

Pre-service physics teachers learn to give feedback to peers' physics laboratory reports

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Abstract. The aim of the study was to investigate the experiences of pre-service physics teachers who were introduced to and learned how to give feedback to peers' physics laboratory reports for improvement. Data sources included feedback given by the participants, weekly reflective journals and semi-structured interviews. 36 students participated in the study (in four cohorts) for one academic semester. It was found that the majority of students reported that peer-assessment and the exchange of oral and written feedback resulted in a better understanding and learning of assessment criteria related to the writing of laboratory reports.

1. Introduction

Research on classroom assessment provided evidence that peer assessment and good quality feedback can promote learning and encourage progress in student learning at secondary [1] and undergraduate level [2] as well as in teacher education [3,4]. In physics education research, there are studies which investigated the development of instruments to assess laboratory reports with secondary and university science students. The presented research study was carried out within a 13-week laboratory course designed for pre-service physics teacher education. The aim was to explore the experiences of pre-service physics teachers who were introduced to and learned how to give grades and feedback (oral and written) to peers' physics lab reports. Four cohorts of pre-service physics teachers in third- or fourth-year participated; in total, thirty-six (36) undergraduate students.

The main research question was: "How did pre-service physics teachers experience peer-assessment?" with three sub-questions:

1. What difficulties and challenges did pre-service physics teachers experience? (when giving feedback and grades to their peers' lab reports).
2. How did their experiences and concerns develop during one academic term?
3. What sort of feedback did they give?

The study employed data collection involving collection of written feedback, reflection journals and semi-structured interviews. The analysis has provided a progression of assessment criteria and a typology of written feedback ranging from simple comments to comments related to the assessment criteria.

2. Findings

The process of giving feedback in the form of written comments resulted in participants taking more responsibility for their own learning. However, they seemed to give feedback as some advice not only for improvement and better quality of the lab report but also for a higher grade.

At the beginning of the course, the majority of students (86%) seemed to believe that grading is more difficult than giving oral and written feedback in the form of comments. In an interview situation, they explained this was the case because grades are important (in the specific educational context) and it was also difficult to give a grade to their peers. During peer-assessment experience and after some weeks, they emphasized that feedback is more important than grades because it helps them understand how they should improve the report and enhance learning. All of them experienced the transition from grading (as an important skill) to learn how to give feedback focused on improvement and informed by the developed assessment criteria. They talked explicitly about how they were supported by peers and how they helped each other identify strengths, weaknesses and missing points.

It was also interesting to find out that the lower achievement pre-service teachers gave better feedback than the higher achievers. In the interviews, it was mostly them who emphasized that the process of peer-assessment helped them improve their laboratory report. Both the assessor and the assessee benefited from looking at their own work. Furthermore, they benefited from the process itself. The purpose was to internalize the quality, to develop and apply assessment criteria, to reflect on them and give feedback while looking at peers' work. They would need to look again at the criteria when they received feedback from a peer. However, a few of them who submitted lab reports of high quality could not see any reason for peer assessment.

The findings are discussed in relation to those by previous studies [5,6] and in particular, to those [7] which

showed that the greatest learning gains are secured for pupils initially classified as low attainers. A possible reason is that such pupils have previously suffered from lack of clear guidance and effective feedback. And finally, there is much room for improvement. Based on the findings, the main argument of the paper is about the role of pre-service teacher education for the development of classroom assessment skills and assessment knowledge in future physics teachers.

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