Department of Biological Sciences

Unit-Level Assessment Liaison Report - Farah Movahedzadeh

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Since the pandemic began in 2020, science professors have struggled to motivate students and to achieve student learning outcomes to their satisfaction. In March 2020, the lab sections of our courses moved to remote instruction, and we struggled since then to determine if the online simulations and virtual labs do an adequate job fulfilling the learning outcomes of the laboratory lessons.

My previous project with a team from other 2- and 4-years institutions on why students fail courses, conducted during 2013[1], 2014[2], and 2015[3] (administrated through students, faculty, and administrators respectively), revealed the main root-cause factors for this was that the lack of student motivation or interest was as a critical factor in student success or failure at the college level. Indeed, how can we motivate our students, is a million-dollar question. For my assessment project, in the spring of 2020, I managed to reach out to over 100 students who participated in my project-based learning courses from 2011-2019 in order to ask them which student learning outcomes (SLO's) of my class they considered to be motivational factors that helped them succeed. Most of the responding students indicated that the laboratory procedures were the biggest motivating factor. This finding, in combination with the pandemic-related changes, have been the basis for my assessment activities in the past year.

I. Department Buy-In and Outcome Definition

The Bio121 course is one of the most popular courses in the department of Biological Sciences at Harold Washington College. It is a cellular and molecular biology course which focuses on the introduction to biochemistry, molecular genetics, and cell structure, function and processes. Bio121 requires a laboratory component (taken from course definition). This course is a prerequisite for a number of courses in our department, including Bio122, Microbiology (Micro233), and Biochemistry (Bio290).

Because of Covid-19, we were forced to teach remotely from the Spring semester in 2020 through the Summer semester of 2021. Then from the Fall semester of 2021 we started offering three types of modalities (remote, face-to-face, and hybrid) for this course. Since then, we struggled to know whether the online simulations and virtual labs have been as effective as the face-to-face laboratory sections.

According to AmeriSpeak, a continuous national survey including students age 13-17, more than a third of high school students were “moderately” or “extremely” concerned that they would fail to complete their STEM courses during the semesters where remote-learning had been implemented [4]. Similarly, a majority of high school science teachers were reportedly struggling to incorporate hands-on learning and investigations in their schools’ remote platforms and considered these remote platforms “not conducive to learning” [5]

This unit survey has been designed in consultation with the Biological Sciences department chair. The ideal outcome of this project is to determine the efficacy of a specific lesson, microscopy, in different learning environments.

II. Assessment Research and Design

An example of a subject that only a face-to-face laboratory lesson can completely demonstrate is microscopy. Certainly, the parts and instructions on how to use a microscope can be taught remotely, but the experience of using a microscope to observe and understand laboratory techniques such as staining can only be demonstrated in an in-person environment where the students are able to interact with the equipment. This is a crucial lesson that needs to be taught for students to fully comprehend the learning objectives in the more advanced biology classes. Without this hands-on learning, the faculty in our department have been attempting to determine the shortcomings of the remote classes in understanding the course’s microscopy learning objectives.

The questions:

1. Have you learned the functions of a microscope?

2. Are you able to identify parts of a compound microscope?

Students had the options to rate their learning as follows:

Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree

or strongly disagree

III. Pilot Assessment Tools and Processes

Due to the simplicity of the survey, we determined that a pilot was unnecessary and that we could move directly to deployment of the assessment measure.

IV. Administer Specific Assessment

Bio121 is one of the most popular courses in our department and, on average, we teach ten sections of this course each semester. A two-question survey was designed and sent to the students who participated in all forms of modality (online, F2F, and hybrid) of Bio121 on October 28th, 2021. The faculty was also reminded to ask all participating students to complete the survey. We accepted completed surveys by the end of Fall 2021 semester.

V. Data Analysis

There were 147 students enrolled in Bio 121 that fall. The majority of those students were female (76.2%; n = 112). The ethnicity of participants was as follows: Latinx (54.4%; n = 80), black (25.2%; n = 37), white (10.2%; n = 15), and small percentages identified as Asian (6.1%; n = 9) and multi-racial/non-Hispanic (4.1%; n = 6). A plurality of the students (42.2%; n = 62) were between 18-19 years old. Out of 147 students who enrolled in this course, we had a good response rate of 76.87% (n = 113). Of the 147 students enrolled that semester, 78.23% successfully completed the course and 79.59% graduated or transferred after the term. 59.86% were from a F2F / hybrid course.

Our response rate was excellent, with 76.87% (n = 113) responding to the survey. Unfortunately, only 48.98% of the respondents included their name. The survey was not designed to collect student IDs or emails, and so the intended analysis seeking correlations and disaggregation by demographics and course and transfer success proved impossible.

In aggregated terms, the student responses to the questions showed that while a majority of the students (91%) either strongly agreed or somewhat agreed that they had learned the functions of a microscope, a lower percentage (84%) either strongly agreed or somewhat agreed that they were able to identify the parts of a compound microscope.

VI. Supporting Evidence-Based Change (Use of Findings)

Because of the aforementioned sample problem, we couldn't come up with any clear conclusion. However, the very positive aggregate results about the microscope knowledge suggests continued confidence in the department's approach to microscope instruction, at least until a future iteration of the assessment, with necessary revisions, allows for more detailed insight.

Success Factors

The assistance of the college's Director of Research was helpful with the design and deployment of the measure, however, collection and analysis of the survey was complicated by her departure from the college without having completed the analysis. In our conversations I was led to believe that the data set was adequate for our aims, but that turned out not to be the case, which we only learned when it was too late in the spring semester to try again.

Nonetheless, the high response rate suggests that the survey design and methods are sound, and we are optimistic that a second attempt will yield the information we hope to gather.

Recommendations

I recommend that we attempt this assessment again in the fall of 2022. In this study, less than 50% of the responses were anonymous, and 34/147 of the responses were blank. This survey needs to continue to be sent to students that participate in all types of classes we offer for this course in the fall, and samples need to be collected appropriately. An additional question could be added to the survey which shows a proficient knowledge of microscopy, or even multiple questions to confirm the respondent's proficiency. With assistance from the Vice Chair of Unit Assessment, we need to develop a different methodology so that we can follow up with students' success, retention, and persistence.

References:

1. Cherif, A., Movahedzadeh, F., Adams, G., Dunning, J., "Why Do Students Fail? Student's Perspective?", April 5-9, 2013, HLC annual conference, Chicago

2. Cherif, A., Adams, G., Movahedzadeh, F., Marty, M., & Dunning, J. "Why Do Students Fail? Faculty's Perspective", April 10-14, 2014, HLC annual conference, Chicago

3. Cherif, A., Movahedzadeh, F., Martyn, M. "Why Do Students Fail? Academic Leader's Perspective", HLC annual conference, March 29, 2015, Chicago

4. Sparks, S. D. "Science Teaching and Learning Found to Fall Off in Pandemic", April 12, 2021. https://www.edweek.org/teaching-learning/science-teaching-and-learning-found-to-fall-off-in-pandemic/2021/04

5. Bushweller, K. "How to get more students of color into stem: tackle bias, expand resources". April 12, 2021. https://www.edweek.org/teaching-learning/science-teaching-and-learning-found-to-fall-off-in-pandemic/2021/04