better learning outcomes. In recent decades, peer assessment has been carried out in various contexts in order to promote student involvement in assessment with fruitful results (Smyth, 2004; Gouli, 2008; Welsh, 2007; Davey, 2011; McGarr & Clifford, 2013).

Despite the extensive literature on peer assessment, it is by no means self-evident that peer assessment is widely adopted into higher education teaching practices (Postareff, Virtanen, Katajavuori, & Lindblom-Ylänne, 2012; Halinen, Ruohoniemi, Katajavuori, & Virtanen, 2013). Studies by Postareff et al. (2012) and Halinen et al. (2013) suggest that assessment practices at the university level are

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still quite teacher-led: the teaching and learning culture in the academic environment as well as the lack of pedagogical training create barriers to changing the tradition of teacher-led assessment. Some have stated that the culture of teacher-led assessment influences students' engagement in peer learning: students with no experiences of peer assessment find it more difficult, and have more negative experiences of it, and require more support to adopt it (McGarr & Clifford, 2013).

One concern about the teacher-led practices also arises from recent research indicating that inappropriate assessment practices can have unwanted effects on students' study processes and achievement (Asikainen, Parpala, Virtanen, & Lindblom-Ylänne, 2013). The results implied that due to the inappropriate nature of the assessment, students applying a surface approach succeeded very well in the exam even though their qualitative self-evaluations indicated poor learning outcomes. The study presented evidence of the backwash effect of assessment, revealing how assessment practices guide student learning by having an impact on student study strategies. Teachers in the field of science are often experts in their own field of study but novices concerning pedagogical thinking (Lueddeke, 2003). The need for pedagogical training in the field of biosciences has been acknowledged (e.g., Asikainen et al., 2013; Halinen et al., 2013). However, for example in Finnish universities, pedagogical training is not a requirement for university lecturers. Thus, a lot of teachers do not participate in those courses. Alternative ways to support students' learning and change the teacher-led practices have to be developed, especially in contexts with a highly traditional assessment culture. In our study, peer assessment was implemented into a traditional lecture course with final exam by giving a minor pedagogical support for the teacher.

One reason for the lack of peer assessment practices at universities is also that peer assessment raises doubts about reliability, standards, and equity (Hinett, 1999). Reliability refers to how consistently a measurement yields similar results under varying conditions (Brown et al., 1997). Researchers have noted that peer assessment involves students in the identification of criteria and using these criteria to make judgements (Nulty, 2011). However, even criteria-based assessment has its challenges in the full complexity of multi-criterion and qualitative judgments that challenge reliability (Sadler, 2009). As Lindblom-Ylänne et al. (2006) noted, the technical aspects were graded more reliably than the content in the peer assessment of essays. A study exploring the quality criteria in peer assessment practices suggests that many of the generic quality criteria serve in peer assessment, but in an embedded way in the assessment settings (Ploegh, Tillema, & Segers, 2009).

The *validity* of assessment refers to whether an assessment meets its own intended objectives and whether the grades correspond to the quality, breadth and depth of students' academic achievement (Sadler, 2009). A meta-analysis conducted by Falchikov and Goldfinch (2000) comparing peer and teacher marks in assessment practices showed high validity in well-designed experiments with well-understood criteria. However, some studies have shown that students assign lower marks to their peers than the teacher does (Elliot & Higgins, 2005); in contrast, other results have revealed that students assign higher marks than the teacher does for descriptive questions, but mark numeric questions equally (Davey, 2011). One reason for the difference in teachers and students marks could be that students participating in lecture courses are not necessarily a homogenous group concerning their subject knowledge and competence. For example, many minor students participate in courses. A previous study has shown that the performance of minor students can be weaker than major students (Hailikari & Nevgi, 2010). Studies concerning the difference in minor and major students' competence in peer assessment have been scarce.

Previous research has shown that students have positive views of peer assessment and generally value the experience of understanding the assessment process (Ballantyne, Hughes & Mylonas 2002; Prins, Slujsmans, Kirchner, & Strijbos, 2005; Davey & Palmer, 2012; McGarr & Clifford, 2013). However, studies have shown that the validity of peer assessment does not necessarily reveal anything about the quality of students' learning outcomes (Segers & Dochy, 2001). Thus, when studying how well peer assessment works, one should also take into account students' own experiences of it. Nevertheless, qualitative research on students' evaluations of peer assessment is scarce (McGarr & Clifford, 2013).

This study originated from the need of academics to support deep-level learning in the study of genetics. It has been shown that in the context of biosciences, the assessment culture is still highly traditional and concentrates on measuring factual knowledge (e.g., Halinen et al., 2013). A previous study has also suggested that neither the teachers nor the students always considered assessment in biosciences to be valid or reliable (Räsänen et al., 2012) and that grades do not always reflect students' learning outcomes (Räsänen et al., 2012; Asikainen et al., 2013). Furthermore, the academic staff recognised two main challenges in the teaching-learning environment: the students do not receive enough feedback on their learning, especially during their bachelor studies, and many teachers of bachelor studies are over loaded with large classes and a heavy workload. Research has shown that peer assessment is an important component of a lecturer's limited resources for providing feedback in a large class (O'Moore & Baldock, 2007; Ballantyne et al., 2002), and student involvement in assessment should also lead to better learning outcomes and a deeper understanding of the subject (Bryan & Clegg, 2006). Thus, with peer assessment, we wanted to support student learning by involving students as active participants in the assessment process. Peer assessment would offer students a learning situation closely tied to an examination, and that would serve as a tool for providing and receiving feedback.

The present study aims first to examine the validity of peer assessment by analysing the compatibility of students' and teacher's evaluations. Second, the study also aims to explore the differences in minor and major students' evaluations. Third, the study examines students' own experiences of peer assessment. Accordingly, in this study we tested our hypothesis that the students' grading would in most cases resemble the grading done by the teacher resulting in a high level of reliability between peer and teacher marking despite the students' heterogeneity in relation to their prior knowledge or motivation. Research questions are as follows:

- (1) How similar are the students' and the teacher's evaluations?
- (2) How similar are minor and major students' peer evaluations?
- (3) How do the students experience the peer assessment?

Methodology

The study context

The gene technology course is a three credit lecture course (1 ECTS equals 27 h of work) which is offered by the genetics major at the Faculty of Biological and Environmental Sciences at the University of Helsinki. The course is obligatory for students majoring in genetics or for any university student studying a minor degree in genetics. During the seven-week course, the lecturer in genetics gives a two-hour lecture twice a week. The lectures took place in a large lecture hall where the teacher presented the subject matter to the students. About 80 students participate in the course

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