

IF14 Data Analysis
Fall 2019 (Natural Science)
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NS OAC Committee: Natural Science (2019-2020)

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IF14 courses in Natural Sciences (NS) were assessed in the Fall 2019 semester using a new 3-step method. In the first step, students are asked early in the semester (Week 3) to respond to survey questions that read: *How confident are you in your ability to: (fill in the SLO(s) the course is designed to address)*. In the second step, students are asked later in the semester (Week 13) to respond to the same questions, *in light of having taken this course*. Changes in aggregate results are recorded. In the third step, at the conclusion of the semester faculty are asked to respond to an online survey to: 1) reflect on the aggregated differences between the pre- and post-test data from students; 2) attach examples of student work that *Do not meet standard, Approach standard, Meet standard, and Exceed standard*; 3) note the number of students in each of these performance levels; and 4) make note of any changes planned for the next time they teach this course to raise the quality of student work.

This method results in three types of data: 1) Data at the level of the student, 2) data at the level of the course section, and 3) data at the level of the instructor. All three types are analyzed in this report. Overall, 46 of 58 course sections reported data for a 79% response rate.

1. **Student Data Analysis.** Summary statistics describe student opinions on levels of familiarity with each of the SLOs at the beginning of the course and at the end of the course. Summary statistics also describe faculty assessment of student work.

2. **Course Section Data Analysis.** Course sections are analyzed on the basis of the percent of students who Met or Exceeded the SLO standard (as assessed by the instructor for each section).
3. **Instructor Feedback Data Analysis.** Instructors are asked to reflect on the data collected at the level of the students.

Results for NSS SLO 1, SLO 2

Part 1: Student Data Analysis

Indirect Measure #1 (Week 3 survey of student opinions)

How familiar would you say you are with the following material?				
Student Learning Outcome	Not at all familiar	A little familiar	Somewhat familiar	Very familiar
Describe the methods natural scientists use to explore natural phenomena, including observation, the framing of scientific questions, the development of hypotheses, measurement and data collection, experimentation, evaluation of evidence and employment of mathematical analysis (NS SLO 1) N=1,021	7.5%	27.7%	44.6%	20.2%
Apply natural science data, concepts and models to natural science (critical thinking) (NS SLO 2) N=1,021	9.2%	31.2%	42.9%	16.7%

Indirect Measure #2 (Week 13 survey of student opinions)

As a result of this course, how much more confident are you in the following?				
Student Learning Outcome	Not at all more confident	A little more confident	Somewhat more confident	A great deal more confident
Describe the methods natural scientists use to explore natural phenomena, including observation, the framing of scientific questions, the development of hypotheses, measurement and data collection, experimentation, evaluation of evidence and employment of mathematical analysis (NS SLO 1) N=719	11.4%	24.1%	33.9%	30.6%
Apply natural science data, concepts and models to natural science (critical thinking) (NS SLO 2) N=719	10.8%	23.2%	33.8%	32.2%

Direct Measure (Instructor Assessment of Student Work based on 46 course sections reporting)

Percent of Students Not Meeting, Meeting, Approaching, and Exceeding Standards				
Student Learning Outcome	Not Meeting Standard	Approaching Standard	Meeting Standard	Exceeding Standard
Describe the methods natural scientists use to explore natural phenomena, including observation, the framing of scientific questions, the development of hypotheses, measurement and data collection, experimentation, evaluation of evidence and employment of mathematical analysis (NS SLO 1) N=997	13.7%	19%	37.4%	29.9%
Apply natural science data, concepts and models to natural science (critical thinking) (NS SLO 2) N=938	10.3%	19.2%	39.2%	31.2%

Part 2: Course Section Data Analysis

Data are now analyzed by course section (CRN) for each SLO. The results reveal significant degrees of variation in the percent of students who Meet or Exceed standards among sections. For example, for NS SLO1, three course sections had 49% or less students Meet or Exceed standards while 10 course sections had 75% or more students Meet or Exceed standards. The results demonstrate that students in some courses excel in achieving the SLO while others struggle. The data available do not offer insight to why this is the case.

Figure 1: NS SLO1

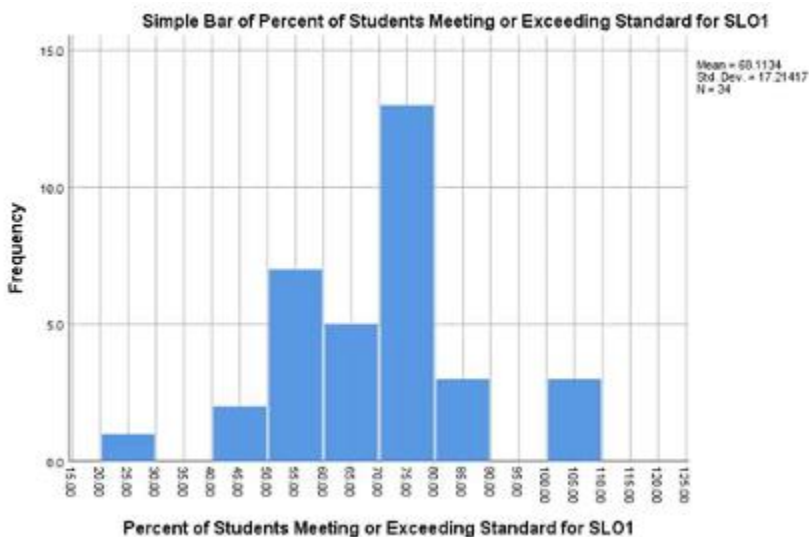
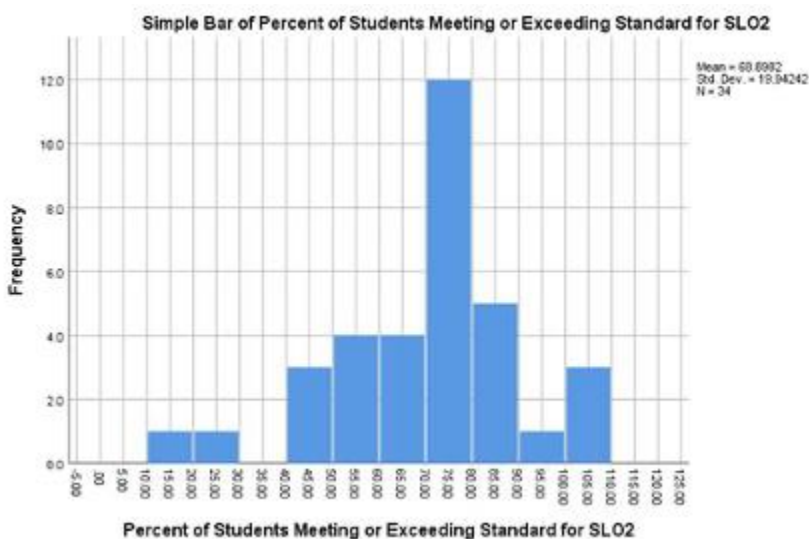


Figure 2: NS SLO2



Part 3: Instructor Feedback Data

Data come from 34 course sections in the Natural Sciences. Instructors were provided an opportunity to offer any thoughts they might have. Comments vary widely, however, a common theme is the level of understanding of college-level expectations among students can be improved, as reflected in the following statements.

Maybe state more explicitly when we are applying concepts, data, etc.

Continue to use current literature to illustrate and support the decisions of specific diet recommendations for a specific person (considering life stages, disease states, and personal goals).

ANT 100 is taught in a flipped format, where students do a hands-on activity every class meeting. I think the results of these indirect assessments illustrate the success of this format. For both SLOs, my students scored higher (both mean and median score) than the school scores. I will continue to make the hands-on activities engaging and relevant to the SLOs.

Include ever-more concrete examples of each SLO in the course lectures and labs. It is interesting to note that some students apparently thought they knew more coming into the course than they actually did since the "somewhat" category dropped from pre- to post-test while the "not at all" category increased. Perhaps students shuffled downward from "somewhat" through "a little" and from "a little" to "not at all". It is encouraging that the "very" category increased for both SLOs from pre- to post-test.

As the instructor responses suggest, the instructors use of high-impact practices changes students' success with SLOs being assessed in their course. Responses also indicate that instructors draw upon a wide range of pedagogical methods to try and improve student outcomes.

NS Part 4: Recommendations

The recommendations are coming from the NS OAC. Based on their review, the following recommendations are made:

- Students should be made more aware that parts of these courses will focus explicitly on particular SLOs. Highlighting these SLOs on the syllabus is important.
- Dean's Offices should reach out to faculty teaching these courses to ensure that instructors are aware of the SLOs and plan accordingly.
- SIFOC and the CSCC should conduct a review of courses included in the IF14 program to ensure they are still appropriate for continued inclusion in the program.