Use of Peer Feedback to Improve Collaborative Learning in Year 5 Mathematics Students

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Introduction
During Term 3 of 2016, twenty-six ten-year-old boys from Brisbane Grammar School engaged in four collaborative peer-feedback sessions during their Mathematics classes. Boys were grouped heterogeneously with respect to mathematics ability and worked together to provide their peers with help and advice aimed at improving their scores on weekly review tasks. Our action aimed to improve student collaboration and encourage meaningful dialogue between students about their mathematical errors.

The Research Question

How might a focus on peer feedback improve collaborative learning in Mathematics for Year 5 boys?

Research Context and Participants
Brisbane Grammar School is a non-selective, independent day and boarding school catering to 1,675 boys from Years 5 to 12. The School's motto, nil sine labore, translates from Latin as "Nothing without Labour" and reflects the commitment to endeavour. The School is committed to offering a broad liberal education philosophy, encouraging boys to engage in a diverse range of cultural, intellectual, sporting, and other outdoor activities. The participants in the project were boys in one Year 5 Form Class (twenty-six students aging from ten to eleven years).

The Research Action
We implemented our action in the final four weeks of Term 3, 2016. The focus was a weekly peer feedback session during which students worked together to identify and categorise mathematical errors and assist one another to avoid similar errors in the future. Groups were formed in an intentional manner with consideration being given to mathematical ability, quality of reflective thinking, and previous knowledge of each boy's characteristics as a learner and collaborator. Boys tracked their scores each week and completed session logs in which they reflected on their collaborative experiences. To support their discussions, a set of categories for classifying student errors in Mathematics was developed. We hoped this would form the basis of a shared understanding. To support their discussions, a set of categories for classifying student errors in Mathematics was developed. We hoped this would form the basis of a shared understanding.

Data Collection and Analysis

The research focus on peer feedback mechanisms as a potential vehicle to improve collaborative learning required us to regularly capture boys' voices as our action progressed. This was achieved using a number of mechanisms:

1. An initial survey that focussed on past experiences with collaboration and peer feedback
2. Session logs that asked structured, but open questions to encourage reflection
3. Transcriptions of student interviews
4. Video footage of student collaboration during the action phase
5. A follow-up survey that contained many of the same questions as the initial survey, providing a ready point of comparison

We analysed Likert Scale data using a spreadsheet, while session logs, interviews and other video footage were transcribed into documents to be further analysed. We developed a set of categories and coded the data to identify emerging themes and supporting observations.

Key Findings and Discussion

From the analysis, four apparent themes emerged. These were:

- Improved collaboration and group cohesion
- Increased levels of feedback and use of a shared language
- Appreciation for feedback
- Improved student results

Within the collaborative groups, there was a real sense of accomplishment when peers were able celebrate each other's success. Student reflections recorded in the session logs each week revealed improved collaboration, rising levels of empathy, and the increasing value boys placed on the contributions of others.

Improved scores were evident for most students. Those who did not record improvements had already earned excellent results in the first week.

Conclusions

The intentional focus on peer feedback led to improvement in both collaborative learning and student achievement. Boys involved in this action research project enjoyed the opportunity to work collaboratively with their peers and increased levels of promotive interaction helped to ensure the peer-feedback sessions were a positive learning experience for most boys.

The pairing of intentional heterogeneous groupings with highly structured feedback routines was a success. Boys who struggle with their Mathematics regularly reflected upon how their understanding of some concepts had improved with the assistance of their peers. Although there was no clear evidence of improved scores for high achieving students, these boys reflected positively on the assistance they were able to provide others and felt that their participation had deepened their own understanding.

Data-collection during the implementation of our action was difficult at times. Student absences, incomplete reflections, and low task completion rates for some boys resulted in the collection of partial data for these students in some sessions. We enjoyed the opportunity to work closely with our boys to improve collaboration in our classroom. They showed a willingness to participate as interested stakeholders in their own learning and to discuss factors affecting collaboration with honesty and sincerity.

Key Readings