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More Blessed to Give Than Receive – A Study of Peer-assessment of Experimental Design

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Abstract

Involving students in the process of classroom assessment through self- and peer-assessment is sometimes motivated by benefits gained from students' metacognitive reflections on criteria in relation to current work. However, prior research on higher education has noticed discrepancies between student and teacher assessment as well as students displaying inabilities to use suggestions for improvement. One prior explanation has been that there are differences among students concerning what is valued as 'good quality'. In this study we investigate how students make meaning of peer-assessment in two Swedish lower secondary schools working with laboratory design. The rationale of the study is to explore the function of peer-assessment in science education, and for that purpose, this work takes an emic perspectives on student-to-student interaction as they collaboratively negotiate how to use received peer-feedback. The empirical basis for the study is an intervention into science classroom practice in collaboration with their science teachers. Data was collected from student written work and audio- and video-taped discussions. Data were analysed with the theoretical framework of Communities of Practice. Type of feedback offered by students differed from 'personal suggestions' on what they preferred to eat and do, to sources of errors effect on the validity of a student's research. One main finding was that the majority of the students used the feedback provided by themselves to other students in their own amendment. Also, students' group discussion seemed to be an important resource for how the students addressed the peer-feedback.

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Keywords: peer-assesment; laboratory work

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1. Introduction and research question

There is a growing rhetoric to involve students in the process of classroom assessment through self- and peer-assessment. This is sometimes motivated by benefits gained from students' metacognitive reflections on criteria in relation to current work (Black, 1998). However, in relation to science education, the empirical research is rather scarce. What prior research has concluded, e.g. in relation to university education, is that there are discrepancies between student and teacher assessment (Poon, McNaught, Lam, & Kwan, 2009; Tal, 2005). Other studies point to tendencies that students do not make use of neither teacher nor peer provided feedback received for improving their work (Jönsson, 2013; Tsai, Lin, & Yuan, 2002). The fact that students seldom use the feedback they receive despite expressing appreciation for receiving it, has been explained as a consequence of the feedback not having offered clear advice to the students on how to improve the work (Brown & Glover, 2006; Gamlem & Smith, 2013). There are however examples of students being unwilling to use advice and suggestions from peers even when such were offered (Tsivitanidou, Zacharia, & Hovardas, 2011). There are indications that this is an effect of disagreement among students concerning what is valued as 'good quality' and that addressing the received suggestions would not lead to improvement of the work (ibid.). Van Zundert, Sluijsmans and Van Merriënboer (2010) argue in a review of research in peer-assessment that there is a need for research specifically zooming in on the differences between giving and receiving feedback. Jönson (2013) furthermore argues that there is a need for research to shift from a transmission model of feed-back towards a more dialogical model on how students use peer-feedback.

The aim of this study is to explore peer-assessment in science education as communicative practice. This study takes an emic perspective on student-to-student interaction by focusing on how the students collaboratively negotiate how to use peer-feedback that they have received. With an emic approach we mean that we are looking at what emerges as valued participation in the interaction between the participants, rather than validating the students comments with an ideal interpretation of stipulated standards and criteria (Tatli & Özbilgin, 2012; Zhu & Bargiela-Chiappini, 2013). In the empirical study we have focused particularly on peer-assessment as part of students' learning to critically examine scientific processes. The research questions are: 1) What peer-feedback do the student provide to peers regarding experimental design? 2) What peer-feedback do the students use in their following amendment of their experimental design?

2. Methodology

The empirical basis for the study is an intervention into science classroom practice in collaboration with two science teachers in two Swedish lower secondary schools. 58 students from one class from school year 8 (14 years old) and three classes from school year 9 (15 year old) participated in the study.

The task criteria was the same as those used in the in the national assessments of the biology subject for school year nine, provided by the Swedish National Agency for Education (2009). These criteria states that needed equipment and conduct should be described, motivated and that the students should explain how they deal with sources of error and safety risks. In the national assessment students' design are assessed by how much change is needed for the design to functional for investigating what the experiment is supposed to investigate. The students were given a task to design an experiment where two different breakfasts' effect on a physical activity was compared. In this study the design of the experiment was evaluated by another student having tried to conduct the experiment according to the instructions offered. The other student then offered suggestions for improvement to the first student. All students received the feedback and were then asked to refine their original design. To support the process the students were placed in groups where they were to discuss the received feedback and what refinements to make of their own experimental design. In all, the sequence consisted of four lessons; (1) planning, (2 & 3) comparing two breakfasts and providing feedback and finally (4) discussing feedback and amending the design.

Data were collected from student written work and audio- and video-taped discussions. Data were analysed by searching for patterns in how students articulated quality of experimental design in given feedback and what suggestions from feedback to use in the subsequent amendment. Analyses were conducted with the theoretical