Title: Testing the Efficacy and Student Acceptance of a Peer-Review Writing Program in an Online Course

Sponsoring Department: Integrative Biology

Abstract:

Writing within Disciplines (WID) is a pedagogical model that aims to engage students in active learning and to develop critical thinking and writing skills within the norms of a particular discipline, but lack of faculty time for grading writing products impedes its broader implementation. Web based peer review programs have been developed that allow for writing assignments in large classes without overburdening instructors. Yet unknowns and barriers remain regarding successful implementation of these programs, notably efficacy in online courses and students' comfort with and acceptance of the programs. The principle investigator (PI) is piloting the peer-review writing program, Peerceptiv, and has received student survey feedback that both suggests positive learning outcomes from Peerceptiv assignments and some resistance to the peer-review process. The proposed research focuses on two major questions: 1) To what extent will students in an online science course show writing gains in Peerceptiv assignments? 2) Do students' exposure to evidence from the literature that demonstrates the value of peer feedback for their writing, and to reminders of the robust course policies for appeal of scores, impact their perceptions of Peerceptiv assignments? The proposed research will measure writing-related learning gains in an online course over multiple Peerceptiv writing assignments, and will survey student acceptance of peer-review after exposure to informational video interventions relative to a control group. The findings of the study will be useful to share with faculty and students and will help facilitate the implementation of WID programs in online courses at OSU and beyond.

Project Description

Background:

Goal 1 of Oregon State University's Strategic plan, phase III is to provide a transformative educational experience for all learners. Two strategies to meet this goal are (1) to advance teaching and learning in the Bacc Core through innovations in course design, authentic assessment, and interactive teaching and faculty development, and (2) to strategically grow online education programs, explore new pedagogical models and address all learning styles through myriad learning platforms (OSU Strategic Plan, Phase III). The proposed research follows both strategies 1 and 2 in order to further Goal 1 of OSU's strategic plan.

Writing within Discipline (WID) is a pedagogical model that aims to engage students in active learning and to develop their critical thinking and writing skills within the norms of a particular discipline (Oschner and Fowler, 2004). WID is not a new model; research has documented major impediments to the implementation of the model. Barriers relevant to

this proposal include large class sizes and the lack of sufficient instructor time to provide formative feedback on assignments (Persky et al., 2003). OSU has embraced WID with its Writing Intensive Program (WIC), which requires students to complete at least one WIC course within their major before they graduate. OSU WIC course sections are limited to 20 student enrollments in order to make the required 5,000 total words of writing manageable for the instructor. Other OSU Bacc Core Courses, with higher enrollments, also have writing requirements, such as the Synthesis Category, which requires a 1250-word term paper. Providing meaningful feedback to students and the opportunity for revision, can be difficult for instructors in Synthesis category classes with 70 students.

Within the past decade, web based peer review programs have been developed that allow for frequent writing assignments to be given within the discipline to large classes without overburdening instructors or teaching assistants (Cho and Schunn, 2007; Clase et al., 2010). One such online review program, Scaffolded Writing and Rewriting within the Disciplines (SWoRD) (Cho and Schunn, 2007), has been shown to be an effective tool at managing writing assignments and providing students with feedback of high quality, useful for subsequent revision/improvement of writing assignments (Patchan et al., 2011). The principal investigator for this proposed study has used SWoRD (licensed under the name Peerceptiv) in a campus pilot for OSU in the Ecampus and on campus sections of Z349 Biodiversity: Causes, Consequences, and Conservation, which is a Bacc Core Synthesis Course, in the Global Issues category.

The SWoRD/Peerceptiv program is modeled after the process of academic writing, with review and suggestions for revisions provided by peers (Cho and Schunn, 2007). For the first stage of a Peerceptiv assignment, students compose a writing assignment and submit it via the web. For the second step of the assignment, each student is anonymously assigned as reviewer of three of their peers' papers. The students then review each paper using highly detailed 7-point rubrics, also providing required comments to justify their score choice and suggestions for improvement and praise for things well done. The third step of the assignment is "back-evaluations," where students are required to review their scores, read the anonymous comments left by their reviewers, and rate the comments on their degree of helpfulness. Upon completion of the assignment, students may appeal directly to the instructor any peer scores that they believe to be inaccurate, and the instructor is able to override any scores he/she determines to be inaccurate. In the PI's experience with Peerceptiv and Calibrated Peer Review, another peer grading program, very few students appeal their peer scores.

In Peerceptiv assignments students are scored on three categories: Writing, Reviewing, and Task score. The writing score is based on a weighted average that comes from their peers' scores on the 7-point scale. The reviewing score is based on the accuracy of the student's reviews relative to the mean review given to papers they reviewed by their peers, and also the helpfulness rating given to them by their peers for their reviews. The task score awards points for completion of all required review and back-evaluation tasks on time. Thus, students are given strong incentive to provide accurate, timely, and detailed feedback to their peers. The weight given to each of the three categories on which students are graded is adjustable based on instructor preference. Thus, students ultimately receive

feedback from the ratings and comments provided by their peers and from their instructor in the form of the detailed grading rubrics used for the evaluation. Peerceptiv allows for multiple drafts of a paper to be assigned and for each draft to serve as an assignment affording peer and instructor review, which allows for the complete cycle of academic writing, with submission, peer review, revision and resubmission.

Studies in on campus courses have shown that online peer review programs that utilize peer grading, such as SWoRD, are effective toward providing students with useful feedback (Patchen et al., 2009) and improving writing assignment quality (Patchan et al., 2011). Not much is yet known about efficacy of such programs for learning, and writing development specifically, for students participating in fully online courses. The PI sees this as a potentially expanding area of research, which would be appropriate for NSF Improving Undergraduate STEM Education (IUSE) grants.

The relatively small body of literature regarding the efficacy of peer review programs writ large points to a problem of student resistance to such systems, that can ultimately prevent faculty from utilizing them (Kaufman and Schunn, 2011; Keeny-Kennicutt, 2008). In the case of the PI's Z349 Bacc Core Synthesis course, the enrollment (approximately 70 students) precludes the instructor from giving the students traditional, timely feedback, in the form of comments on drafts and opportunities for revision before they turn in their final 1250-word term paper. In order to increase student success, the author utilizes the Peerceptiv program to provide the students with peer-generated feedback on their term papers incrementally. Student term papers are produced in three parts, each part a separate Peerceptiv assignment. (Shorter assignments are more effective for student-grade peer review than complete term papers, in the principal investigator's experience.) Students receive feedback from the Peerceptiv peer review on their drafts, and then synthesize the three parts (1, 2, and 3) into a final paper, which is graded directly by the instructor. In surveys at the end of the course, students generally rated the experience highly overall, and believed that Peerceptiv helped them revise towards a better final paper, but were less convinced as to whether peer grading was fair or whether peer feedback was meaningful.

Research Objectives:

The current project will investigate the following two research questions: 1) To what extent will students in an online science course show writing gains in Peerceptiv assignments? 2) If students are given evidence from the literature that demonstrates the value of peer feedback for their writing, and are reminded of the robust course policies allowing for appeal of scores, will their perceptions of Peerceptiv assignments change?

Methods:

The proposed research will take place during the summer of 2018 in the online course Z349: Biodiversity: Causes, Consequences, and Conservation. The student population of the course, approximately 60 students, will be split randomly into two equal groups of students. Student research participants will be selected from those indicating willingness

to be such, as participation is voluntary. Research participants, like all others enrolled in the class, will complete three Peerceptiv writing assignments.

Research objective one: Research participants in both Group One and Two, like all others enrolled in the course, will produce three Peerceptiv work products. Two graduate students from the OSU Science and Mathematics Education doctorate program (College of Education) will be blinded to the order of the Peerceptiv assignments. They will undergo training with the Principal Investigator using the peer review rubric for writing quality used by students in the review phase of the assignments (see Appendix I). The two reviewers will score past year's (2017) student examples until an acceptable rate of inter-rater reliability (above .80) has been established between the two scorers. The two reviewers will then independently rate assignments #1 and #3 for all study participants from the course in 2018 using the peer review rubric, and an average (if necessary) will be calculated for each assignment between reviewers. Assignment #1 and assignment #3 mean rubric scores will then be compared for the entire sample via a t-test. The PI predicts that papers produced for assignment #3 will be rated significantly higher on average for writing quality than will papers produced for assignment #1.

Research objective two: Research participants in Group One will be given two short video interventions, one that describes the research behind peer review and the Peerceptiv program itself, and a second that describes the Z349 peer review appeal process if students wish to challenge an inaccurate peer review. Students in Group One will be quizzed on the content of the videos (for extra credit) to ensure that they watch them. Students in Group Two will not be shown the videos, but will be given a similar opportunity to watch two short videos related to course content and take a quiz worth the same amount of extra credit as allocated to Group Two's quiz. Each group will be surveyed at the end of the course on their perception of the fairness of Peerceptiv peer review assignments, as well as of their self-reported learning gains in regards to course content and writing skills from the assignments. The survey, administered via password protected Qualtrics, will consist of multiple Likert-scale items and data will be analyzed via t-tests of significance using Bonferroni corrections. The PI predicts that students in Group One will rate the assignments higher for fairness than will students in Group Two, who did not receive the video interventions.

Project Outcomes: The project outcomes will include video interventions developed for the research that the PI and other ecampus instructors will be able to use in their courses to help justify the use of Peerceptiv writing assignments. The PI will produce an Ecampus white paper that reports the results of research objectives 1 and 2, which will be revised and then published in a peer-reviewed journal. In addition, the PI will present the study results at a national conference and at the Ecampus faculty forum.

Plan for Sharing Outcomes: The PI, and the Ecampus developer who assists with developing the videos, will apply to present the results to the Ecampus Faculty Forum. The PI and Ecampus developer will also present the results at the American Educational Research Association (AERA) Annual Meeting, which will host a broad audience, consisting of science, online and writing educators. The PI will publish the results in a

journal such as the International Journal for the Scholarship of Teaching and Learning, CBE-Life Sciences Education, or the Journal of College Science Teaching.

Collaborators that will be integral to the project's success: The PI has collaborated with eight different OSU Extended Campus videographers and developers for past projects, including the awarding winning 3-D microscope project for Bi206. It will be critical to the proposed research that the PI partners with a developer and/or videographer to create effective intervention videos for the proposed research. Depending upon the developer's level of interest, they could also collaborate in other aspects of the research.

Timeline for completion and dissemination:

Winter 2018: The PI will apply for OSU IRB approval for the study, and will begin study planning.

Spring 2018: The PI will identify two graduate students from the college of education who will be hired to collect data in the summer. The PI and Ecampus developer will create the video interventions.

Summer 2018: The PI will implement the study in Z349e, which is held during the 10-week summer session. Science education graduate students will be trained by the PI and they will collect data from Peerceptiv assignments by the end of September 2018.

Fall 2018: The PI will analyze the data and prepare the Ecampus White Paper.

Winter 2019: The PI will submit the study for publication in a peer-reviewed journal.

Spring 2019: The PI will present the results at AERA Annual Conference in Toronto.

References

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Appendix I: Peerceptiv Rubric

1. Mechanics

After rating the essay with the below rubrics, please identify ways that the mechanics of the essay could be improved in order to make a stronger final essay.
Comment 1: (*Required)
Comment 2:

Thesis statement.
Please rate the thesis statement according to the following rubric.
7 - Distinguished: Meets ALL FIVE of the following criteria; Thesis statement is clear (1), expository(2), the last sentence of the first paragraph(3), bolded(4), and all information supports the thesis(5).
5 - Proficient: Meets THREE OF THE FIVE following criteria; Thesis statement is clear (1), expository(2), the last sentence of the first paragraph(3), bolded(4), and all information supports the thesis(5).
3 - Emerging: Meets TWO OF THE FIVE following criteria; Thesis statement is clear (1), expository(2), the last sentence of the first paragraph(3), bolded(4), and all information supports the thesis(5).
1 - Not evident: No identifiable thesis statement in the introductory paragraph.

Topic Sentences.
Please rate the topic sentences according to the below rubric.
7 - Distinguished: Topic sentences clearly introduce the main idea of the paragraph
5 - Proficient: Topic sentences mostly introduce the main idea of the paragraph
3 - Emerging: Topic sentences somewhat introduce the main idea of the paragraph
1 - Not evident: No consistently identifiable topic sentences that indicate the main idea of the paragraph

Proofreading.
Please rate the degree to which the essay was reviewed for typos, misspellings, and grammatical mistakes.
7 - Distinguished: The essay has no evident typos, misspellings, and grammatical mistakes
5 - Proficient: The essay has at least THREE evident typos, misspellings, or grammatical mistakes
3 - Emerging: The essay has at least SIX evident typos, misspellings, or grammatical mistakes
1 - Not evident: The essay has at least TEN OR MORE evident typos, misspellings, or grammatical mistakes

Essay Structure.
Rate the essay with the below rubric based on its overall structure.
7 - Distinguished: The essay has an introductory paragraph that introduces the topics that are discussed, body paragraphs that explain each topic, and a concluding paragraph that sums the essay
5 - Proficient: The essay has an introductory paragraph that introduces most of the topics that are discussed, body paragraphs that explain each topic, and a concluding paragraph that somewhat sums the essay
3 - Emerging: The essay has an introductory paragraph that introduces some of the topics that are discussed, body paragraphs that explain some topics, and a concluding paragraph that sums part of the essay
1 - Not evident: The essay is not clearly organized into introductory, body, and concluding paragraphs

2. Citations and bibliography

After rating the essay with the below rubric, please indicate how the references could be revised in order to improve the final essay. See the below reference and follow the link for APA citation style examples:Ramirez, F., Afan, I., Davis, L. S., and Chiaradia, A. (2017). Climate impacts on global hot spots of marine biodiversity. Science Advances, 3(2). doi:10.1126/sciadv.1601198APA
Comment 1: (*Required)
Comment 2:

Format of references.
Please rate the references according to the below rubric.
7 - Distinguished: References page contains at least 5 appropriate APA formatted citations, and at least two of them come from a peer-reviewed source
5 - Proficient: References page contains less than 5 appropriate APA formatted citations, with minor errors present, and at least two of them come from a peer-reviewed source
3 - Emerging: References page contains less than 5 appropriate APA formatted citations, with minor errors present, and/or fewer than two of them come from a peer-reviewed source
1 - Not evident: References page missing, major problems with formatting, or no peer-reviewed references

In-text citations.
Please rate the in-text citations according to the following rubric.
7 - Distinguished: Citations are made in the text to the source of important statements and conclusions, all references in the bibliography are cited in the text.
5 - Proficient: Citations are made in the text to the source of most of the important statements and conclusions, all references in the bibliography are cited in the text.
3 - Emerging: Citations are made in the text to the source of some of the important statements and conclusions, or not all references in the bibliography are cited in the text.
1 - Not evident: Citations are not made in the text to the source of important statements and conclusions