Modifying Active Learning Activities to Enhance Student Engagement

INTRODUCTION

Active learning that promotes higher order thinking can benefit student performance.

SCHOOL OF FOREST,

FISHERIES, AND

GEOMATICS SCIENCES

- Flipped classroom designs can provide valuable opportunities for active learning.
- However, the extent to which students engage in higher order thinking may vary based on the specific activities and questions provided in the flipped class.
- I examined whether changing the structure of two types of activities in an ecology class could enhance student engagement.

HYPOTHESIS

Student engagement (participation in and perception of the course) will increase when students are provided with additional opportunities for higher order thinking and discussion in small groups.

METHODS

Course Type

- A freshwater ecology class with a flipped classroom design.
- Enrollment is typically 10 20 upper-level undergraduate students and 3 – 5 graduate students.
- A typical class consists of students working in small groups (3 - 5 students) on sets of questions related to the lecture or a whole class discussion of a scientific paper.

Modification

- I added an open-ended "challenge" question to the beginning of each question set that required students to apply their knowledge to a new situation or to analyze or evaluate new information.
- I divided students into groups during discussions of scientific papers and had each group interpret one of the figures, synthesize the information it contains, and present it to the rest of the class.

Lindsey S Reisinger

EXAMPLE QUESTIONS

Challenge:

Think about three common types of freshwater habitats in your local area (such as small ponds/wetlands, lakes, reservoirs, streams, rivers, wetlands, or springs)

Based on what you have learned in this class about the drivers of local diversity, make a reasonable argument for which of these habitat types would have the highest diversity and which would have the lowest. It might help to focus on a particular group of organisms (phytoplankton, zooplankton, macrophytes, macroinvertebrates or fish).

Does your answer change if you are thinking about α diversity or β diversity?

Challenge:

Based on lake shape and depth, what formation process is likely to be responsible for creating each of these lakes? What are some characteristics of lakes formed by each of these processes?



Challenge:

You are designing a research project to look at how fire in forest landscapes affects algae in ponds. You are working in a forest where some areas are frequently burned by managers and other areas are not burned, and you plan to compare ponds in these two areas. You expect fire to release nutrients that can be carried to ponds when it rains.

How might soil permeability (to water) and heterogeneity in the aquifer affect your results?





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SCIENTIFIC FIGURE ACTIVITY

Figures

- What main methods were used to collect the data in the figure?
- Explain the relationship(s) in each panel of the figure. What could be happening to cause these relationships?
- Summarize the main point of the figure in one sentence (or a few sentences if needed)
- Share with the rest of the class!



Pawlick et al. 2013

Ollard and Aldridege 2022

RESULTS

- Compared with course evaluations from the previous year, student's ratings and self-
- reported participation in the course increased. 100% of students rated their participation as
- high or very high compared to 50% the previous year.
- Student ratings of the instructor increased from 4.31 to 4.67.
- Student ratings of the course increased from 4.25 to 4.71.

CONCLUSIONS

These results suggest that these achievable modifications to the class activities had a positive impact on student engagement and perception of the course.