

Case-based critical thinking exercises to improve student learning and engagement in a hybrid A&P course

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Background and Study Design

An introductory level A&P course was redesigned to accommodate both in person and remote students for the 2020-2021 academic year.

The following changes were made to both semesters of the course:

- Synchronous in-person and virtual class sessions twice/week
- Flipped-classroom components including graded daily homework assignments to promote pre-reading and class participation
- Weekly online quizzes with multiple attempts allowed (using the course LMS)
- Unit exams were online (using the course LMS), timed, and focused mostly on quick recall of objective content, with a few application-based short answer questions

The spring 2021 semester implemented the following changes:

- Bi-weekly virtual, required, instructor-led, small group sessions which allowed students to collaborate on case-based critical thinking problems
- Summative assessments were modified to include an open-book take-home case study problem set in addition to the timed, objective-based, unit exams

The goals of the spring 2021 course updates were to encourage the practice of application, synthesis, and evaluation of the course material and to promote collaborative learning through peer discussions both in and out of the classroom.

Study Details and Participants

Participants:

- Spring 2021 A&P 2 students
- n = 32 (34 students were enrolled in the course at the end of the semester, 2 students opted out of data sharing per the consent form.)

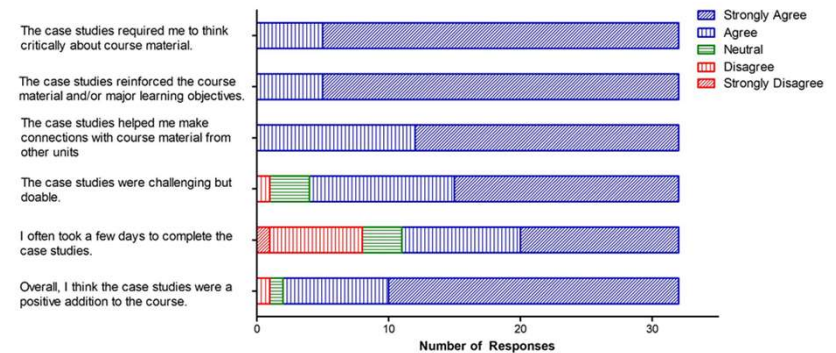
Assessment Details:

- Four unit exams, each with an objective and take-home portion
- The **online objective exam** was timed, open book, open notes, 50-52 questions in 60 minutes. *They were not allowed to work with other students per the Honor Code.*
- The **take-home exam** was case-study based, open book, open notes, and students were allowed (and encouraged) to work with each other. Students had 5-6 days to complete the take home exam depending on their section.
 - A shared Google doc template with space limitations for each answer was provided. Once complete the students uploaded their file to the course LMS.
 - An example of one of these take home exams can be found [here](#).

This study is approved under the SU IRB proposal SP21_03(Stokes).

Results

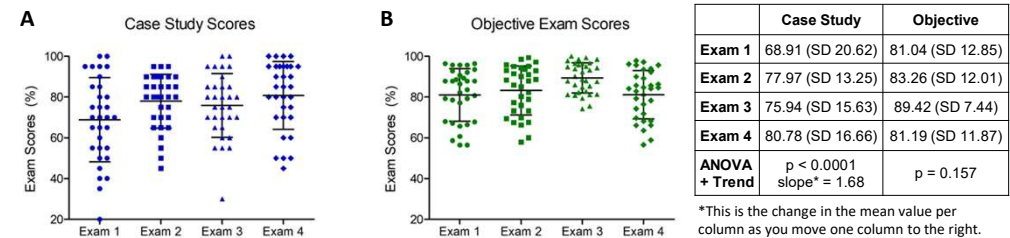
Figure 1: Student Perceptions of Case Studies. Students were asked to rate their level of agreement with six different statements about the case study portion of the exam. Student response rate was 100%. Select student comments are below the graph.



Select Student Comments:

- "I think the case studies were a great addition not only because they make you think critically but because they are also fun. They are a much better alternative to the short answer questions we had in A&P I."
- "I like that we got to discuss with other people, and that it forced us to make connections and really test our knowledge."
- "I also liked that we could work on it with other students... i feel like discussing it helped me work through the answers."
- "I liked how they were all unique and applicable to not just the class, but to real life as well."
- "I liked that we were able to have a lot of time to look at the questions and be able to answer them thoroughly using our notes and the textbook. It really allowed me to connect all the concepts together and be able to apply them to a clinical situation."

Figure 2: Student Performance on Exams. Student scores on the case study take-home exams (A) and the objective exams (B) are represented as a percent (%) of the total possible points. The table provides descriptive statistics and results from a repeated measures one-way ANOVA with a post-test for a linear trend.



Conclusions and Future Course Plans

- Overall the students' perception of the case study portion of the exam was positive (Figure 1).
- Students improved on the case study questions as the course progressed (Figure 2).
- The students appreciated both the critical thinking and challenging nature of the questions, as well as the encouragement to work together.
- Based on these data, I plan to use similar collaborative case-based assessments in future course iterations regardless of the the course format.