

idea that they had to choose their own best option; many wanted me to pick the best possible for them. This was perturbing, as it suggested to me that many students were so used to having things done **to** them, that when given the opportunity and responsibility to be co-authors of their own destiny, they were paralyzed.

The second time I did this, I gave a wider range of values, recognizing that both the maximum and minimum values for assessed work had to reflect both the learning objectives and the teaching strategies for the particular course. For example, if I deemed it particularly important that students do an independent or group “research” project, then I needed to require that they allot some of their overall grade to this aspect (not the case in the above marking scheme).

On the purely practical side, I also learned a couple of things. I quickly found that I needed to

add a “default” grading scheme, as there was always at least one student for whom I would not have a grading scheme in the end, especially in larger classes. I now clearly indicate that default scheme as the criteria I will use if I do not get a signed sheet of their selected marking scheme, or if their total does not add to 100% (and this does happen on occasion). Some colleagues have questioned the increased time it must take to compile data, but I have not found this onerous. I have wondered if there is a potential psychological study of the fact that students tend to select multiples of 10 in their final grading schemes! As well, there tend to be two clusters of students: those who maximize their on-going work, and those who maximize their exam and quiz marks. The end result is that there typically are few variations on the allotted grades, and using Excel© makes this task very manageable, even with large classes.

I took a hiatus from using flexible grades last year, but returned to their use this term because I see that helping students learn how to take responsibility for their learning is a critical component of what we aim for in higher education. With increased ownership of their evaluation, the level of engagement and commitment of students has the potential to be increased, as they work to achieve the goal they have helped create for themselves. Mezeske (2007) concludes that variable grading does indeed increase student engagement, and offers, as an alternate to the model above, a whole series of activities with points allotted to each, from which the student selects their options for grading. Whichever variant we may choose when giving students a range of grading options, the outcome is similar: students take greater ownership of their learning and the reduced level of anxiety over grades frees them to engage in the learning process more completely.

## Reference

Mezeske, B. A., 2007. Getting creative in a required course: Variable grading, learning logs, and authentic testing. In Mezeske, R.J and Mezeske, B.A. (Eds.), *Beyond tests and quizzes: Creative assessments in the college classroom*. San Francisco: Jossey-Bass, A Wiley Imprint.

## Assessing the Masses: Notes from the frontlines of first year biology



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How does one assess 800 students and provide frequent and useful feedback over the course of a semester without spending all your time or resources grading exams? In Biology 1010 and 1011,

we do it using a combination of multiple choice exams, face-to-face interactions, and written lab reports.

I know; everyone hates multiple choice exams. Students hate them because they are convinced they can't do well in them. Faculty often think they can only be used to test trivial knowledge. However, well-written multiple choice questions can test far more than the recall of facts; a well-crafted exam can provide the means for students to demonstrate higher-order thinking skills and can usually expose student weaknesses in

understanding.

By its very nature, first year biology is content-laden. Like a language course, it is full of vocabulary whose definitions must be learned, and the vocabulary must be used in the correct context. Such material is readily tested using multiple choice exams, but the faculty teaching Biology 1010 and 1011 also want their students to be able to apply information and understand the conceptual framework and theory in which the vocabulary is embedded.

Biology is full of wild and fascinating narratives about the workings of nature which are, in essence, the concepts of the science. To gain a successful understanding of biology, students must understand and be able to explain these concepts. Many of the fundamental concepts of biology involve processes such as that whereby DNA is first replicated, then transcribed into RNA, and then translated into protein. Or the impact that population increase or decrease may have on the birth rate of that population. Students' understanding of these processes is readily assessed through multiple choice questions. For example, most students understand that plants both consume carbon dioxide and release oxygen through photosynthesis; however, fewer students understand that plants also produce carbon dioxide and consume oxygen through cellular respiration. A simple multiple choice question where the choices involved list whether carbon dioxide and oxygen are consumed or produced often uncovers students' failure to associate the cellular respiration process with plants.

In addition, it is possible to test students' ability to apply concepts through multiple choice questions in which students must perform calculations and select the correct answer. A benefit of testing calculation through multiple choice is that students are usually able to identify simple errors in calculation since their incorrect answer won't be in the list of possible choices—giving them a chance to redo the

calculations and demonstrate their skill at application. Other higher order cognitive skills can also be assessed through multiple choice exams. Interpretive or analytical skills can be assessed by asking students to select from a series of different interpretations of data (graphs, tables, pictures, scenarios).

Further feedback and assessment occurs in the laboratory, where we are able to meet with all 800 students for 2 hours once a week. To accomplish this, we run 36 two-hour lab sessions throughout the week. Each lab holds 24 students, who are taught by a Teaching Assistant and supervised by a Lab

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Instructor, resulting in a 12:1 student to teacher ratio. This ratio provides the opportunity for face-to-face interaction between the teacher and individual students, thus providing one of the best ways to really assess what

a student has learned. Such close interpersonal interaction makes it clearly obvious who understands and who doesn't. Students have access to individualized support in a small group setting and teachers get to know their students and can better identify and help those who may be struggling.

Students' lab reports are a great window into the world of student knowledge. These reports consist of a series of questions pertaining to the material being examined in lab. The questions focus the student on the material we want them to understand, its application, and how it relates to biological concepts. Often, students

are required to write hypotheses and predictions as part of their lab reports, providing another way to assess more than simple recall and observation.

We abandoned the standard written lab report a few years ago because student work tended to be unfocused and because of the variation in grading among the over twenty TA markers. By limiting the reports to a certain number of questions and space for responses, students have to focus their answers, making it easier to provide them with feedback. Variation among graders is reduced by asking a limited number of set questions to which a range of points can be assigned based on completeness and correctness.

It is, indeed, challenging to provide meaningful, timely, and accurate assessment of over 800 students in first year biology. By using a combination of methods, we firmly believe we are providing the students with the necessary background that they require for their programs and with a valuable picture of how much they are truly learning as they complete the course.

