Online Quiz Use in a Large-Lecture Genetics Course

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Introduction

There have been many pedagogical practices implemented and examined within the sciences as a result of a growing need to improve the quality of instruction within the Science, Technology, Engineering and Mathematics (STEM) fields. These practices include several active learning techniques, concept mapping and use of formative assessment. Many studies within the biological sciences have focused on the use of active learning approaches in large introductory biology courses. The research pertaining to effective methods used in large, upper-level undergraduate courses, such as Genetics, is more limited. These large upper-level courses serve as an important step in furthering students’ knowledge within a given discipline.

Here we ask whether the use of online quizzes as a formative assessment correlates with student performance in a very large lecture-based undergraduate Genetics course.

Results: Online Quiz Use Does Not Appear to Impact Student Performance on Comparable Questions, But Could Benefit Attitude

For all graphs, black bars represent semesters when online quizzes were used, and gray bars represent semesters when online quizzes were not used. Significance was determined using a generalized linear mixed model, with whether the student responded the question (for a particular topic) correct or not as the dependent variable and independent variables including whether quizzes were used, sex, or ethnicity and accounting for year as a random independent variable. * indicates a p-value < 0.05 with a positive association and ** indicates a p-value ≤ 0.01 with a positive association. ** indicates a p-value < 0.01 with a positive association and *** indicates a p-value<0.001 with a positive association. No significant associations with quiz use was identified for both female and minority performance. For minority analyses, students were classified as an minority if they were “Black,” “Hispanic,” “Native American,” or “Other.”

Table 3: Qualitative Data from Student Feedback Suggests Students Value Use of Online Quizzes
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<td>I really only completed them for the points. They were not challenging nor did they really help me learn the material.</td>
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Conclusions

Surprisingly, we found no evidence of a positive association between student performance and the use of online quizzes in a large-lecture genetics course. Although we did not find any correlation using these comparable questions, the online quizzes may help students in other respects. For instance, these questions were an “average” level of difficulty range; the use of quizzes may be more correlated with higher level questions not assessed here. The quizzes also appear to help students “keep up” with the material as evident from student feedback (Table 3). This could be very important for students in a course that moves quickly with a substantial amount of content. The positive sentiments towards the quizzes are shared by the instructor, P.J.W., based on the higher quality of questions students asked during the semesters when quizzes were used. Factors not examined in this study that could affect the impact of quizzes include the content and format of quiz questions, other course components (e.g. that could replicate the effect of quiz use in years they were not used) or variation in instructor effectiveness from year to year.

Acknowledgements

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