Peer Review

Does it really help students?

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Abstract

Student peer review has long been a method for increasing student engagement and work quality. We present notes on teaching tips and techniques using peer review as a means to engage students interest in the area of computer graphics and interactive animation. We address questions, such as, when feedback fails, why students should be 'trained' on feedback, and what constitutes a 'constructive' review. We present a case study around the structure and workings of a module - and its success in encouraging collaborative working, group discussions, public engagement (e.g., through wikis and events), and peer review work.

Keywords: peer review, teaching, assessment, graphics, physics, technical, format

1 Introduction

When does student peer review fail? Often peer review fails because we give our students too many things to concern themselves with [Rie06, Bos00]. Students will feel uncertain about their ability to 'teach' their peers anything about programming, writing, or mathematics - hence, the peer reviewers will give up before they have even begun. We solve this by giving students a structure (i.e., a framework or scaffolding to guide them through the process), such as, example questions and ideal outcomes to help them focus their responses. Typical paper review questions might be:

- What was the best things about the paper?
- Say one thing you would add or change to make it more clear?

Limiting the scope of the review to smaller items, makes the student think critically about the question of what they need to write.

Why use peer review? The feedback process is an essential part of learning. What is more, peer review is at the heart of most scientific methods. To list but a few of the many advantages reported in the literature on peer review, are:

- develops collaborative working [PMB09]
- motivates students [Big11]
- improves behaviour and learning [LC06]
- students are exposed to a greater diversity of perspectives [Rub06]
- students pay more attention [Fal13]
- helps provide detailed and timely feedback for large classes [Rub06]
- meaningful interaction with peers, greater exposure to ideas, and new perspectives [LB09]
- builds problem solving skills by identifying issues and providing constructive suggestions [DSS99]
- encourages reflection and thereby promotes skills in self-assessment [LC06]
- enhancing greater meta-cognitive self-awareness [Top98]

Why focus on the positive points? Students often see the peer review process as a means of giving 'negative criticism'. Encouraging students to list positive points first helps them see things differently. Of course, do not neglect issues or problems in the work - but encourage students to suggest ways to improve or address these problems.

Why give feedback? Educate the students so they understand what the feedback provides. Help them understand how constructive feedback (both negative and positive) is fundamental. The feedback they provide helps both themselves and others 'improve'. Explain to the students that 'honest' feedback helps prevent the same issues popping up repeatedly in future work.

Why coach students? Give students examples of 'good' and 'bad' examples of reviews. Coaching students helps them become better reviewers and writers. After many semesters using peer review in modules and classes (e.g., computer graphics, physics-based animation, and game engineering), we have found student peer review to be a successful tool in several specific aspects, such as, inspiring and aiding student understanding. When instructors try peer review for the first time or refining their own methods of using peer review - care must be taken to ensure students are 'guided' - and not left to their own interventions.

What are the limitations of peer review? You must understand your **students will not typically respond to each others' papers**

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as well a professional reviewer. The review process should be a means for the students to engage and learn. It lets students get actively involved in their own learning. We want to make students more self-conscious about their own working process and to begin to take control of that process.

2 Paper Review

An excellent method to get the students engaged in research and peer review - is to have students read a paper (critically) as homework. Then the following week, in class, have the students discuss the paper in small groups. Ask the students to explain what they liked and dis-liked? Have the students find the paper's 'contribution'. Discuss the citations and the related work and how it supports the work. Doing the review process from an early stage helps students understand key principles of technical writing. Hence, when the student writes their paper or peer reviews another paper - they have been presented with the fundamental skills necessary.

3 Case Study

We give the peer review methods and results used in a technical module. The module is split into multiple components (i.e., formal lectures, tutorials, and practicals). The formal lectures are the traditional component - with PowerPoint slides and talks explaining concepts/techniques and demonstrations. The tutorials are lessons where students work in groups to apply theoretical concepts through discussion and questions, such as, small groups of 2 or 3 with white boards and table clusters, working through example problems and puzzles from lectures. The practicals enable students to work through simulations and software on a computer in the lab - applying theoretical concepts to situations (e.g., Visual Studio and OpenGL).

The module is assessed through class tests and a large individual project that stretches the duration of the module (i.e., 14 weeks).

At the start of the module, the students are told to start thinking about a topic related to the taught subject they are interested in and would like to focus on over the full duration of the module. After the first week, the student must give a presentation to present their ideas and motivations to the group - where students and staff are allowed to give open informal feedback/discussion. Subsequently, after two weeks, the student has read the literature and researched the project in depth and must present a proposal (i.e., a structured report). During the module the student must develop the project and at the end submit a technical paper in a conference template (e.g., using LaTeX), videos, a wiki-website, and source code. Also the student must give an 'educational' lecture to the class at the end - to explain their technique and results. The mathematics, the implementation, the test cases, and limitations - such that, any of the students attending could reproduce their work. Furthermore, each student must peer review 'three' other students final conference template report. The peer review must answer a set of questions, such as, clarity, reproducibility, understanding, and technical soundness.

The module is taught to encourage collaborative working - yet each project is unique to the individual. The lecturer offers an open door policy to enable the students to pop in from time to time if they need assistance due to the technical complexities or challenges they might face with an open ended research project.

4 Conclusion

Peer review enables students to share exploits and stories - to encourage and inspire. However, it must be emphasised that the feedback should be 'constructive'. It is all too easy to have peer review feedback focus on faults. To search for errors and neglect positive factors. We have presented a practical example of how continual peer feedback and collaboration helps steer the quality of work and create a more engaging and challenging learning environment. Designing the curriculum for technical courses, such as, computer graphics and related disciplines, to include, peer review, should be encouraged.

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