

BS Biological Sciences 2021-22 Learning Outcome Assessment Report

Learning Outcome 1 – Scientific Communication

Methods

We assessed students' mastery of written communication in Biological Sciences using a term paper assignment common to the three 4000-level writing intensive courses within the department (BIO 4110: Biomedical Technology and Molecular Biology, BIO 4120: Comparative Physiology, and BIO 4130: General Ecology). Each course requires multiple writing assignments that require revision, and the final term paper assignment is graded using a rubric common to all three courses. We used the distributions of the points earned for the final term paper based on the rubric to assess students' mastery of written communication in the biological sciences. The proportion of students meeting or exceeding the minimum criterion of 80% of the rubric points (56 of 70 points) is reported here, with our stated goal being 80%.

Results

In the 2021-22 academic year, we assessed 85 students earning a BS in Biological Sciences who completed one of the writing intensive courses, and 88% of these students scored at least 80% of the points on the rubric for the final draft of their term paper in the writing intensive courses. This proportion well exceeds our stated goal of 80%. Notably, 74% of the students scored at least 90% of the rubric points, and 22% scored 100% of the points. Three of the 85 students (4%) scored fewer than 60% of the rubric points on the term paper assignment.

Learning Outcome 2 – Conduct experiments

Methods

We assessed students' ability to successfully conduct scientific experiments at the introductory level using a lab report assignment required of all Biology majors in the BIO 1511 course. The lab report summarizes a laboratory experiment that all students must conduct, and the assignment is graded using a rubric common to all sections. We used the distributions of the points earned for the lab report based on the rubric to assess introductory students' ability to conduct experiments in the biological sciences. The proportion of students meeting or exceeding the minimum criterion of 80% of the rubric points is reported here, with our stated goal being 80%.

Results

In the 2021-22 academic year, we assessed 167 students working towards a BS in Biological Sciences who completed the lab report in BIO 1511, and 80% of these students scored at least 80% of the points for the assignment. This proportion exactly meets our stated goal of 80%. Notably, 50% of the students scored at least 90% of the points, and 18% scored 100% of the points. Twenty of the 167 students (12%) scored fewer than 60% on the lab report.

2022-23 Action Plan

As a consequence of the 2021-22 assessment results, three actions are planned for the 2022-23 academic year:

1. Continued emphasis on scientific communication. In revising our undergraduate curriculum this year, the faculty agreed to maintain an emphasis on scientific communication, but to expand it beyond the three writing intensive courses and beyond writing alone. Efforts will need to be undertaken to develop a rubric that can be used to assess scientific communication other than writing across many more courses.
2. Develop assessment methodology for new Learning Outcome #2 (interpreting quantitative data) and for the upper-level lab courses in Learning Outcome #5 (experiments).

Timeline for Action Plan

A timeline for the implementation of the action plan for the 2022-23 academic year follows:

1. Continued and improved emphasis on scientific communication will be assessed using writing and oral assignments in multiple courses (at formative and advanced levels) rather than the writing-intensive courses alone. Curriculum revision has designated multiple courses as scientific communication courses in the department, and standardized rubrics will be developed for assessment. Rubric development will occur prior to the Fall semester.
2. Courses at the introductory, intermediate, and advanced levels will be identified that include quantitative interpretation to be used as assessment. Likewise, lab courses will be identified for the assessment of Learning Outcome #5; upper level lab courses are now required for the BS degree in the department, and these approved courses as well as the introductory courses will form the basis for future assessments. Standardized rubrics for assessment will be developed for both LOs prior to Fall 2022.