



Student Performance and Perceptions of Exam vs. Quiz Based Assessment in Animal Science



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ABSTRACT

Although educational research supports the use of formative assessments, there is a lack of implementation and empirical data to demonstrate its effect in the classroom. Furthermore, students often report cramming as the primary method of studying in the summative exam classroom, and more temporally spaced assessments may provide better regulated learning. Thus, our objective was to investigate differences in student performance and perceptions of learning with various instructional strategies across two semesters of an undergraduate animal genetics course. Performance on two units of course content was evaluated for this study. Mastery of material in the first semester was assessed by two exams (semester 1, n=131) while the same topics were assessed by eight weekly quizzes in the second semester (semester 2, n = 66), using the same questions. Additionally, student perceptions of learning were collected in semester 2 using two nearly identical surveys at mid and end-of-semester, comprised of Likert-scale and free response questions. Student performance did not differ between semester 1 and semester 2 assessments (79.7 ± 0.9 vs 76.0 ± 1.29, respectively) for the first evaluated unit. In the second evaluated unit, performance was ~3.7% greater ($P < 0.05$) in semester 1 (exam-based) compared to semester 2 (quiz-based). Thematic analysis of survey data indicated an overwhelming preference (~97% of students) for the quiz-based classroom. Students reported an ease on mental health, increased preparation and study efforts, as well as improved application of knowledge within the quiz-centered semester. Moreover, ~84% of students agreed that weekly quizzes adequately demonstrated their knowledge. Analysis of pre-test results given in the consecutive course showed a tendency for students of the quiz-based semester to retain knowledge at a greater degree as compared to the exam-based semester (78.2 ± 1.77 vs 73.5 ± 4.05 respectively). These data indicate that formative assessment with quizzes may serve as a potential alternative to the traditional exam classroom to effectively gauge student learning and enhance the student experience and knowledge retention.

HYPOTHESES

- Student performance and retention of knowledge would improve with the use of temporally spaced quiz-based assessments.
- Student perceptions of learning within quiz-based courses would be more favorable to that of exam-based courses.

MATERIALS AND METHODS

COURSE FORMAT

- Undergraduate Foundations in Animal Genetics (ANEQ 328)
- Semester 1: 2 exams evaluated (n=131)
- Semester 2: 8 weekly quizzes evaluated (n = 66)

PERFORMANCE

- Student performance on two units of material when evaluated by two exams compared to student performance across corresponding 8 quizzes
- Analyzed by ANOVA and EMMEANS Pairwise Comparison in R

PERCEPTIONS OF LEARNING

- End of semester surveys conducted in semester 2 classroom
- Thematic analysis of free response questions
- Comparison of self reported quantitative data

KNOWLEDGE RETENTION

- Pre-test in the subsequent course (ANEQ 330: Animal Breeding & Genetics)
 - Completed ANEQ 328 as exam based (n=8) or quiz based (n=42)
 - Identical to post-test given in ANEQ 328

RESULTS

Preference for Quizzes vs Exams

- "I personally find that exams add stress and hurt my grade/learning more than it helps. The weekly quizzes and assignments have really helped me understand each topic and figure out where I need to review or practice more."

Improvement in Mental Health

- "I think this class structure has enabled me to learn content in a stress-free manner and makes me actually look forward to this class and what it has to offer me instead of being stressed about making sure I cram and study when instead of that I have opportunities in class to practice the content we are learning"

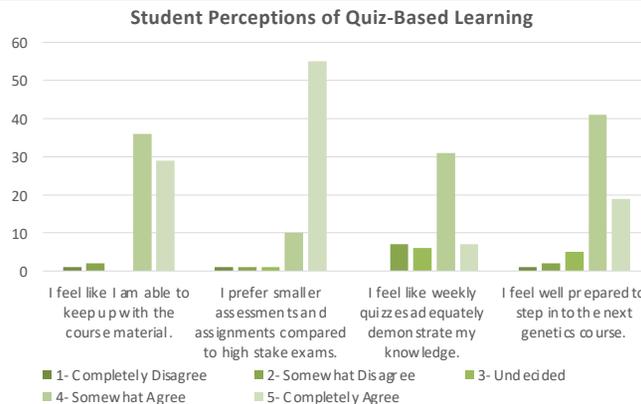
Self-Reflection

- "I really enjoyed the in-class activities we did, I thought they really helped clarify the material and helped me succeed. I also liked the quizzes as they showed you what you needed to study and understand better without destroying your grade."

Enjoyable Classroom Format

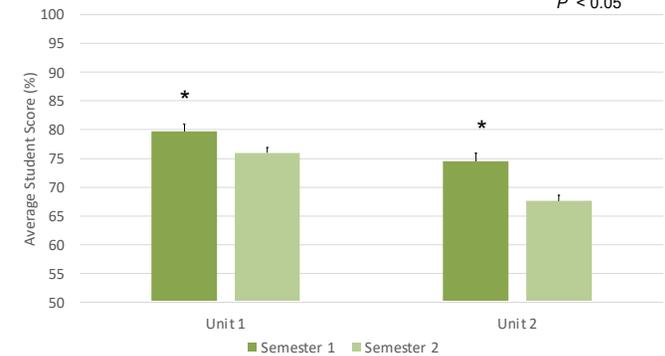
- "This course is set up for YOUR success, take advantage of that. If you show up to class, complete the assignments, and pay attention you should have no problem getting an A. The workload is reasonable and the instructor and TA's are very sweet. This was one of the best classes I have taken so far at CSU, I was able to learn and enjoy the class without too much stress about my grade. This is the first class I have not had anxiety about"

- **Figure 1. Major themes within free response statements from students in a quiz-based course**
- Quiz-based courses reduce student stress and anxiety
- Quiz-based assessment helps students and instructors gauge student learning and identify areas that may need additional practice



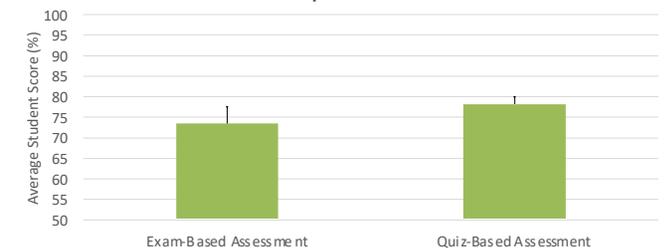
- **Figure 3. Self reported perceptions of a quiz based undergraduate course**
- The majority of students feel able to keep up with material and prepared for subsequent courses
- Students feel as though quizzes adequately represent their knowledge
- Frequent low stake assessment is preferred over high-stake exams by the majority of students

Student Performance on Exam vs Quiz Based Assessment



- **Figure 2. Student performance on two units of material evaluated by the same questions presented on either two exams (semester 1) or eight corresponding quizzes (semester 2)**
- Students performed better on exams rather than quizzes for both units within the undergraduate ANEQ 328 course

Student Knowledge Retention Seen in a Pre-Test of the Subsequent Course



- **Figure 4. Student pre-test performance in a subsequent genetics course (ANEQ 330) after completing the prerequisite course (ANEQ 328) as either exam-based or quiz-based**
- Students within the quiz-based ANEQ 328 course performed better on the pre-test

IMPLICATIONS

- Quiz-based assessment can be utilized to improve student mental health and perceptions of learning
- Quiz-based assessment may not improve initial performance, but may contribute to more durable learning
- Temporally spaced assessment may be used to not only assess student learning but also improve long-term knowledge retention

ACKNOWLEDGEMENTS

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