Final Network Reflections and Implementation Notes – Melissa Haswell

**Course/Course format** – BIOL 222, Anatomy & Physiology II for pre-nursing students; 3-hour lecture format

**BioInteractive Module** – Lactase Persistence

**Quantitative skill focus** – Data analysis:

**Expected dates of implementation** – Fall 2016; continuing to improve revise Winter 2017

1. **What are the learning objectives (content) did you address in your course using the selected BioInteractive materials?**

**Concepts and Learning Objectives:**

1. Review basic nutrition including vitamins and organic molecules.
2. Relate organic molecules with the process of chemical digestion in the human digestive tract.
3. Introduce students to the genetic basis of lactase persistence.
4. Relate role of respiratory system in pH balance using the hydrogen breath test for lactose intolerance as an example.
5. Review the process of osmosis as it applies to fluid movement between body compartments using lactose-induced intestinal problems as an example.
6. Introduce/practice data and graph creation and analysis skills.

1. **Briefly describe the pedagogical techniques you used to facilitate the BioInteractive activities and reinforce the quantitative reasoning skill.**

This 2-week unit relies on a combination of several teaching and learning strategies in order to scaffold the concepts covered in this unit. These include:

* Flipped classroom model – students use a series of videos to complete worksheets in order to review the following: organic molecules, vitamins, basic overview of digestive system, fat digestion & absorption (as an example of chemical digestion)
* Mini-lecture on digestive system
* Just-in-time teaching when it is apparent that students are not making the appropriate connections between the concepts
* Collaborative, team-based learning using modified version of “Got Lactase? Blood Glucose Data Analysis” BioInteractive activity. Students analyze data that is graphically represented and analyze it.
* Case-based assessment – students create their own graph from a map in the case study (for both formative and summative purposes)

1. **Did you make adaptations to the BioInteractive materials? If yes, please describe them here. If no, please indicate why.**

Yes, I made edits to the “Got Lactase? Blood Glucose Data Analysis” BioInteractive activity worksheet. I wanted to also include the SCN case study because different aspects of lactase persistence were covered. Therefore, to save a bit of time, I created the graphs for the students to analyze in the HHMI activity. I also added questions that have students do a brief web search to learn about the hydrogen breath test, and then relate it to a previous units covered in class (blood and respiratory system). I wanted them to relate how the hydrogen is absorbed from the digestive system, the role of the erythrocyte, and the exhalation of hydrogen gas. This should help them make a connection between the body systems in order to understand how they work together to maintain pH balance, as well as relate it to the abdominal distention experienced by patients . I also added a couple of questions to allow students more fully investigate how digestive upset (diarrhea) is created due to the excess undigested lactase present in the large intestine. This will also allow them to review fluid movement (osmolarity), which is part of the next unit we cover (fluid, electrolyte, and urinary system). My goal is to help students more fully realize the interconnected interactions required between body systems in order to maintain homeostasis.

1. **Did you use supplemental materials with this module, please describe them (e.g. where did you find them?).**

* Yes, I used the following videos and accompanying worksheets to provide an overview of nutrition and the digestive system.
* Watch the video “Crash Course: Biological Molecules – You are what you Eat” at <https://www.khanacademy.org/partner-content/crash-course1/partner-topic-crash-course-bio-ecology/crash-course-biology/v/crash-course-biology-103>,
* Watch the video “How Do Vitamins Work?” at <https://ed.ted.com/lessons/what-s-the-value-of-vitamins-ginnie-trinh-nguyen>,
* Watch the video “Crash Course: The Digestive System” at <https://www.khanacademy.org/partner-content/crash-course1/partner-topic-crash-course-bio-ecology/crash-course-biology/v/crash-course-biology-127>,
* I also used a case study from Science Case Network: “I Scream for Ice Cream: Lactase Persistence in Humans” (http://sciencecases.lib.buffalo.edu/cs/files/lactase\_persistence.pdf)

1. **What assessments did you use to measure student progress? Please either describe, attach, or provide a link here.**

**Overview:**

* + **Formative Assessments:**
  + Flipped classroom video assignments - worksheets completed using videos with answers used to complete an online quiz that I could check before the next class period.
  + Got Lactase? Blood Glucose Data Analysis” BioInteractive activity completed in class as teams with follow-up discussion
  + Case Study from Science Case Network: “I Scream for Ice Cream: Lactase Persistence in Humans” (http://sciencecases.lib.buffalo.edu/cs/files/lactase\_persistence.pdf)
  + **Summative Assessments:**
* Unit Assessment (Exam – combination of short answer and case study analysis questions)

**Week 1: Flipped assignments covering digestive system and molecules given as homework**

**Overview of Nutrition and the Digestive System**

1. Watch the video “Crash Course: Biological Molecules – You are what you Eat” at <https://www.khanacademy.org/partner-content/crash-course1/partner-topic-crash-course-bio-ecology/crash-course-biology/v/crash-course-biology-103>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the video directly through Blackboard also.
2. Watch the video “How Do Vitamins Work?” at <https://ed.ted.com/lessons/what-s-the-value-of-vitamins-ginnie-trinh-nguyen>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the video directly through Blackboard also.
3. Watch the video “Crash Course: The Digestive System” at <https://www.khanacademy.org/partner-content/crash-course1/partner-topic-crash-course-bio-ecology/crash-course-biology/v/crash-course-biology-127>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the video directly through Blackboard also.

**Week 2:**

* Mini-lecture on digestive system
* Diagramming of digestive system activity (students trace a food item through the digestive tract)
* Flipped assignments covering:

**In-Depth Examination of Digestion and Enzymatic Activity Using Fat and Lactase as the Representative Molecules**

* Review the “Click and Learn” Activity at: <http://www.hhmi.org/biointeractive/molecular-structure-fat>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the Click and Learn directly through Blackboard also.
* Review the “Click and Learn” Activity at <http://www.hhmi.org/biointeractive/how-body-uses-fat>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the Click and Learn directly through Blackboard also.
* Review the “Click and Learn” Activity at <http://www.hhmi.org/biointeractive/lactose-digestion-infants>, complete the attached worksheet while you view the video. Then complete the online quiz on Blackboard. Note: You may access the Click and Learn directly through Blackboard also.

**Week 3: Lactase persistence activities**

* **Complete in class:** [**http://www.hhmi.org/biointeractive/got-lactase-blood-glucose-data-analysis**](http://www.hhmi.org/biointeractive/got-lactase-blood-glucose-data-analysis) **modified version**
* **Complete in class:** Case Study from Science Case Network: “I Scream for Ice Cream: Lactase Persistence in Humans” (http://sciencecases.lib.buffalo.edu/cs/files/lactase\_persistence.pdf)
  + - study analysis questions)

1. **What would you do differently if you were to implement this module again?**

I was only able to introduce the flipped assignments and was not able to introduce the modified Got Lactase activity due to some time constraints that arose during the semester. I have modified my teaching schedule to include these activities and do less lecturing next semester.

1. **Overall, how would you describe your experience with the BioInteractive modules? Please provide any additional teacher notes here.**

I enjoyed the faculty mentoring network immensely. I was able to work both collaboratively as well as on my own. Working with a group and with the HHMI mentors allowed me to see that I was not including enough quantitative analysis in my classes. It is something that I had been working on over the course of the past 2 years and working with this group gave me access to exceptional materials to adapt and to like-minded colleagues that I could rely on for an honest opinion.