

Program-Level Assessment: Annual Report

Program: BA/BS/Minor Biology

Department: Biology

Degree or Certificate Level: Undergraduate

College/School: College of Arts & Sciences

Date (Month/Year): December 2020

Primary Assessment Contact: Elena Bray Speth

In what year was the data upon which this report is based collected? 2019-2020

In what year was the program's assessment plan most recently reviewed/updated? 2018

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle?

The programmatic Student Learning Outcomes adopted by the department's faculty in 2017 for the Minor, BA, and BS in Biology are:

Minor - Students minoring in Biology will be able to:

- 1) Effectively apply core biological concepts to solve problems
- 2) Critically evaluate scientific information from multiple sources, including that from the primary literature
- 3) Apply biological principles to global societal issues

Bachelor of Arts - In addition to 1 – 3 above, B.A. degree students will be able to:

- 4) Draw valid conclusions from quantitative data
- 5) Formulate hypotheses that address research questions
- 6) Correctly perform common laboratory and/or field techniques

Bachelor of Science - In addition to 1 - 6 above, B.S. degree students will be able to:

- 7) Effectively apply the scientific method to test hypotheses

In this assessment cycle, the Biology Department Assessment Committee has focused on developing and field-testing an assessment instrument that could be used to complement and reinforce course-based assessment of **LO1 through LO4**. Committee members crafted a set of multiple closed-response questions (modeled after published examples of conceptual assessments for undergraduate biology) that could be implemented in multiple courses along the curriculum. The assessment instrument was field-tested with a cohort of over 800 entering freshmen (Fall 2018) and with a smaller group of graduating seniors (n=24; Spring 2019). We intended to expand data collection to a larger sample of upperclassmen at the end of the Spring 2020 semester, in order to perform analyses of validity and reliability of our question set. Unfortunately, following the sudden switch to online instruction caused by the COVID-19 pandemic, we were unable to collect assessment data in the classroom as planned, and had to place this project temporarily on hold.

In a parallel effort, we have started collecting information from Department Faculty (through an online survey) to begin identifying appropriate sources of data and metrics for assessing the remaining learning outcomes (**LO5 through LO7**).

2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

The biology assessment instrument described above was distributed in person to students enrolled in BIOL 1245 (Principles of Biology I Laboratory) in Fall 2018, and to students enrolled in BIOL 4280 (Biology of Fishes) in Spring 2019. Students completed the assessment during class time, and the data were collected in the form of paper scantron sheets for rapid machine-scoring.

3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and include them in/with this report.

The assessment instrument contains 5-11 questions for each learning outcome. An answer key was developed along with the questionnaire items, for use with a scantron-reading machine.
The assessment tool, complete with answer key, is included with the report, as a separate file.

4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

1. **Pilot Assessment Instrument (targeting student achievement of LO1-4):** Preliminary results obtained from analysis of the pilot dataset are encouraging, yet remain to be refined. The first-year student sample ($n > 800$) included 75 students who self-identified as Biology majors; the senior class sample included 24 Biology students nearing graduation. Preliminary analysis of the aggregate data indicates that entering freshmen achieved less than 50% correct answers on each of the outcomes assessed, while graduating seniors provided greater than 70% correct answers. While these data suggest that the instrument has enough resolution to discriminate among students at the beginning and end of the program, a finer-grain analysis of the results will be necessary to identify strengths and weaknesses of the instrument itself, and of our sampling plan.
2. **Faculty Survey (targeting faculty inclusion of LO 5-7 in their UG teaching and training):** most Biology faculty members, to date, have participated in the survey. Faculty provided very valuable information about the specific programmatic LOs they intentionally target in the context of their structured laboratory and lecture courses, as well as in the context of independent inquiry, unstructured courses (e.g., BIOL 4980 - Advanced Independent Study or BIOL 4970 - Library Project).

5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

1. Data from the student assessment with our pilot instrument will need further mining, including analyses of reliability and item discrimination, possibly followed by focus groups with faculty and students to determine validity and improve the tool if necessary.
2. We are excited to see (from the survey) that faculty are incorporating several program LOs into their course goals; our next step will be to generate a comprehensive map of the programmatic LOs across the entire Biology curriculum. That will be the first step toward generating a data collection plan that incorporates course-based evidence for all outcomes (in addition to the department-wide biology assessment instrument addressing outcomes 1 through 4).
3. Based on further review, and on the results of the faculty survey, we may be coming close to a round of review and refinement of our Learning Outcomes (i.e., we may find it useful to combine outcomes that are very closely related, and we may need to fill some gaps in the current LO set).

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

- A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

We have not had a conversation about this assessment cycle with the department. The Biology department has been dealing with disruption of normal activities since summer 2017, when our building burned in a fire. Reconstruction has been long and painful; some degree of normalcy was only beginning to be restored, when the COVID-19 pandemic changed our plans again. Ten faculty offices and laboratories were only able to return to the renovated Macelwane Hall during summer 2020. In addition, this year, we have had changes in departmental leadership and in the composition of the program assessment committee. We look forward to returning to this topic with the faculty in 2021.

B.

- B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies

- Course content
- Teaching techniques
- Improvements in technology
- Prerequisites

- Course sequence
- New courses
- Deletion of courses
- Changes in frequency or scheduling of course offerings

Changes to the Assessment Plan

- Student learning outcomes
- Artifacts of student learning
- Evaluation process

- Evaluation tools (e.g., rubrics)
- Data collection methods
- Frequency of data collection

Please describe the actions you are taking as a result of these findings.

N/A

If no changes are being made, please explain why.

The current LOs were only approved in AY 2017/2018 - and we have not yet had the opportunity to analyze and discuss our findings with the faculty, as explained above.

7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

N/A

B.

B. How has this change/have these changes been assessed?

N/A

C.

C. What were the findings of the assessment?

N/A

D.

D. How do you plan to (continue to) use this information moving forward?

N/A

E.

IMPORTANT: Please submit any assessment tools and/or revised/updated assessment plans along with this report.