

Biology Learning Outcomes Pilot Study

Introduction:

The following are the results of the pilot study for Biology in gathering indirect evidence of student learning; that is student self-perception of their level of learning in outcomes associated with general education, active learning, mission of the college, and department specific goals. Normally, student survey data is measured against Faculty Information Form (FIF) data to assess students' perceptions of their learning compared to how well faculty felt they addressed particular goals in their courses, but the sample size (1 form) from faculty members was too small to be considered statistically significant, so this analysis is not included. Student data was collected from 133 surveys submitted by students who were taking Biology classes in the spring of 2008.

In order to present the data in a concise and familiar format, the model is based on the output of the Course and Instruction Evaluation Forms the faculty receive at the end of each semester. However, the reporting scale on this survey differs from the evaluation forms. The ranks used on these evaluations were: rank 5 for students who felt they significantly improved in a particular learning goal, rank 4 for above average improvement, rank 3 for average improvement, rank 2 for somewhat, rank 1 for students feeling as if they did not improve at all in a particular area, and rank 6 for a question not applying to the course.

Report Organization:

The frequencies of responses for each rank are reported on the data sheets under the Course Evaluations sections. Some surveys had blanks or multiple bubbles filled in, and while not included in this report, they are counted toward the total of $n=133$. In order to be consistent with the format of the Course and Instruction Evaluation forms, which present data on percent (%) below good, included on this report are percent below average ($\% < 3$), and percent above average ($\% > 3$) for comparison. These percentages do not take into account rankings of 6 (does not apply), or 3 (average.)

There is one section to this report, which includes all of the frequencies of responses, % above and below average, and student means. This primary section is broken into the following sub-sections: General Education Learning Goals, Active Learning Goals, College Mission Goals, and Biology course goals. These sub-sections represent all forms of learning pedagogy valued by the college. All percentages reported at 50% or more above average are shaded, and represent perceived best learning achieved by students.

When examining the data, keep in mind that all Biology classes were analyzed together.

Summary of Findings:

In general, biology does not appear to be meeting many of the college goals with a few exceptions. The specialized focus of most Biology courses could be partially responsible for the low student means and perceived learning. For most of the college goals, biology courses tended to have high values for the "does not apply" category.

According to the data, understanding of the natural world was the only General Education learning goal that students reported was met by the Biology courses they were in. While some of the learning goals, like improving artistic sensitivity, do not necessarily apply to all Biology courses, there are some areas that do apply and where there can be development. For example, 43% of students reported that they improved in technical competence. Not all biology classes include hands on assignments, but through experimentation and analysis of material it seems likely that a student should be able to gain some insight into technical aspects of the sciences and laboratories. In addition, since improving scientific writing is one of the biology specific course goals, it is of note that only 19% of students feel they improved in their clarity of writing. This low percentage might be in part due to the fact that 51 students reported that improving writing did not apply to their course. In general, low averages should be acknowledged and if possible addressed, especially when the students report that 90% of the General Education goals are not being well attended to in their courses.

The college continues to value more students centered, active learning pedagogies such as discussion, oral presentations, and collaboration with others. Based on this data, the Biology courses do not appear to be addressing these goals well. 37% of the students reported they improved in discussion, which is very low, even with 18% claiming it did not apply to their course. Beyond discussion, only 34% of the students surveyed reported they improved in oral presentation and 43% believed they improved in their ability to work with others. Since 49 students, over one third of those surveyed, reported that oral presentations did not apply to their courses, the low percentage of student learning could be due to students opting to give a low ranking instead of claiming oral presentations did not apply to their course. However, the collaboration with others question has a much lower rate of students who chose "Does not apply", and might be something worth examining. Since biology is a laboratory focused field, one could assume that working on a laboratory with a partner would lend itself to collaboration, but this does not appear to be happening in the minds of the students. In general, both means are only a bit above the average range of the scale, so more stress could be placed on these goals going forward.

Students reported that only one of the college mission goals was well addressed in their classes. The areas where the most improvement is needed are in addressing the goal of improving leadership ability, accepting the challenges of creative visions, and in forming connections among people. Science is often a collaborative field, so goals of collaboration and forming connections could be important to future work in biology.

Overall, more than half of the students surveyed reported they had achieved a greater than average improvement in five of the eight Biology specific learning goals. While none of the percentages above average were 70% or higher, the fact that most Biology courses are content specific and not all courses feature laboratory work could result in a reduced number of students reporting that they improved in areas which were not directly addressed by their course. The Biology specific goals dealing with written and oral communication of findings lag behind the other goals, and might be examined especially considering how communication relates to general college goals. "Best Expectations" is an area which shows very positive results. In all three categories relating to course expectations, students reported that they knew what to anticipate before taking the course.

Further analysis of the data presented on the following sheets is the providence of the Biology department at Mills. Since this is our pilot study, and we plan to do an analysis for all departments in the future, we likely cannot do such complete reports in the future. Therefore, we would like to request feedback on what data and information you found valuable. What was useful and how? What do you wish we had included in the report? Do you like the structure? Please, e-mail aknudsen@mills.edu with feedback on this report. Thank you.