REEXAMINING THE UNDERGRADUATE INTRODUCTORY BIOLOGY LABORATORY PEDAGOGY

Laura Camp
Richard Bland College of the College of William and Mary Petersburg, VA

Background:

Due to the COVID pandemic, undergraduate biology lab meetings underwent scheduling changes in order to complete the in person labs before a possible shut down. Lab times were decreased from two hours to one hour and labs meetings were twice per week instead of once a week. Students were assigned pre-lab online homework that included a narrated PowerPoint and a procedural video. Online quizzes were assigned for both.

Learning outcomes from previous semesters, a survey and interviews with the instructors will be used to examine the effects of these changes and the possibility of continuing this approach to labs in the future.

Research Questions:

Focus Question:

What are the effects of changing the pedagogy in an undergraduate biology laboratory course with respect to learning outcomes and student success?

Sub-Questions:

1) What are the quantitative differences in learning outcomes assessment after the implementation of the change in format in Fall 2020 and Spring 2021 semesters compared to prior semesters?
2) If there are quantitative differences in learning outcomes assessment, what were the reasons that some learning outcomes were more effected than others by these changes?
3) What was the student response to the accelerated format and the decreased laboratory time during the semester?
4) What was the instructor response to the scheduling changes, their teaching strategies, and the impact on the student learning?

Data Collection:

Assigned technologies	2018	2019	Fall 2020	Spring 2021
Pre-laboratory Assessment	X	X	X*	X*
Procedural Video Assessment			X	X
Proctored Online Exams			X	X

Table 1. Data Research matrix: Assigned Technologies

Instruments	2018	2019	Fall 2020	Spring 2021
Learning outcome data	X	X	X	X
Student surveys			X	X
Instructor interviews (Observance)	X*	X*	X	X
Teacher journal (Observance)				X

Table 2. Data research matrix: Instrumentation

X - Questions will refer to previous semesters.*

Data:

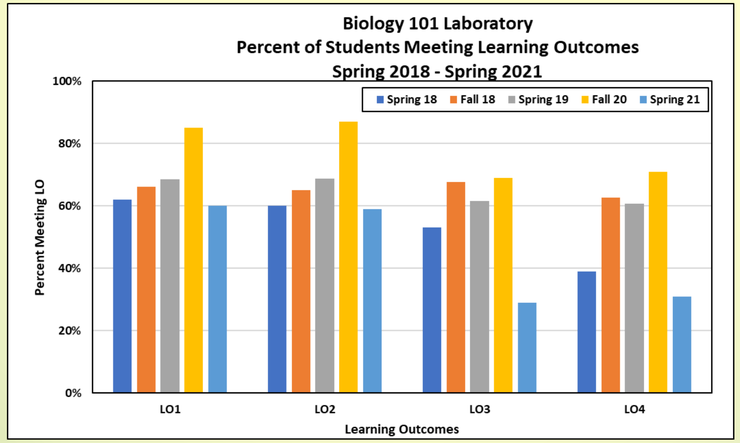


Figure 1. Spring 2018 – Spring 2021 Biology 101 Laboratory Learning Outcomes, (N=542).

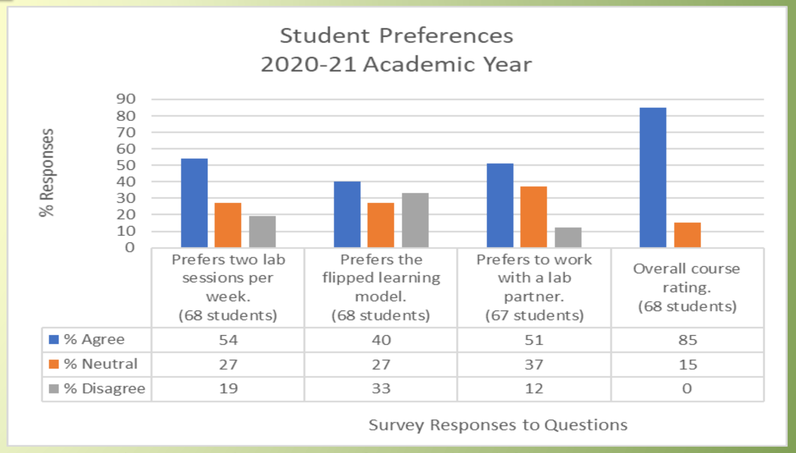


Figure 2. Student Course Evaluation Survey preferences at the end of the course for the 2020-21 academic year.

Treatment:

Prior to the Fall of 2020, all students in the biology laboratory sections over were taught using the traditional once a week, two hour lab sessions over the entire 15 week semester. During the Fall of 2020 and the Spring of 2021, students were taught using a flipped classroom with twice a week, one hour lab sessions in 7 weeks.

Discussion:

Learning outcome (LO) results in the Fall of 2020 showed a considerable increase from prior semesters. Results from the Spring semester of 2021 dropped for all LO compared to all prior years, however the number of students enrolled was much less compared to prior years. Overall, students preferred the online pre-lab instructional approach to the lab sessions. Instructors felt the students were more engaged during the one hour sessions after being exposed to the material prior to the lab session.