

Institutional Effectiveness Report

General Education

Department of Biology
Academic Year 2021-2022

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Executive Summary of Report

The Biology Department assessed student achievement this year in two general education courses offered by the department (Biology 103 and 104) with cumulative exams. This academic year we again used “pre-post testing” to assess achievement from the beginning to the end of the semester. We administered different but comparable forms of each exam that we created to ensure that the student is not taking the same exam twice. Achievement did meet benchmarks and targets for both classes. Achievement improved by 40% in Biology 103 and 21% in Biology 104 from the beginning of the semester to the end of the semester. We will continue discussions of issues related to achievement. To maintain and improve student performance we will enhance instruction in areas we determine from the exam results that need to be reinforced.

General Education - Science-Related Goal:

Goal 5: The ability to describe the natural world and apply scientific principles to critically analyze experimental evidence and reach conclusions

Student Learning Outcomes derived from that goal:

1. The student will have the ability to describe the natural world.
2. The student will the ability to critically analyze experimental evidence and reach conclusions.

Assessment Methods

1. The student will have the ability to describe the natural world at the overall average of: Baseline (3-year average of Bio 103 and Bio 104) 66%, Benchmark 66%, Target (4 year, set in 2021) 68%, as measured by a cumulative exam.
2. The student will the ability to critically analyze experimental evidence and reach conclusions at the overall average of: Baseline (3-year average of Bio 103 and Bio 104) 60%, Benchmark 60%, Target (4 year, set in 2019) 64%, as measured by a cumulative exam.

The Department of Biology offers two courses that non-majors may take to complete science-related general education requirements at FMU (Biology 103 and 104). To assess student success in meeting the science-related learning outcomes 1 and 2 above, a course-specific cumulative exam (multiple choice format) was administered. We implemented the use of “pre-post testing” to assess achievement from the beginning to the end of the semester in each course. We created different but comparable forms of each exam to ensure that the student is not taking the same exam twice. We administered the exam to Biology 103 students at the beginning and at the end of the fall semester 2021 (103, section 1). The online section of Biology 103 only received the exam at the end of the semester. We administered the exam to Biology 104 students at the beginning and at the end of the spring 2022 semester. We regard the mean percent score of the exam results for all students to be a reasonable indicator of student-success in meeting the science-related general education learning outcomes.

Assessment Results

Student Learning Outcomes

1. The students demonstrated the ability to describe of the natural world at an average of 61% as measured by a cumulative exam. Since that is less than the benchmark of 66% and the target of 68%, neither of those goals was achieved.
2. The students demonstrated the ability to critically analyze experimental evidence and reach conclusions at an average of 53% as measured by a cumulative exam. Since that is less than the benchmark of 60% and the target of 64%, neither of those goals was achieved.

Tables 1 and 2 below lists the exam questions that apply to each learning outcome and summarizes the results. We administered exams at the beginning and the end of the semester.

Table 1. Summary of results of the Biology 103 cumulative exam administered in Fall 2021 at the beginning and at the end of the semester. Exams were not administered in the 2020-2021 semesters due to COVID-19 related restrictions. Results from the end of the Fall 2019 semester are included for comparison.

Student Learning Outcome	Assessment (questions that pertain to each learning outcome)	Result (Mean percent correct)		
		Fall 2019 End	Fall 2021 Beginning	Fall 2021 End
1. The student will have the ability to describe understanding of the natural world.	1, 6-8, 11-15	71.4	56.9	83.2
2. The student will have the ability to critically analyze experimental evidence and reach conclusions.	2-5, 9, 10, 16-18	65.6	54.4	73.2
Number of students		132	53	86
Overall mean		68.5%	55.7%	78%

Table 2. Summary of results of the Biology 104 cumulative exam administered in Spring 2022 at the beginning and at the end of the semester. Results from the end of the Spring 2021 semester are included for comparison.

Student Learning Outcome	Assessment (question that pertains to each learning outcome)	Result (Mean percent correct)		
		Spring 2021 End	Spring 2022 Beginning	Spring 2022 End
1. The student will have the ability to describe understanding of the natural world.	1, 2, 4,6-8, 10, 11,15, 17, 19,21-23	61.3	68.4	82.7
2. The student will have the ability to critically analyze experimental evidence and reach conclusions.	3, 5, 9, 12 -14, 16, 18, 20, 24, 25	53.0	53.7	65.0
Number of students		68	43	87
Overall mean		57.2%	61.9%	74.9%

Student achievement exceeded the benchmarks and targets of both SLO 1 (understanding the natural world) nor SLO 2 (critically analyze experimental evidence and reach conclusions) (Benchmarks: SLO 1 66%, SLO 2 60%; Targets: SLO 1 68%, SLO 2 64%) in both the overall exam average and on questions that assessed each SLO separately. Achievements at the beginning of Spring 2022 in Biology 104 were higher than achievements at the end of Spring 2021. The low scores in 2021 were likely due to COVID-19 related impacts. Overall achievement increased by 40% in Biology 103 and 21% in Biology 104 from the beginning of the semester to the end of the semester.

Action items

An action plan that addresses the following areas is being developed for implementation during the next academic year:

Student Learning Outcomes

1. The student will have the ability to describe the natural world.
2. The student will the ability to critically analyze experimental evidence and reach conclusions.

1. We will continue to administer the cumulative exams in both semesters (Bio 103 Fall, Bio 104 Spring) and to as many sections of the courses as possible.
2. To improve student achievement, faculty reinforced certain core principles and concepts and critical thinking skills. Benchmarks and targets were achieved in Bio 104. We will

ensure that instruction will continue to be enhanced in all areas in both courses in 2022-2023.

3. We will continue our practice of administering pre- and post- exams at the beginning and end of the courses in the 2021-2022 academic year. Creation of different but comparable forms of each exam for both courses (Bio 103 and 104) was completed but evaluation of the results for reliability and refinement of the exams is not complete and will be carried over to the 2022-2023 academic year.
4. We evaluated the exams for balance between content vs critical thinking. However, the evaluation of exams based on individual exam item analysis results from test item statistics will be carried over to 2022-2023 to determine if more question refinement is warranted. That continued evaluation and revision of the exams to better assess the students will be carried over to the 2022-2023 academic year.