

## QL Assessment in Human Physiology Lab (BIOL 2425)      Fall 2014

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During 2014, The Biology Department participated in a multi-state assessment of Quantitative Literacy. The Biology Department selected an assignment that was and is part of the BIOL2420/1425 (Human Physiology) course requirements. The assignment requires students to work with numerical data that are obtained in two separate laboratory activities. The details of these assignments are given below. The assessment rubric, that was developed in collaboration with the SLCC Assessment Department, is intended to measure established criteria for measuring acquisition of quantitative literacy. The results for Fall Semester 2014 are reported below. A total of 83 students completed the assignment and were subsequently scored using the rubric. Eighty-seven percent or more of the students that completed this assignment met or exceeded expectations in all criteria used to assess quantitative literacy activities. That is, the majority of students scored at least a 2 or 3 in each category. The area that students tended to score the lowest was recognizing assumptions and data limitations. The area in which students scored the highest was in making decisions about the data.

### Assignment Description:

Quantitative Literacy (QL) of BIOL2425 students will be assessed in the first two labs of the term.

**Lab 1** deals with recognizing and avoiding fallacious reasoning. Lab instructors will ask students to submit answers to Activity 3, problem 1.(available in a separate PDF file) The students will also submit answers to items 1-5 below. The answers can be submitted online or in hand-written form. The lab instructors will then use the rubric below to assess the submitted answers for each student. Each student will receive a numeric score for each row of the rubric. Finally, the lab instructor will tally how many students received each score on the rubric. This summary rubric form will then be sent to [Arleen.sawitzke@slcc.edu](mailto:Arleen.sawitzke@slcc.edu) for final reporting.

**Lab 2** deals with the use of Excel, statistics, and graphing. Lab instructors will ask students to submit answers to Activity 2, problems 1, 2, and 3(see separate PDF file). The students will also submit answers to items 1-5 below. The answers can be submitted online or in hand-written form. The lab instructors will then use the rubric below to assess the submitted answers for each student. Each student will receive a numeric score for each row of the rubric. Finally, the lab instructor will tally how many students received each score on the rubric. This summary rubric form will then be sent to [Arleen.sawitzke@slcc.edu](mailto:Arleen.sawitzke@slcc.edu) for final reporting.

### Description of the assignment for lab instructors and specific questions analyzed

Week 1.	The following data will be collected and emailed to the students as an excel spreadsheet: Height, weight, age, sitting, standing, and exercise pulse rate (pulse data obtained in Activity 3, recorded into spreadsheet in activity 4.)
	Assess the following:
	Activity 3, problem 1.— <b>Recognizing and Avoiding Fallacious Reasoning</b> --Interpreting data about diabetes. Answers to be submitted via the Canvas “Before you begin” site, in-class, or via email.
<b>1</b>	<b>Verbally describe the information that was provided for you in this activity</b>
<b>2</b>	<b>What assumptions were used when interpreting this information, what were some of the limitations of the data presented?</b>
<b>3</b>	<b>Why/how did you arrive at your conclusions?</b>
<b>4</b>	<b>Verbally describe what information is presented in Figures 5 and 6.</b>
<b>5</b>	<b>What aspects of data presentation are important to assure proper interpretation? What aspects of data presentation could lead to fallacious reasoning?</b>
Week 2.	The following data will be collected: %body fat as per bioelectrical impedance analysis (BIA)—email this to students (they will need to copy/paste this to the excel spreadsheet they received the first week.
	Assess the following:
	Activity 2.— <b>Applying Descriptive Statistics and Graphing</b> students will submit excel spreadsheets (one copy displaying the data and one copy displaying the formulas) Answers to be submitted via the Canvas “Before you begin” site, in-class, or via email.
	Problem 1: histogram of height, mean, SD
	Problem 2: histogram of age, mean, SD
	Problem 3: calculate BMI <u>and</u> % body fat from above data (using excel). Calculate mean and SD for these two variables.
<b>1</b>	<b>Verbally describe the information that was used to produce these 2 graphs, the BMI, and the % body fat</b>
<b>2</b>	<b>There are 3 ways to calculate % body fat. What is the basis of each of these methods, how do the methods compare in accuracy, precision, and convenience.</b>
<b>3</b>	<b>Were the formulas correct?</b>
<b>4</b>	<b>Is the graph correct? (proper labels, units, title, depiction of data points)</b>
<b>5</b>	<b>Why is it important to understand the difference between BMI and percent body fat?</b>

## Quantitative Literacy Scoring Rubric

Criteria	Well Below Expectations 1	Below Expectations 2	Meets Expectations 3	Exceeds Expectations 4	Score 0=N/A
<b>1. Reading and Interpretation</b> <i>(The student accurately and appropriately reads and interprets data found in various quantitative formats.)</i>	Does not read and interpret the meaning of data found in written, symbolic, tabular, and/or graphic form.	Attempts to read and interpret the meaning of data found in written symbolic, tabular, and/or graphic form but makes significant errors.	Usually reads and interprets the meaning of data found in written symbolic, tabular, and/or graphic form but might make minor errors.	Consistently and accurately reads and interprets the meaning of data found in written symbolic, tabular, and/or graphic form.	
<b>2. Assumptions and Data Limitations</b> <i>(The student evaluates assumptions and limitations in quantitative information.)</i>	Does not mention any assumptions and/or limitations.	Identifies assumptions and/or limitations.	Evaluates assumptions and/or limitations.	Provides rationale why each assumption is appropriate or limitations are mitigated.	
<b>3. Decision Making</b> <i>(The student makes decision/conclusions that are consistent with the data and situation.)</i>	Does not make decisions that are consistent with the data and situation.	Attempts to make decisions that are consistent with the data and situation but makes significant errors.	Usually makes decisions that are consistent with the data and situation but might make minor errors.	Consistently and accurately makes decisions that are consistent with the data and situation.	
<b>4. Results Representation</b> <i>(The student organizes and represents information in quantitative formats.)</i>	Does not organize or represent information in quantitative formats.	Attempts to organize and represent information in quantitative formats but makes significant errors.	Usually organizes and represents information in quantitative formats but might make minor errors.	Consistently and accurately organizes and represents information in quantitative formats.	
<b>5. Conclusions and Meaning</b> <i>(The student draws conclusions and meaning out of quantitative information - e.g., computations, results, graphs, etc.)</i>	Lists the numeric results or provides a graphic, but does not describe the meaning of the data.	Provides a written description of the quantitative information but provides limited explanation of the meaning.	Provides meaningful descriptions of the meaning of the quantitative information.	Organizes the material and narrative to make a point, resolve an issue, or provide evidence.	

## Summary QL scoring rubric with results for Assignment 1

Criteria	Number of students receiving a 1	Number of students receiving a 2	Number of students receiving a 3	Number of students receiving a 4	No response
<b>1. Reading and Interpretation</b>	4 (4.8%)	15 (18.1%)	26 (31.3%)	37 (44.6%)	1 (1.2%)
<b>2. Assumptions and Data Limitations</b>	8 (9.6%)	23 (27.7%)	28 (33.7%)	23 (27.7%)	1 (1.2%)
<b>3. Decision Making</b>	3 (3.6%)	14 (16.9%)	38(45.8%)	28 (33.7%)	0 (0%)
<b>4. Results Representation</b>	7 (8.4%)	10 (12.0%)	27 (32.5%)	38 (45.8%)	1(1.2%)
<b>5. Conclusions and Meaning</b>	9 (10.8%)	16 (19.3%)	30 (36.1%)	26 (31.3%)	2( 2.4%)

## Summary QL scoring rubric for Assignment 2

Criteria	Number of students receiving a 1	Number of students receiving a 2	Number of students receiving a 3	Number of students receiving a 4	No Response
<b>1. Reading and Interpretation</b>	3 (3.6%)	12 (14.5%)	37 (44.6%)	29 (34.9%)	3 (3.6%)
<b>2. Assumptions and Data Limitations</b>	5 (6.0%)	18 (21.7%)	37 (44.6%)	20 (24.1%)	4 (4.8%)
<b>3. Decision Making</b>	4 (4.8%)	12 (14.5%)	21 (25.3%)	42 (50.6%)	5 (6.0%)
<b>4. Results Representation</b>	7 (8.4%)	13 (15.7%)	24 (28.9%)	35 (42.2%)	5 (6.0%)
<b>5. Conclusions and Meaning</b>	4 (4.8%)	13 (15.7%)	37 (44.6%)	24 (28.9%)	6 (67.2%)