SUNY College at Brockport

General Education Natural Science Assessment (Outcome #2)

Instructions: Please provide the information requested in the form below and return to P. Michael Fox, Vice Provost for Academic Affairs, 618 Allen Administration Building. Fall assessments should be submitted in January 2015; Spring assessments in May 2015.

**Department:** Chemistry and Biochemistry  
**Course Reporting Data:** NAS 273 Investigating Physical Science

There are two General Education student learning outcomes for the Natural Sciences. Assessment data for the two outcomes are to be submitted on separate report forms.

**Natural Science Student Learning Outcome #2:**

*Students are able to apply their knowledge of scientific data, concepts, and models in one of the natural sciences*

**Sources of Assessment Data on Outcome #2:**

Data can be test scores from items on exams testing a specific understanding of the scientific method; data can also be scores on laboratory reports that evaluate students’ practical understanding of scientific method; or other sources as specified below.

Semester(s) in which reported assessment data were collected: Fall 2014 ☐ Spring 2015 X Both ☐

Below briefly describe how you collected these assessment data. What specific assessment methods—exams, assignments, lab reports, or other instruments did you use to acquire the data reported. Use of a scoring rubric is highly recommended for less-quantitative assessments.

- **In each lecture meeting (session), a series of multiple choice iClicker questions were posed to the students to assess current understanding of material by analyzing word problems, performing mathematical manipulations, and applying concepts and interpreting scientific models. Students were allowed 1-3 minutes on average to work through problems and discuss with their peers before ringing in a final answer. One or two sessions of iClicker questions were evaluated from each of the 10 units covered in NAS273 (11 total sessions). The sessions were chosen based on the fact that they covered a major concept in that unit and in most cases that the questions were similar to ones that appeared on exams, so that there may be a comparison done between the two.**

- **A series of multiple choice questions (13 in total) that largely related to the iClicker questions were chosen from exams #2, 3 and 5 to be evaluated for correct vs. incorrect (Exams #1 and 4 were only left out because of timing issues that did not allow me to gather the necessary data).**

- **The total correct answers were added together and divided by the total possible points. Missed sessions for iClickers were dropped from the assessment and total possible points adjusted accordingly.**

Enter the total number of students from whom you collected the assessment data. N =48  
CHECK: Data are totals from a multi-section course? ☐ Data are only from one course/section? X

In the spaces provided below, enter the number of students (and percent of total) who scored in each of the achievement levels indicated:

<table>
<thead>
<tr>
<th>Achievement Level</th>
<th>Number of students who reached this level</th>
<th>Percent of total students assessed who reached this level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeded Criterion (A/B) 80-100 %</td>
<td>25</td>
<td>52.1%</td>
</tr>
<tr>
<td>Met Criterion (C) 70-79.99%</td>
<td>16</td>
<td>33.3%</td>
</tr>
<tr>
<td>Approached Criterion (D) 60-69.99%</td>
<td>6</td>
<td>12.5%</td>
</tr>
<tr>
<td>Did Not Meet Criterion (E) &lt;59.99%</td>
<td>1</td>
<td>2.1%</td>
</tr>
</tbody>
</table>
Closing the Loop Recommendations: After examining these assessment results, do you find any weaknesses in student performance on this specific student learning outcome that you plan to address by changes in course content, curricular emphasis, instructional approaches? If so, please describe the need for improvement and what you will do. Also, even if you have reached your desired criterion, you should have a plan to go beyond this level in the performance expectations on this outcome.

This assessment plan covered a wide variety of topics over a whole semester's work and I believe it to be representative of the population’s ability to apply their knowledge of data, concepts, and models in physical science given the introductory level of the course. I have reflected upon a number of issues and am contemplating strategies to improve the performance on this SLO, including:

- I have been trying to build more inquiry based learning in lecture through a partially “flipped” classroom, but in general, the students aren’t ready for it (they don’t watch the videos in a timely manner if at all), so I tend to get pulled back into more traditional lecturing. I am going to try giving credit for watching videos in preparation for “flipped” classroom days, including a quick online quiz to emphasize the importance of this preparation.

- Practice doing calculations, interpreting models and analyzing unique problems/examples are critical to success in this SLO. We do this in lecture and lab, but in both cases the lower end students often become too dependent on groups to get them through. Analyzing concepts post-lecture or lab in the form of homework is one key to success. I collected homework periodically this semester, but for the first time ever, I announced in advance when I would collect. I know from talking with and overhearing students that when I wasn’t collecting, homework was not being completed by many students. I am definitely going back to not announcing when I will collect homework as I know from past experience that this pressures some of students (especially those in the middle range) to stay current and generally do better both in lecture and lab.

- I intend to bring in a stronger meta-cognition piece to the course by initially using pre-concept questions that address the major misconceptions in physics and chemistry (to be administered by some mix of online quizzes, lab quizzes and iClicker questions), followed by reflective questions that address:
  - how their knowledge has changed after lecture or lab
  - what concept(s) do they still have questions about
  - what kinds of test questions are anticipated related to the concepts covered in that meeting
  - what underlying themes tie this concept into others we have already covered