

Evaluating Calibrated Peer Review (CPR) in a First-year Science Course

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Introduction

Students rarely have the opportunity to review the work of their peers, respond to feedback by making improvements, and resubmit their work, all of which are known to be effective communication instruction strategies. The First-Year Seminar in Science (SCIE 113) at the University of British Columbia (UBC) in Vancouver, Canada, was partly designed to give students multiple opportunities to review the work of their peers.

This course is a writing intensive course that explores science as a way of knowing and applies that knowledge through writing, class activities, and discussion. The course is taught by a team of faculty from different departments in the Faculty of Science and provides an enriched educational experience to approximately 800 students per year. Each section of the course has a maximum of 25 students.

Calibrated peer review (CPR) is a web-based instructional tool that supports peer feedback on writing using customizable rubrics (<http://cpr.molsci.ucla.edu/Home.aspx>). We have been using CPR in most sections of SCIE 113 for the past four years. To use CPR, students first perform a calibration phase during which they review three sample papers of varying quality. After this calibration, each student paper is reviewed by three peers. There are strict deadlines for the anonymous reviews. Once the CPR process is complete, students can revise their essay based on the feedback they receive and then submit a final version to the instructor for assessment and additional feedback.

Originally, all sections of the course used calibrated peer review. However, recent anecdotal evidence from students and instructors, as well as evidence from the end-of-course student surveys, suggested that there was dissatisfaction with the CPR system. Students mentioned confusing deadlines, difficulties during the calibration stage, and unhelpful reviews. Faculty members also expressed frustration with the system. One course instructor ultimately decided to abandon the calibrated peer review system and instead use an in-class face-to-face peer review model, where students exchanged physical copies of their work and discussed their writing.

Therefore, we were approached by the course director to formally study the two models to determine if the perceptions of the peer-review process and the perceptions of feedback quality vary between the sections that use calibrated peer review and the ones that do not. We also looked at how these perceptions changed as more peer reviews were done as the course progressed, in an attempt to understand the root cause of these perceptions.

In this study, we sought to answer the following research questions:

- (i) What are the general perceptions of both the students and instructors about the peer review process within the sections that use CPR and the ones that do not?
- (ii) From both the student and instructor perspective, does the perceived quality of peer review feedback and writing vary between the sections that use CPR and the ones that do not?
- (iii) What classroom practices contribute to these perceptions?

This research builds and expands on insights from previous research studies from our group (Birol et al., 2014; Birol et al., 2013) that examined students' learning and the effects of increased exposure to writing within the context of this course as well as insights from research studies that examine the educational value-add of technologies-mediated peer review (Gunersel et al., 2009; Margerum et al., 2007).

Methods

We received approval from the UBC Behavioural Research Ethics Board for this research. Students opting to participate in our study completed a consent form for each data collection method used in the study. These components included student grades, classroom observations, surveys, and interviews.

(1) Student grades

Grades on peer reviewed written work were extracted from the course's learning management system.

(2) Classroom observations

We performed six classroom observations (three sessions for course sections that used CPR and three for the course section that used face-to-face peer review). The aim of the classroom observation sessions was to gather information about the type of interactions that the instructor and students engage in when discussing or doing peer review.

(3) Student surveys specifically about the peer-review process

To further examine student perceptions of their peer review experience in SCIE 113, and about peer review in general, we used two online surveys at the end of the course; one for a CPR section of the course (N=18) and one for a section that did not use CPR (N=26).

(4) Student interviews about the peer-review process

After the course had finished and the final project was submitted, we interviewed four students from a course section that uses CPR and four students from the course section that does not use CPR. The aim of these interviews was to learn about student perceptions of and experience with the peer review process and how peer review in SCIE 113 impacted their learning experience.

Results

We noted similarities between sections of the course that use CPR and sections of the course that use face-to-face peer review. For example, students in both groups recognized the value of peer review in scientific writing. They also reported being comfortable giving and receiving feedback and they felt prepared to give and receive feedback. Using a grading rubric in the peer review process helped students in both contexts understand professor expectations, but challenges using the rubric were noted in both groups.

However, we also noted differences between sections of the course that use CPR and sections of the course that use face-to-face peer review. The face-to-face group agreed (95%) more than CPR group (60%) that peer review contributed to improving their writing. Also, the face-to-face group found (53% frequently) the feedback received to be more consistent than the CPR group (30% frequently). In addition, the face-to-face group found their feedback more constructive (95%) than the CPR group (45%). The face-to-face group enjoyed the peer review process (79%) more than CPR group (40%) and they liked being able to ask clarifying questions about their feedback. When asked, the face-to-face group said they would keep in-person peer review if given the option to switch to CPR; the CPR group said they would change to in-class reviews.

Recommendations for implementation

(a) Include learning activities that teach ways of communicating science orally as well as in written forms. Currently, argumentation is assessed only through writing. Interview and classroom observation data suggest that students enjoy engaging in discussion and that this helps them clarify what it means to think like a scientist and create scientific arguments.

(b) Implement targeted classroom activities (in both the CPR and face-to-face contexts) that support students learning to give relevant, constructive, and tactful feedback. This addresses the challenges students have at the beginning of the course to formulate and deliver good feedback.

(c) Optimize and fine-tune the internal structure and components of the rubric. The current rubric mixes grammatical aspects of writing with the argumentation aspects of the writing. Students reported that they found using the rubric challenging.

(d) Optimize course operations. Students in both the CPR and face-to-face contexts reported frustrations with the amount of time they had to access, read, reflect upon, and review their peers' assignments.

(e) Continue supporting peer review in the course. Peer review activities are highly valued by the students and they constitute a corner stone in teaching students how to communicate, argue, and think like a scientist.

Future work

We are currently comparing student written work from sections of the course that use CPR and those that do not for the quality of writing, in particular the strength of arguments used. The details and results of this analysis will be the subject of a future publication.

References

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