

**Assessment Trends Report
Student Learning Outcomes in Biology**

November 2009

The goal of this report is to evaluate the assessment of student learning outcomes in Biology. The report addresses four key questions to evaluate the quality of our assessment processes.

(1) How have we sustained the assessment effort over a multi-year period of time?

How many years have you completed an annual assessment report?

2006 2007 2008 2009

All faculty members in the Department of Biology collaborated on the development and design of their student learning outcomes. All Biology faculty take part in discussions about the validity of the student learning outcomes, the reliability of the rubrics, and the norming of raters that needs to take place to yield the most useful data.

(2) How do we systematically and comprehensively collect and analyze data about student learning?

The learning goals for Biology majors are:

Graduates with a Biology Degree should:

1. Understand and be able to apply the concepts of evolution and natural selection.
2. Have exposure to the following general areas of biology: ecology, taxonomy, morphology, function, molecules/cells and genetics/reproduction.
3. Be able to use and apply critical thinking to life situations.
4. Be able to present in oral and written form a completed research project, using testable hypotheses, logical arguments and appropriate methodologies and equipment.

All faculty collect data at different points in the Biology curriculum, although the Department Chair is the ultimate clearinghouse for data collection. The faculty collect student artifacts and evaluate them according to departmental rubrics; these artifacts include senior seminar reports and exams. And while faculty provide data to the department chair, the analysis of that data falls to her.

The departmental learning goals are assessed as follows:

- Assessment for goal 1 is done using a pre-test and post-test format. Testing is conducted at four times using a test consisting of evolution related questions from the freshman courses, Evolution and Ecology (BI 105) and Attributes of Life (BI 108). The first test is given at the beginning of BI 105 and the second one at the end of BI 105. A third exam is given at the end of Attributes BI 108 and a final one when students complete the senior seminar course (BI 481 or 482).
- Assessment for goal 2 is done using the grades in six courses, one in each area mentioned in the goal. Each student must receive a C- or better in one course in each area in order to satisfy the requirements for graduation. This goal will also soon be assessed using the Major Field Test in Biology.
- Assessment for goal 3 is done using a rubric to grade two papers, one written the first year at Millikin, and the one from senior seminar research. These papers must be of an investigative nature that draw conclusions from data personally collected or analyzed by the student.
- Assessment for goal 4 is done using rubrics to assess performance in Senior Seminar, which is required of all majors.

The data is gathered for all biology majors.

	Student Learning Outcome 1	Student Learning Outcome 2	Student Learning Outcome 3	Student Learning Outcome 4
AY 2006-07	GREEN/YELLOW	YELLOW	YELLOW	GREEN
AY 2007-08	GREEN/YELLOW	GREEN/YELLOW	YELLOW	GREEN
AY 2008-09	GREEN/YELLOW	GREEN/YELLOW	GREEN	GREEN

(3) How do we use the analysis to improve curriculum and pedagogy and to inform decisions about budgets and strategic priorities?

The department Chair distributes a draft of the annual reports to the Biology faculty, who then make their own contributions to the report and resubmit it to the Chair. The Chair then designates a portion of regularly scheduled faculty meetings to discuss the findings, and she also calls special, dedicated meetings as the assessment data comes in. All of these meetings occur during the academic year.

Three highlights in particular demonstrate that the Biology faculty use their assessment data to improve their courses and their teaching effectiveness:

- Based on assessment of incoming students' knowledge of evolution and natural selection, the faculty determined that they needed to teach this cornerstone of their discipline with more intentionality and emphasis. They "hit it hard" in the first year, as the department chair has said. As a result, students' knowledge of this foundational material increases by about 75% from the beginning to the end of the first year, as demonstrated by the administration of pre- and post-tests.
- The faculty agreed to refocus and rename a core course, Attributes of Life. They now call it Diversity of Life, which more accurately reflects the course content they want to deliver. As a result, the course fits better into the logic of the curriculum, enabling students to build on prior knowledge. Not surprisingly, then, students' knowledge in this core area of studies in Biology has also increased.
- Because the faculty determined that too many students were entering Senior Seminar underprepared, they have now decided to collect some material from the students a semester in advance. By preparing the rising seniors this early, the faculty have helped them succeed in the seminar.

(4) How do we evaluate, modify, and continue to improve the student learning assessment process in this program?

Based on the conclusions they've drawn from their analysis, the Biology faculty have made decisions that have both improved their assessment process and their students' learning outcomes. Review of the rubrics, for example, has demonstrated that the faculty needed to modify them, and so they clarified the stated expectations, both for their students and for themselves. Furthermore, the department chair identified a specific reform she would like to implement: delegating the analysis of the data to all of the faculty so that all members of the department can participate more actively in the discussion of student learning in Biology. Based on the findings in their annual reports, the faculty also plan to administer the Biology Major Field Test (MFT); by measuring their students against national standards, the faculty expect to increase the students' motivation—and thus their performance level—by taking this test. The faculty have also discussed streamlining their data collection by planning a move to electronic artifacts; doing so would give them a larger, and therefore more statistically significant, pool of data to evaluate.

Evaluation from Focus Visit Leadership Team (includes Academic Deans, Program Leaders, and Focus Visit Report Writers)

Rating: Green

Academic program	Goal 1 (multi-year)	Goal 2 (data collection)	Goal 3 (Use assessment to improve)	Goal 4 (improve assessment)	Total
Biology	3	3	3	3	12

Based on the four questions/criteria, the Focus Visit Leadership Team rates Biology as Green. The faculty in the Biology Department have a strong record of assessing their assessment process. They regularly review and improve courses, rubrics, and data collection. They make decisions based on data analysis. They are developing a more systematic process. Their goal is continued sustainability with increased faculty participation. With the development of comparisons over time—this is the first academic year that the department has papers from their students' freshman and senior years—the department chair predicts that the validity of the comparisons will increase. And as the faculty continue to refine their expectations and communicate those expectations to their students, they can confidently predict even greater achievement in student learning in the Biology major.