**Foundational Studies Assessment 2022**
**Science & Lab**

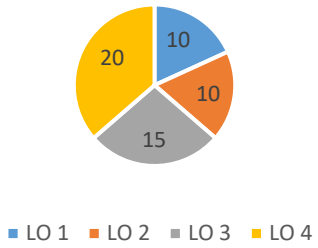
**Science Sample Summary:**

$n_{courses}$ = 11  $n_{artifacts}$ = 55

section data not submitted = 2
participation rate = 85%
all courses were 100 level

$\bar{x}_{rating}$ = 2.76, between Benchmark & Milestone 1

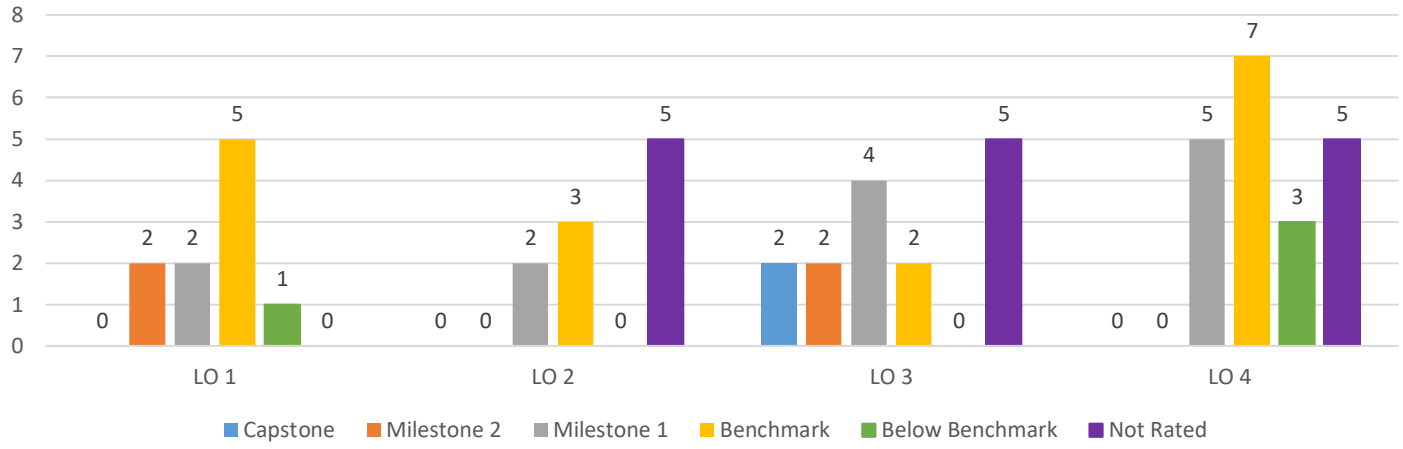
Science Learning Objective Distribution



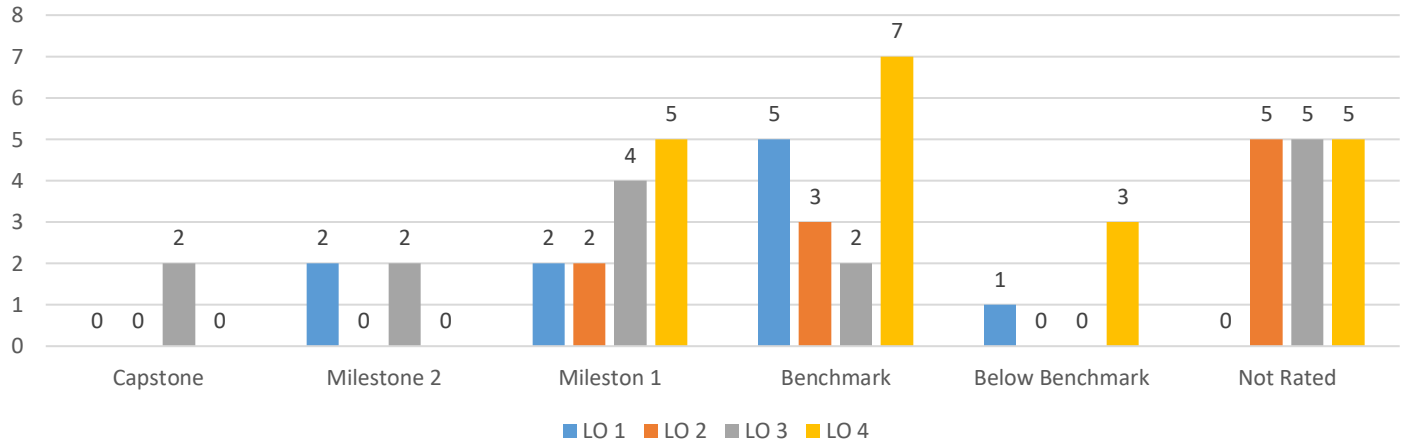

**Science Learning Objectives:**

1. Articulate how data are acquired, and how hypotheses and theories are constructed.
2. Use the scientific method to formulate and test hypotheses.
3. Apply scientific theories to predict the nature and behavior of new systems, environments, or scenarios.
4. Articulate how current issues in science and technology intersect with populations, institutions, and societies.

Ratings by Learning Objective



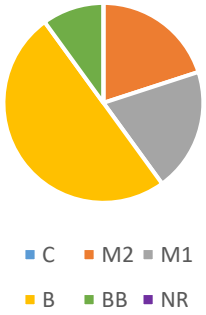

Learning Objectives by Rating



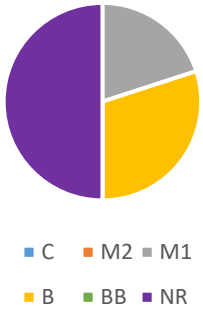
## Ratings by Learning Objective

(Descriptive data provided below each chart excludes artifacts that were Not Rated – NR)

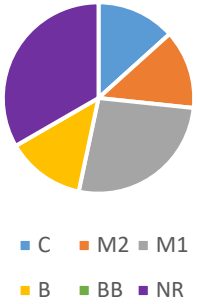
LO 1



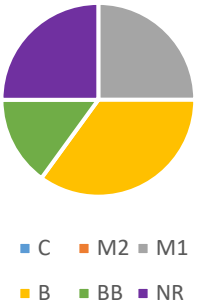

LO 2




LO 3




LO 4




| $\bar{x}$ = 2.50 (between B & M1) | $\bar{x}$ = 2.40 (between B & M1) | $\bar{x}$ = 3.40 (between M1 & M2) | $\bar{x}$ = 2.13 (just above B) |
|---|---|---|---|
| 40% above Benchmark | 40% above Benchmark | 80% above Benchmark | 33% above Benchmark |
| 10% below Benchmark | 0% below Benchmark | 0% below Benchmark | 20% below Benchmark |

Conversion of ordinal data to discrete data for analysis (e.g., BB=1, B=2, M1=3, M2=4, C=5) yields the following:

$\bar{x}$ = 2.76 median = 3 mode = 2 range = 4 s = 1.03 CI = 3.0687-2.4529, α=0.05

**95% confidence that the population mean rating for the category will plausibly fall in Benchmark, in the higher end of the range between Benchmark & Milestone 1.**

## Reviewer Notes

**Science Reviewers:**

| | | | | |
|---|---|---|---|---|
| John David Moody | Linda Maule | Shelley Arvin | Brian José | Rich Harden |
| Jin Park | Fan Zuo | Debra Israel | Liz Brown | Jennifer Inlow |

| | Factor | | | |
|---|---|---|---|---|
| **Objective Rating Potentially Affected** | **Assignment Type or Instructions** | **Learning Objective Language** | **Rubric Language** | **Other** |
| LO 1 | The assignment doesn't invite explanation of proper practices of data collection ; only specific cases (Class 2) | | | |
| | We like this assignment, but it doesn't ask for general procedures or practices, only about the particular methods in this one study; asks about hypotheses, but not about how they are formulated (Class 8) | | | |

| | | | | |
|---|---|---|---|---|
| LO 2 | Designated exam questions – multiple choice & short answer – do not prompt students to demonstrate range of the LO (Class 5 – Not Rated) | | | |
| | 5 minute discussion board format may have limited student performance (Class 9) | | | |
| LO 3 | Question is not written to address the LO (Class 3 – Not Rated) | | | |
| LO 4 | No assignment prompt provided (Class 11) | It was noted during rubric construction that the word "and" in LO 4 could be problematic. It was shifted to "and/or" in the rubric language for the sake of evaluation, but may need to be adjusted. | | |
| | Assignment prompt does not ask student to demonstrate mastery related to this LO (Class 4 – Not Rated) | | | |
| Other | | It was noted during rubric construction, and again during rubric use, that the LOs are highly compound (this goes for all LOs). | It was noted during rubric construction, and again during rubric use, that the descriptions are very long and compound (this goes for all LOs). | It was noted during evaluation that a subject-matter expert is really needed in each reviewer pair, especially for LOs 1, 2, & 3 where correctness of scientific methods & outcomes is important. Some reviewers determined they could not evaluate assigned artifacts for lack of expertise. |
| | | Courses are lecture + lab with separate LOs for each. We should consider the LO language and where these skills are intended to be demonstrated. Some may be taught in lecture, demonstrated primarily in lab. | | |

**Foundational Studies Assessment 2022**
**Science & Lab**

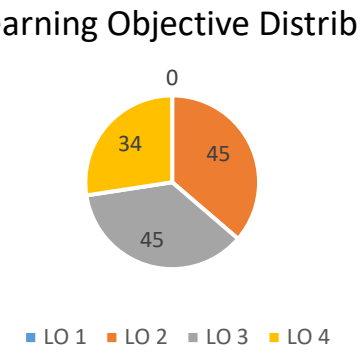
**Lab Sample Summary:**

$n_{courses}$ = 25 $n_{artifacts}$ = 124*

section data not submitted = 2
participation rate = 93%
all courses were 100 level

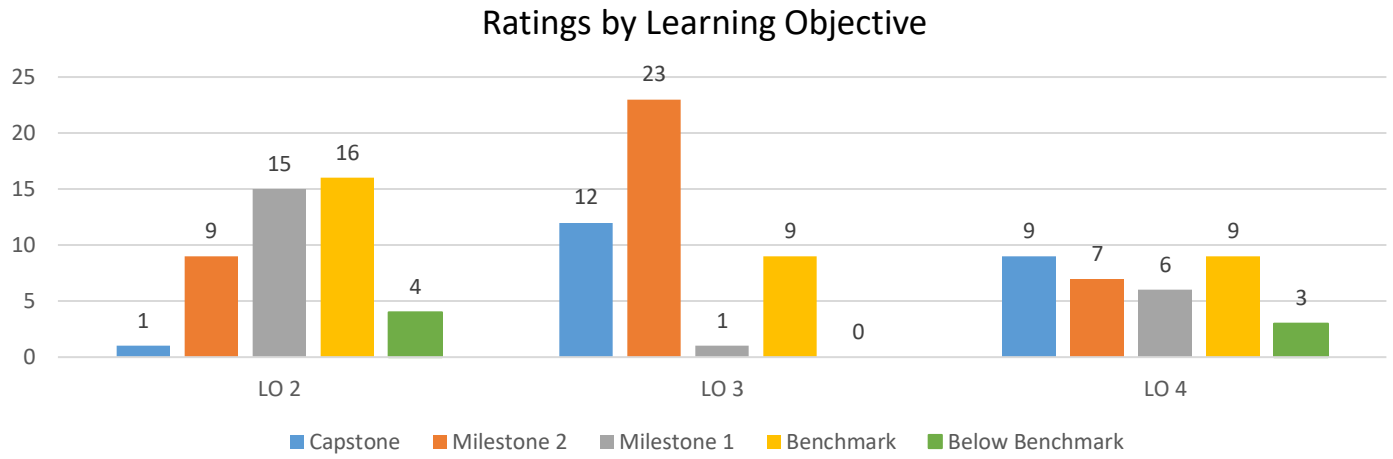
$\bar{x}_{rating}$ = 3.28, between Milestone 1 & 2

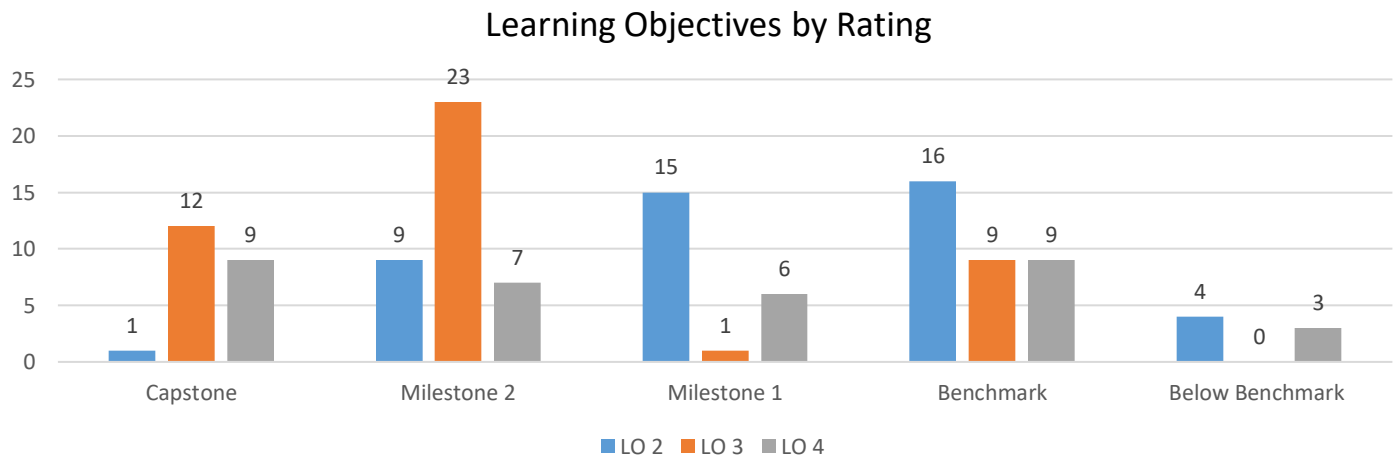
*1 course submitted fewer than 5 artifacts




**Lab Learning Objectives:**

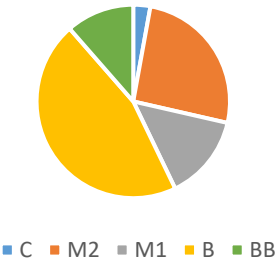
1. Engage in laboratory experience that reinforces and augments the theoretical content of the lecture course.
   *This LO was not described in the rubric nor evaluated in the artifacts because is not an outcome of student performance.*
2. Use the scientific method to formulate and test hypotheses.
3. Use the tools and techniques of the discipline to gather and analyze data.
4. Present the analysis and findings of the lab experience.



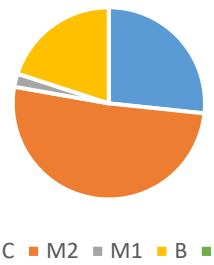
## Ratings by Learning Objective

LO 2



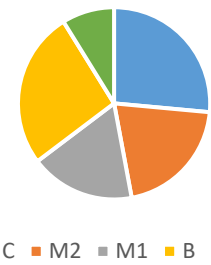

$\bar{x}$ **= 2.71 (B approaching M1)**
55% above Benchmark
8% below Benchmark

LO 3




$\bar{x}$ **= 3.84 (M1 approaching M2)**
80% above Benchmark
0% below Benchmark

LO 4




$\bar{x}$ **= 3.29 (between M1 & M2)**
64% above Benchmark
8% below Benchmark

Conversion of ordinal data to discrete data for analysis (e.g., BB=1, B=2, M1=3, M2=4, C=5) yields the following:

$\bar{x}$ = 3.28 median = 3 mode = 4 range = 4 s = 1.21 CI = 3.4967-3.0677, α=0.05

**95% confidence that the population mean rating for the category will plausibly fall in Milestone 1, in the lower range between Milestone 1 and Milestone 2.**

## Reviewer Notes

**Lab Reviewers:**

| | | | | | |
|---|---|---|---|---|---|
| Jennifer Inlow | John David Moody | Liz Brown | Linda Maule | Fan Zuo | Shelley Arvin |
| Brian José | Kelley Woods-Johnson | Debra Israel | Kevin Ward | Rich Harden | Jin Park |

| | **Factor** | | | |
|---|---|---|---|---|
| **Objective Rating Potentially Affected** | **Assignment Type or Instructions** | **Learning Objective Language** | **Rubric Language** | **Other** |
| **LO 1** | | It was determined that evaluation of this LO is a yes or no answer about how the instructor designed the course rather than what the students mastered, so it was not evaluated. | | |
| **LO 2** | Perhaps students would have done better re: LO2 if they had been given more specific instructions on constructing hypotheses that related to the types of data they were going to collect (Class 9L) | | | |

| | | | | |
|---|---|---|---|---|
| | Hypotheses were often not worded as such, so while present conceptually, the instructions did not lead them to meet the descriptions in the rubric (Classes 11L, 20L, 21L, 22L) | | | |
| **LO 3** | Assignment does not give us insight into the last part of each rubric description for the LO – "Analysis demonstrates a … interpretation of the data." (Classes 13L, 14L) | | Per the comment to the left – reviewers were instructed to use the spirit of the LO and focus on the use of "tools and techniques of the discipline to gather and analyze data." | Some aligned assignments (namely the Community Garden assignment) had students follow very specific instructions that they did not design, potentially influencing the high ratings on this LO. Is this in the spirit of this LO? |
| **LO 4** | | | | |
| **Other** | | | It was noted during rubric construction, and again during rubric use, that the descriptions are very long and compound (LO2 & LO 3). | It was noted during evaluation that a subject-matter expert is really needed in each reviewer pair, especially where correctness of scientific methods, calculations, and outcomes is important. Some reviewers determined they could not evaluate assigned artifacts for lack of expertise. |

Compiled by Dr. Kelley Woods-Johnson, Assessment and Accreditation Coordinator, 3/3/2022