Preventing the Sophomore-Slump: Strategies for Keeping Biology Majors on Track in Their Second Year

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Introduction

St. Mary’s University, founded in 1852, is the first institution of higher learning in San Antonio and the oldest Catholic university in Texas and the Southwest. Undergraduate enrollment consists of 2,300 students of which, 70% are Hispanic and come from Texas. 80% of all first time freshmen live on campus and over 50% receive financial assistance. Close to 40% of undergraduates are pursuing a STEM degree and 97% of them are enrolled in a biology program.

In order to support the retention of second year biology majors, FANGS (Finding the Antidote to Negativity and Promoting Growth Mindset for Sophomores) was designed to provide experiences to prepare students for the second year of their biology major. Throughout the program, particular emphasis was placed on students’ feelings of self-efficacy in their biology and chemistry courses. Through engaging discussions, small group interactions, and competitive team activities, students actively explored relevant biology and chemistry topics aimed at increasing their preparedness for rigorous course content.

Student Objectives

- Develop strategies to prioritize and balance the demands of second year courses, study requirements and school activities.
- Participate in activities and content designed to reinforce the application of key concepts learned in year 1 in preparation for year 2 courses.
- Improve self-efficacy with respect to second-year biology and chemistry courses.

Program Information & Assessment Plan

Program Information

- 3 day program (first week of the Fall 2018 semester)
- 3 hours each day
- 3 Biology labs and 2 classrooms were utilized
- 5 biology faculty members and 6 student tutors
- Program was part of the lab requirements for:
  - Cell and Molecular Biology
  - Cell Biology
  - Genetic Principles
  - Organic Chemistry

Assessments

- Self-efficacy in biology courses
- Self-efficacy in chemistry courses
- Content assessment
- Demographics

Administration Schedule

- Start of Day 1 - Pre
- End of Day 3 - Intermediate Post
- End of Fall 2018 semester - Post

Activities

Day 1: DNA Modeling Challenge:

Students built a DNA molecule out of candy, described important components and explained the rules of base pairing and how DNA sequences relate to the final protein product.

Day 2: Quantitative Challenge:

Students used lentils and measurement instrumentation to solve a number of quantitative problems related to those commonly applied in biological and chemical contexts.

Day 3: Peer and Faculty Panels:

Students discussed the importance of self-efficacy, strategies for success in 2nd year biology and chemistry courses discussed and received tips on how to study for each course.

Attendance & Demographics

Start of FANGS: Day 1
- N = 76 Students
- N = 54 Biology Majors
- N = 61 Second Year

End of FANGS: Day 3
- N = 54 Students
- N = 45 Biology Majors
- N = 48 Second Year

Results Summary

Students with Pre and Intermediate Post Data:

- N = 44 Students
- N = 36 Biology Majors
- N = 41 Second Year

Pattern across majors (similar for biology majors alone):

- Increased self-efficacy in biology (t = 3.12, df = 43, p = .002, two-tailed) p < .05)
- Increased self-efficacy in chemistry (t = 2.60, df = 43, p = .012, two-tailed) p < .05)
- On average, students got about 1.5 more content items correct (p < .05)
- On average, students attempted 0.66 more correct items at the end of FANGS
- On average, students attempted more items at the end of FANGS
- On average, students attained about a 10 point increase in the percentage of correct content items (p < .001)

Future Work

Data collected at the end of the Fall 2018 semester will be analyzed and reported. Focus groups will be held with FANGS participants near the end of the Fall semester to capture more informative student perspectives. Collectively, these data will be provided to the biology faculty for use in planning for next year’s program. Students’ final grades will also be examined at the end of the Fall 2018 semester.

Best Practices

- Incentivize attendance to prevent program attrition
- Emphasize self-efficacy to promote confidence in 2nd year biology and chemistry courses
- Relate activities to relevant content to see an improvement in student retention of relevant subject matter
- Include both faculty and student peers to support participating students

References


