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Incorporation of Writing Assignments into Large Introductory Biology Laboratory Courses

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Extended Abstract

Within the undergraduate courses of the departments of Cell and Systems Biology and Ecology and Evolutionary Biology at the University of Toronto, we aim to help our students increase their scientific literacy, clearly communicate both orally and in writing, and demonstrate their understanding of key scientific concepts. To reach these goals, we incorporate written assignments within the activities of the laboratory component of the courses. We use writing assignments as a way to invite our students to participate in the discourse of the discipline. Furthermore, we strive to provide our students with transferrable skills such as the ability to develop persuasive, evidence-based arguments and to present them in a clear and concise manner.

There are numerous challenges associated with the introduction of writing assignments into large classes with multiple teaching assistants (TAs). Of primary concern is maintaining fairness and consistency in the grades awarded across TAs and in the effectiveness of the formative feedback the TAs provide. However, it can be difficult to prepare marking guidelines that promote consistency among TAs while at the same time allowing individual TAs sufficient flexibility to recognize and reward the independent thinking of students. Another challenge is the inherent diversity in large groups of TAs and their individual levels of preparation and confidence with regards to assessing student writing. Lastly, we must find a process for grading that can function within the limited time allocated to our TAs for this task.

Over numerous years and iterations we each independently developed a process that addresses these challenges. Interestingly, the approaches we developed for our specific courses are remarkably similar, despite the fact that the subject and assignment format differ between them. Our common approach relies on three components: (1) scaffolded writing assignments with detailed assignment instructions, (2) detailed marking rubrics, and (3) assignment-specific TA training sessions.

A scaffolded assignment breaks up a complex assignment into stages or parts. For example, in one of our courses, students are asked to first describe two research articles that relate to their assignment, write a draft that they compare to other students' assignments, submit a final draft, and then revise and re-submit their assignment after receiving feedback from their TA. These scaffolded assignments provide a supportive environment while facilitating student independence. They divide up the assignment so that it is less overwhelming and reduces the anxiety associated with high stakes assignments. Perhaps the most important characteristic of scaffolded assignments is that they provide students with the opportunity to revise their work in response to feedback and self-evaluation, in some cases before it is graded, which ultimately reduces grading time.

Marking rubrics state the criteria used to assess students' writing assignments and how marks are allocated for each criterion. The criteria should align directly with the learning objectives of the assignment and of the course. If so, the rubric will make it clear to students what they can learn from completing the assignment. Another benefit of rubrics is that they standardize how multiple TAs grade the same assignment. For example, in one of our courses, TAs are provided with a standardized 'comment' bank, from which TAs select applicable comments to include in their formative feedback to students. This promotes consistency and objectivity across TAs. Rubrics direct TAs to focus their attention on the key concepts and skills that students are meant to develop through the assignment. It can be challenging to create a rubric that is rigid enough to standardize the grading of multiple TAs, but flexible enough to allow TAs to effectively address all issues that may arise in students' assignments. One way this can be addressed is to include TAs in the design and modification of marking rubrics.

The final component of our approach is to hold assignment-specific training sessions for our TAs. We first introduce the assignment and how it will be graded using the rubric. We provide a specific strategy for how to grade each assignment, which we have learnt over the years to be both the most effective and efficient: we ask TAs to read the entire assignment without grad-

ing, reflect on what they noticed as they were reading, and to focus their comments on the issue that was most significant. We then lead the TAs in a benchmarking session: TAs use the rubric to grade the same student assignment individually, and then as a group we discuss the major issues within the assignment and come to a consensus on the grade and feedback it receives. We choose a variety of students' samples that either demonstrate a specific issue or characterize a specific grade (e.g., a "B" assignment). The primary objective of benchmarking is to provide TAs with a consistent strategy for grading and for providing effective feedback to students. Ultimately, it results in the identification of best practice in relation to grading of assignments. These training sessions improve the quality of undergraduate instruction, increase the confidence level of TAs in their ability to grade these assignments, and build TA investment in and accountability for the assignment. TA training does not end with the benchmarking session and we have found it essential for the instructor to be available to provide continuous support to the TAs during the entire scaffolded assignment. This can be accomplished by setting up a "wiki" or discussion forum where TAs can post their questions about grading the assignment, or by making time to meet with individual TAs to discuss any issues they may encounter while grading.

In summary, we believe that the successful integration of writing assignments into large introductory biology laboratories involves the following three components: scaffolded writing assignments, detailed marking rubrics, and extensive TA training both before and during the grading of assignments. We have found this approach to promote fairness and consistency in grading across TAs. TA feedback in response to our approach has been positive and indicates that TAs have found the benchmarking sessions valuable in preparation for their marking of written assignments.

Keywords: scaffolding, rubric, benchmarking

Mission, Review Process & Disclaimer

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