

Biology Assessment Data

Evidence of Student Success

Student Assessments

While not perfect, standardized student assessments are one way to measure, monitor, and provide evidence for student success. As of this writing, Biology students have taken part in three assessments:

Assessment 1- Student Learning Outcome #4 (*Analysis*) found at <http://hilo.hawaii.edu/catalog/biology.html> is to “acquire proficiency with quantitative concepts, statistical analyses, and graphical presentation of data”. To assess the abilities of UH Hilo Biology students in this area, a UH Hilo Quantitative Reasoning Assessment Committee was formed that focused on both the "analysis" and "visual representation" aspects of the QR rubric (see Appendix 2), including critical thinking skills. Analysis and visual representation were chosen as opposed to computation, since the study was intended for all students, not just STEM majors who are generally more adept at computation, and visualization and analysis incorporate a higher degree of critical thinking. The committee wanted to know:

1. Can students interpret quantitative information represented graphically? (Visual)
2. Can students extrapolate such quantitative information to solve related problems that one might encounter in everyday life? (Visual and Critical Thinking)
3. Are our graduating students more proficient at quantitative critical thinking and visual representations than incoming freshmen?

The assessment was given to a group of 71 Biology majors in the spring of 2015.

Assessment Details

This was a Direct True/False Assessment, administered in classes, without prior notice. Students were allotted 15 - 20 minutes. The QR Assessment Committee provided the assessments to the instructors, who then administered the assessment in their classes and returned the assessments to the committee for scoring and analysis of the results. The assessment mechanism was developed by the math department, primarily through the collaboration of the QR Assessment Chair and the Mathematics Department Chair. It was decided, in accordance with the QR Core Competency Rubric that scores would be interpreted as 0 = "Beginning," 1 = "Emerging," 2 = "Competent," and 3 = "Advanced." Ideally, the committee wanted to see a high percentage of students earning a score of 2 or 3. As shown in Table 3, mean total scores for all three questions were mid-way between emerging and competent. This test will be administered at regular intervals and it will be of great interest to determine if future scores are similar, and if so, are there mechanisms to improve student learning in this area. Please see Appendix 2 for additional information on the assessment based on a report prepared by Mitchell Anderson (Dept. of Mathematics) in August 2015:

		Q1	Q2	Q3	
	n	Mean	Mean	Mean	Mean Total score
Junior	7	0.86	0.29	0.43	1.58
Senior	64	0.73	0.25	0.48	1.46
All	71	0.75	0.30	0.48	1.53

Table 3. Quantitative Reasoning Student Assessment scores for upper division UH Hilo Biology majors

Student Learning Outcome #5 (*Communication*) found at <http://hilo.hawaii.edu/catalog/biology.html> is to “develop skills in written and oral interpretation, synthesis, and presentation of data”. To assess the abilities of UH Hilo Biology students in this area, two different assessments were conducted, including the Written Communication Core Competency Assessment (*Assessment 2*) and the Oral Communication Core Competency Assessment (*Assessment 3*):

Assessment 2: For the Written Communication Core Competency Assessment, students in the senior level Biology 495 seminar were asked to identify a specific biological topic, formulate hypotheses, undertake research to address their hypotheses, and communicate their results in an 8-10 page research paper in CSE format with a proper bibliography. A “rubric for written communication (Appendix 2) was used by the Assessment Support Committee, which is made up of eight faculty/librarians. Seventeen (n=17) papers were blind-read by two readers from the committee.

The readings indicated that 5 of 17 (or 29%) of student were approaching or near competency, with the rest (>70%) exhibiting competency or advanced skill in writing (Table 2). However Readers noticed that in a number of papers, the section called “Discussion” was rather weak. Readers also noticed that in some instances, grammar and prose errors contributed to some problems with readability. Of concern was the lack of consistency in citation formatting. The readings indicate that 5 of 17 (or 29%) of student were approaching or near competency, with the rest (>70%) exhibiting competency or advanced skill in writing.

Faculty will highlight the importance of improving the Discussion section of student papers. To improve grammar, faculty will increase the use of peer-proof reading. Also, we will expand the practice of having students turn in multiple drafts for editing. To improve the Citations section, students will be directed to follow a single citation style.

		Line of Reasoning	Org/Structure	Content	Language/Grammar	Average
Paper 1	Reader 1	3	3	3	3	
	Reader 2	2	3	2	3	
		2.5	3	2.5	3	2.75
Paper 2	Reader 1	3	3	4	3	
	Reader 2	3	3	3	3	
		3	3	3.5	3	3.125
Paper 3	Reader 1	3	3	3	3	
	Reader 2	3	3	3	3	
		3	3	3	3	3.00
Paper 4	Reader 1	3	3	3	2	
	Reader 2	2	2	2	3	
		2.5	2.5	2.5	2.5	2.5
Paper 5	Reader 1	4	3	3	3	
	Reader 2	4	4	3	3	
		4	3.5	3	3	3.375
Paper 6	Reader 1	2	3	3	3	
	Reader 2	3	4	3	4	
		2.5	3.5	3	3.5	3.125
Paper 7	Reader 1	3	4	3	4	
	Reader 2	4	4	4	4	
		3.5	4	3.5	4	3.75
Paper 8	Reader 1	3	3	3	3	
	Reader 2	3	3	3	2	
		3	3	3	2.5	2.875
Paper 9	Reader 1	3	3	3	3	
	Reader 2	2	3	3	3	
		2.5	3	3	3	2.875
Paper 10	Reader 1	4	4	3	3	
	Reader 2	3	3	3	2	
		3.5	3.5	3	2.5	3.125
Paper 11	Reader 1	3	3	3	4	
	Reader 2	4	4	4	4	
		3.5	3.5	3.5	4	3.625
Paper 12	Reader 1	4	4	4	3	
	Reader 2	4	4	4	4	
		4	4	4	3.5	3.625
Paper 13	Reader 1	4	4	3	3	
	Reader 2	4	3	3	3	
		4	3.5	3	3	3.375
Paper 14	Reader 1	3	3	3	4	
	Reader 2	4	4	3	4	
		3.5	3.5	3	4	3.5

Paper 15	Reader 1	3	3	3	3	
	Reader 2	2	2	2	2	
		2.5	2.5	2.5	2.5	2.5
Paper 16	Reader 1	3	3	4	4	
	Reader 2	4	3	3	4	
		3.5	3	3.5	4	3.5
Paper 17	Reader 1	4	4	4	4	
	Reader 2	3	4	3	4	
		3.5	4	3.5	4	3.75
		3.205	3.294	3.117	3.235	3.21

Table 2. Written Communication Core Competency Assessment outcomes in four areas (line of reasoning, organization/structure, content, language/grammar) for 17 senior level UH Hilo Biology students. Possible scores in each category range from 1 (beginning) to 4 (advanced).

Assessment 3- Oral Communication Core Competency Assessment. For this assessment, nine students from the senior level Biology 481 (Tropical Island Ecology and Evolution) course gave a 15 minute oral powerpoint presentation of results from ecological field studies in which students designed an experiment, and collected and analyzed data. Three reviewers that consisted of faculty members from the UH Hilo Department of Biology scored each student from 1 (beginning) to 4 (advanced) based on each of four core competencies, including organization/structure, content, language, and delivery. Overall, reviewers were very impressed with the overall quality of the presentations. Mean scores for the organization/structure, content, and language competencies were 3.96, 3.9, and 4.0 respectively. The mean scores for the delivery competency was slightly lower at 3.42 but still relatively good.

Student		Reviewer 1	Reviewer 2	Reviewer 3	
					Mean
1	Org. and Structure (OS)	4	4	4	4.0
	Content C	4	4	4	4.0
	Language (L)	4	4	4	4.0
	Delivery (D)	3	3	3	3.0
2	(OS)	4	4	4	4.0
	C	4	4	4	4.0
	(L)	4	4	4	4.0
	(D)	3	3	3	3.0
3	OS	4	4	4	4.0
	C	4	4	4	4.0
	L	4	4	4	4.0