PLO# 3: Scientific Communication (Assessed 2012)

Students will be able to present the findings and implications of scientific research through written research reports, oral presentations and scientific posters.

Assessment method

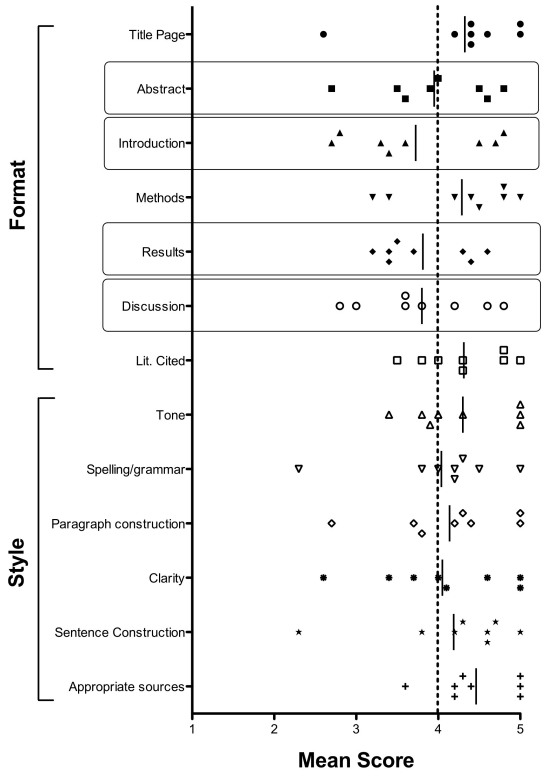
To evaluate departmental progress in this goal, we have focused on written papers that were produced by senior students in three of our upper division biology classes: Biology 110, Microbiology; Biology 130, Cell Biology; and Biology 132, Molecular Biology. We analyzed 9 research papers; three from each of the three courses, randomly selecting an "A, a "B," and a "C" paper from each. All department faculty members read all 9 papers (faculty were not given the students' names or their grades) and scored each with a rubric that focused on two general areas of competency: Scientific Format, and Scientific Style. Not by design, two of the "C" papers from two different courses were actually written by the same student. We therefore omitted data from one of these "C" papers, thus reducing our student sample size to eight.

Benchmark

Group mean of 4.0 or above on each of the key criteria listed in the rubric

Results:

Figure 1. Compiled mean student scores on writing rubric



a.) Our upper division students did a good job writing in an appropriate scientific tone and style. The group means for all of the statements relating to style were 4.0 or above (meeting the benchmark)

b.) With regards to format, students showed some deficiencies in effective use of the three core sections used in scientific reports – the Introduction, Results and Discussion sections, as well as (for a few) the writing that occurs in a paper's Abstract. The group means for these sections fell somewhat below our benchmark of 4.0 (falling below the benchmark).

Generally, students could improve in the following areas:

- understanding the rationale for doing what they are doing and connecting their research question to previously published literature (=Introduction),
- comparing their own data to previously published literature (=Discussion),
- understanding what statistical analysis is required (=Results),
- choosing the most relevant literature sources (although significant progress has been made in discerning the difference between peer-reviewed literature and other non-scholarly sources).

Closing the loop:

- Writing instruction for the more difficult sections in a scientific paper (Introduction, Results and Discussion) needs to be improved given the observations above.
- We will meet during fall 2012 to review the report guidelines currently used for the Genetics course, where scientific writing is introduced (COMPLETED).
- We will implement, on a trial basis, the use of upper division biology students as departmental tutors during the second semester of this academic year. These tutors will run "open," several-hour study/help sessions, scattered throughout the semester, for those students primarily (but not restricted to) enrolled in the BIO-005 course that will run during the spring semester, 2013. Student tutors will assist BIO-005 students, for instance, in working with correct poster formatting, utilizing appropriate literature resources, running studying sessions before exams, and could provide needed "guidance" for students in other courses (Genetics, particularly) as well (COMPLETED).
- We need to modify the way we select student papers to read for assessment. In future, we plan to assess a larger and completely random sample of upper division, senior papers.