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Tipping the balance towards 21st century skills through peer-to-peer learning: A cross-disciplinary pilot of peer review software

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Abstract: There is growing recognition that many college students enter the workplace lacking “21st Century Skills” such as critical thinking, collaboration and communication. Peer-to-peer feedback provides a large number of benefits, including these “lifelong learning” skills valued by industry. Peer review, however, poses many challenges: for instructors; these include management of the process and poor quality of peer feedback; and for students, socioemotional barriers. Key socioemotional challenges are learners’ lack of trust in the process, in their peers, and in themselves as reviewers. This paper describes a pilot of a web-based peer review software called “Peergrade”, which was found highly effective in terms of efficiency and enhancement of learning. Emerging research and our experience indicate that such software can significantly enhance peer review, helping to overcome multiple barriers inherent in the process. This paper will also discuss key features and their impact on learners and conclude with recommendations for implementation.

Introduction:

Feedback is the most important aspect of instruction in terms of its impact on learning; research shows its effect size to be higher than all other instructional interventions (Hattie and Timperley, 2007). There are, however, many challenges in providing feedback to students, including a lack of time and the perception that students do not read or use it to improve their work. There has also been a recognition of student dissatisfaction with feedback they receive from instructors (Higher Education Funding Council for England FCE 2011). While instructors perceive their feedback to be useful, “students largely report them as difficult to understand, ambiguous or unusable” (Orrell, 2006; Walker, 2009). Peer review has been advocated as a solution to these challenges for over forty years (Elbow, 1998). In addition to serving as a way to overcome these obstacles, peer review has a host of advantages, improving students’ written work (Topping, 1998), collaborative skills, self-confidence, understanding of subject matter, connection with peers, metacognitive skills, and transfer of skills beyond the classroom (Pearce, J., Mulder, R., & Baik, C., 2009). Most significantly, peer feedback develops learners’ evaluative judgement, the ability to judge one’s own work and that of peers. This ability is a key attribute of lifelong learners (Absolum, Flockton, Hattie, Hipkins & Reid, 2009) and greatly enhances learners’ success, both in school and later in the workplace (Nicol, 2010). To take advantage of these benefits, instructors must manage a number of difficulties inherent in this teaching strategy.

While some instructors successfully use peer review, the effort required is significant. The pedagogy is complex, and managing the process requires careful planning and monitoring. Substantial time is required to implement this strategy in the classroom, particularly as research advocates multiple reviews from multiple peers in order for students to benefit. As Papadopoulos (2017) states, “Peer review requires a significant volume of information exchange and may pose a difficult administrative overhead for the instructor” (p.70). Another key challenge is mitigating socioemotional challenges such as anxiety around exchanging feedback with peers (Carless, D., 2012). Solutions to these challenges can involve extensive efforts, but technology-mediated peer review holds great promise, and software specifically designed for it can overcome many of these barriers. Papadopoulos (2017) suggests that “Technology can lift this overhead, by distributing material, collecting student work, granting access to peer work, guiding students in the review process, and providing a comprehensive picture to the instructor that orchestrates the process” (p.70). This paper will focus on how software designed specifically for peer review can

enhance teaching and learning. Our experience over the past year indicates that it can play a significant and effective role in peer review in both face-to-face and online courses.

The Pilot

Context for the pilot

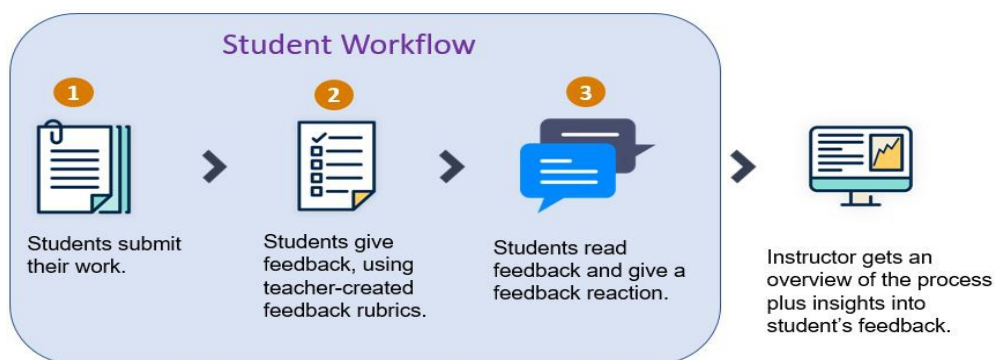
This project arose as an offshoot of a four-year, cross-disciplinary, Scholarship of Teaching and Learning-style research group focused on improving peer review practice. Initially, two instructors who were using peer review but experiencing poor results, came together to improve their use of this technique. Over several years, the group grew to five instructors and several staff, including the Director of Assessment and Director of eLearning Design. Informed by research literature on peer review and by their own investigations, they made significant progress, developing a cross-disciplinary protocol to guide peer review and designing techniques to overcome key challenges. The instructors experimented with increasingly articulated and refined peer review processes in their classrooms, collecting data including evidence of student perceptions and experiences. The protocol they developed guides instructors through three steps of peer review. The first is building student commitment to the process; the second is guiding the provision and reception of peer feedback; and the third is guiding the revision process. In the summer of 2018, the Director of eLearning became aware of a promising peer review software tool called “Peergrade”. Two of the group used it in the fall of 2018, and three more instructors joined in the spring of 2019. Instructors using Peergrade taught Writing, Literature, Sketching, Animation, History, and Internship Preparation.

Peergrade: Workflow and key features

The REAP group (Re-engineering Assessment Practices in Higher Education) has done extensive [research](#) on peer review and has recommended a number of [features be included in peer review software](#). Peergrade claims to have incorporated a great majority (Wind, D. K., Jørgensen, R. M., & Hansen, S. L., 2018). A brief explanation follows of Peergrade’s workflow for students, including three basic steps: after students read the assignment description, they (1) submit their work (2) review classmates’ work, and (3) rate the feedback received (Figure 1).

Figure 1: Peergrade steps

During the process, students receive emails alerts of the next step required. An essential feature is the



feedback rubric created by instructors and used by students in step two while providing feedback. Peergrade allows anonymous or non-anonymous review, asynchronous text-based dialogue for clarification or other communications between peers, and a flagging feature to alert instructors to issues requiring their attention. Instructors can give feedback to students, and they can view student submissions, feedback, and interactions. This data is filterable and viewable in various ways.

Results: Overview of instructor and student experience

Data was collected from students and instructors. Feedback was collected from thirty students across three courses taught by a total of three instructors. One instructor used his own survey within a Blackboard discussion forum, while the other two used a more formal survey. In one common survey, feedback was collected from four instructors who taught one or two courses during the pilot year.

All instructors enthusiastically endorsed Peergrade's effectiveness and usability and committed to continued or expanded use. Results from student surveys were extremely positive, with particular features and advantages coming into focus. Three advantages emerged that appeared particularly impactful. First, the complicated logistics and time requirements of peer review were greatly relieved. Second, the format of the rubric questions was very effective in guiding and focusing students on important elements of work under review. Finally, the option of using anonymous feedback proved to lower anxiety, allowing the freedom to give and receive critical feedback without bias or intrusion of other social factors. Results from one survey question given to twenty-two students in two courses indicate satisfaction in terms of ease of use and learning benefits. Eighty-six percent agreed or strongly agreed that Peergrade was user-friendly and benefitted their learning. In a survey answered by four instructors, all agreed or strongly agreed that Peergrade was user-friendly, that it benefitted their teaching, and that it benefitted students' learning.

Results: Peergrade's impact on challenges of peer review

This section uses selected quotes from surveys to illustrate how Peergrade impacted key challenges. The instructor survey questions typically followed the format in this example: "Research has indicated that a number of socioemotional issues can cause students difficulty with the peer review process. Please discuss how Peergrade has mitigated socioemotional issues in your practice." It is important to emphasize here that in most cases, the benefits discussed derive from an integration of effective peer review practice with features of Peergrade rather than from the tool alone.

Management of the peer review process:

Instructors:

"It does require a lot more planning and work for the instructor. Well written rubric questions are important to the process and take a lot of planning in advance."

"It certainly required more advance planning and time up-front to develop questions and load in assignments into the tool... However, once I did that the first time, my advanced worktime for each session went WAY down, because I could use the same rubric in the PeerGrade library (easily, quickly tweaking it, as needed)... I also had to do a lot less explaining in class about expectations, directions, etc: it is all just there so students understand quickly what to do, and they just start doing it."

"Peergrade improved the organization and delivery of peer critique for my course significantly. In the past, it was difficult to arrange for each student to receive the exact same number of critiques from their peers...a process that is exacerbated when not all students submit their work on time. Peergrade handles that process behind the scenes (including late-submissions) in a way that requires no faculty direction or oversight."

"Completion rates have been much higher with Peergrade. I attribute it to the email messaging PeerGrade does around assignment deadlines. Each time I've used Peergrade, I've had near 100% of all students submit the assignment. Sometimes late, but always submitted."

"... I do see tremendous potential as a time-saver for me to assess feedback there, keeping peer comments and instructor comments (assessment comments, & possibly a grade) all in one place... for the student. ...I could quickly see what was effective and what could be better in the rubric questions to yield what I was looking for from students, and could easily enhance and quickly tweak them in the tool. This seems to offer big potential to increase teaching ability and student learning."

Students:

"It was great to have a structured platform to give feedback on multiple levels, not just on the work submitted, but feedback on the feedback as well."

"Peergrade made it easier to get more productive feedback from my peers because they had guided questions."

"I love how it combines everyone's feedback for you in the end once you have gave your reaction to their feedback. It's a helpful takeaway document you can use when you go in to revise your own work based on feedback."

Socioemotional issues:

Instructors:

"The anonymity provided by Peergrade allowed my students to feel comfortable providing extensive critiques on their peers' writing without fear of any potential social backlash for simply providing their peer with honest feedback."

“The clearly-directed rubric questions and structure helped ease student anxiety about the process in terms of wondering what type of feedback to offer, since they only have to answer the specific questions rather than coming up with a direction for the feedback themselves.”

“In the spring semester, I had a few students who exhibited significant anxiety when presenting their work to the entire class. These students reported they were more comfortable with the Peergrade review process. It avoided the anxiety of standing in front of a group and also the targeted questions relieved their anxiety around what the focus of the critique will be.”

“They wrote more comments due to the word count I set, and many times, writing more allowed them to find and develop more effective / useful ideas, especially ones including clear examples. I think the longer, more developed comments increased peers' level of trust and connection with peer partners, as it suggests a deeper caring about a peer's work.”

Students:

“I really like peergrade, I only wish the rest of my courses used this site. It is so much easier to give the feedback and receive the feedback that you want without upsetting another peer about your opinion. Since it is anonymous it is easier to be truthful if you have suggestions on changes.”

“...it also relieved the pressure of confrontation or impression of being too hard when you just want to be constructive when in a physical space for critique. Peer review was always tense in physical classrooms in my experience, as giving your work to someone else for review always involved a lot of vulnerability and pressure from the person reviewing to not come off as harsh in their review.”

“I found it very intuitive and useful for getting anonymous feedback by your peers without the pressure of knowing who is reading it. I felt like the reviewer had an easier time being honest about faults in a resume or cover letter without feeling like it would reflect on them.”

Quality of feedback:

Instructors:

“I was able to create targeted questions for reviewers to respond to, thus ensuring that their critiques would be directed, relevant and useful to their peer.”

“Having students respond to specific rubric questions and respond with written feedback forces them to think more critically and articulate their feedback.”

“This really depends on the quality of the rubric provided by instructors. If thorough enough (but not too cumbersome) it provides a foolproof structure for giving feedback and takes the pressure off students to feel like they're doing it right.”

“Peergrade doesn't solve this issue, but having well written rubric questions and requiring students to write a minimum number of words helps address this issue when paired with detailed guidance and instruction on peer review protocols.”

Students:

“I was able to receive written feedback from multiple people. It helped me in my writing but also in how to evaluate someone else's writing”

Other statements (metacognitive skills, understanding of subject matter, etc):

Instructors:

“Understanding subject matter and metacognitive skills seems to be the biggest impact on students.”

“...students were asked, "after reviewing your classmate's document, what changes would you make to your own."

Student responses to this question were particularly thoughtful, and certainly demonstrated the metacognitive skill in question. Here's one response to this question from one of my students after he reviewed a cover letter written by one of his peers: “I would definitely add more to my own letter. I already knew mine was too short, but your letter is very descriptive and sounds great. I need to be more descriptive of my previous work experience.””

Students:

“PeerGrade deeply impacted my learning experience in this course. It help me modify and improve my revisions; especially during prototyping.”

Potential problems caused by use of Peergrade and Suggestions for changes in Peergrade:

Instructors pointed to certain limitations in Peergrade, some of which would be relieved by the use of the more expensive “Pro” license (we were using the “Basic” license). The most commonly desired feature is the ability to selectively group students. A second one is the ability to view all other students’ work at some point during the process. One student mentioned wanting to write directly on documents, a feature that would help visually tie feedback to specific locations in the document.

Recommendations for peer review:

With any instructional method used across disciplines, it can be difficult to give generalized advice. This section provides recommendations intended for any subject area and learner-produced work product. These are not specific to the use of Peergrade; however, the tool can in many cases simplify and/or enhance these practices.

Assignment structure: In order for students to value (and benefit from) peer review, it is critical that they use the feedback beyond the current iteration of the assignment, either through a subsequent draft to revise or a later assignment which can be informed by the feedback on the first. We advise a minimum of three peer review sessions in a course with three reviewers per assignment. Develop trust through collaborative learning activities that focus on gaining an understanding of the value of peer review and on learning about high-quality feedback.

Pre-training: The key goal of peer review is the development of evaluative judgement, which can support the ability to improve learners’ own work. Training students to evaluate work can be organized with exemplars and be an effective way to prepare students for peer review. Recent research has shown that the internal feedback required to improve student work can even be generated without peers (Nicol, 2019). Asking students to produce feedback on work examples allows them to reflect on and generate this internal feedback to inform their own work.

Process driven by author’s goals: In order to shift accountability for learning towards students, the author’s goals should drive feedback. Some instructors required students to write a “memo to reviewer”, which explained the student-author’s specific needs for feedback. Within Peergrade, students would submit this along with their work.

Review criteria/rubrics: Learners should understand what constitutes quality feedback, and the rubric tool can support this goal. It is perhaps the most important feature in Peergrade but one that relies on crafting questions that guide students to writing actionable, high-level feedback. Research outlines criteria for effective feedback (see list below), and this should be integrated into the assignment guidelines and/or into the questions themselves.

Instructions and questions should integrate these criteria, along with content-specific guidance.

1. Addresses author’s needs, question, or concerns
2. Focuses on issues of substance (not simply editing of grammar or spelling)
3. Is specific, using examples in the work to support comments
4. Suggests strategies for improvement
5. Provides reasons or argument supporting comments
6. Use effective tone (kind, positive, growth-oriented)

Oral feedback: Research strongly encourages peer feedback to include both dialogic and written forms. Dialogue provides a way to gain clarity via “discovery mode dialogue” (Crossman, J. M., & Kite, S. L., 2012), or verbal interaction that encourages exploration of the author’s intended meaning of her or his work. Live dialogue must be managed outside of Peergrade, using additional synchronous tools or live class time.

Conclusion

Peer to peer feedback has significant support in the literature as an effective pedagogical strategy that leads to a wealth of learning benefits, particularly lifelong, higher-level skills in the areas of communication, evaluative judgement, revision of work, and collaboration. Instructors who attempt to implement this strategy are faced with significant challenges, a number of which can be overcome with the use of peer review software. Such software greatly facilitates much of the set up and management of the process, allowing instructors to focus on important issues of students’ growth and progress in providing and using feedback. For instructors who believe that peer to peer feedback can have an important role in the growth of these skills, peer review software can be the catalyst to successful peer review practice.

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