

Learning Assessment of Core Outcomes
Focus 2009-2010: Critical Thinking and Problem Solving

SAC: Biology

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Parts 2-4

2. When your project is completed, please describe the method (s) that you used.

We used a rubric that was adapted from one used by the University of Washington. It was personalized to better fit our project for BI 112 Lab (Cell Biology for Health Occupations). The project is a culmination of the students' lab exercises earlier in the term which stress the scientific method of research. The students conducted a lab experiment that they designed themselves in order to test a hypothesis that they developed. The proper experimental design and execution required significant problem solving skills. Individually, each student wrote a paper in the same format used by research biologists to communicate their findings with the scientific world. In the paper students analyzed the results of their experiment and related it to other work published in peer reviewed journals (critical thinking). Students also identified errors in the design and/or execution of the experiment that could have affected the outcome. Student scientific papers were collected and several papers from each lab section were randomly selected for scoring with the rubric. Thirty-two papers with accompanying rubric were collected from the biology departments of the various campuses.

3. What did you learn? We learned that this lab course and the associated scientific experiment and paper project are positively reinforcing the Critical Thinking and Problem Solving outcome. The average score was 3 (Developing) out of a possible 4 (see attached rubric). The average score is encouraging when one considers that BI 112 is typically the first biology class taken by students interested in health occupations and the majority of these students are unfamiliar with the problem solving and critical thinking aspects of biology. The majority of these students will take three terms of 200 level Anatomy and Physiology and a term of 200 level microbiology following successful completion of Bi 112. These courses will require the skills associated with this core outcome and Bi 112 appears to provide experiences that support skill development.

4. What changes, if any, are you making or recommending as a result? No changes are contemplated at this time.

Critical Thinking and Problem Solving Rubric for Bi 112 Scientific Paper

For each of the seven criteria below, assess the work by circling the phrases that describe the student's work and then average the scores.

Average score: _____

	Emerging	Developing	Mastering	
	1	2	3	4
1 Identifies and explains topic/issue at hand	Does not identify nor explain main issue/topic at hand; is confused.	Identifies main issue/topic, but does not explain clearly.	Identifies main issue/topic clearly, explains in limited fashion.	Identifies main issue/topic clearly, explains fully by discussing subsidiary and/or other relevant issues.
2 Identifies and uses a primary source	Does not identify a primary source or cites an inappropriate one.	Cites an appropriate primary source, but merely repeats the information or does not engage it	Cites an appropriate source, presents / engages the information in a limited fashion	Cites an appropriate source, fully presents and engages the information, examines and assesses it.
3 Develops, presents, and communicates own hypothesis	Fails to present a hypothesis	Hypothesis is unclear or simplistic	Presents and justifies hypothesis without appropriate support	Appropriately presents justifies hypothesis with support from scientific sources
4 Presents, assesses, and communicates experimental data	No evidence of evaluation/analysis	Evaluation/analysis of data is simplistic and/or inappropriate	Demonstrates adequate skill in evaluating data	Examination and analysis data reflects clear organization of ideas, demonstrates understanding of limitations of data to confirm hypothesis, questions accuracy
5 Identifies and considers the influence of context on the issue/topic at hand	Does not present the issue / topic as having connections to other contexts.	Presents the issue / topic largely within a single context (e.g., scientific).	Presents the issue / topic as having connections to other contexts, but in a limited fashion.	Presents the issue / topic as having connections to other contexts important for the issue / topic at hand.
6 Identifies conclusions and implications of the issue/topic at hand	Fails to identify conclusions / implications of the issue / topic.	Identifies conclusions / implications, but within a single context.	Identifies conclusions / implications as having connections to other contexts, but in a limited fashion.	Identifies conclusions / implications relative to the contexts important to the issue / topic at hand.
7 Communicates effectively	Language obscures meaning work is unfocused, lacks organization and logical connection of ideas	In some places language obscures meaning, organization is inconsistent, connection of ideas is confusing	In general language does not interfere meaning, basic organization is apparent, transitions connect ideas	Language clearly and effectively communicate ideas, few, if any, errors organization is clear, transitions between ideas enhance presentation

*Contexts for consideration: scientific, technological, social / cultural, economic, political, ethical.