Engaging students in equitable hands-on assessments

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What is Equity?

The Oxford Dictionary defines equity as “a situation in which everyone is treated equally”

Source: Oxford English Dictionary, 2nd ed. (Oxford: Oxford University Press, 2004)

What does Equity mean to me?

Equity means many different things to me as an educator.

Equity means recognizing that each individual is unique, and recognizing our individual differences.

Equity in education means providing many diverse learning materials to encourage students with different perspectives to successfully demonstrate their understanding.

What is equity in assessments?

- Identifying Biases
- Multiple sources of evidence for assessing work
- Reflective practices

Creating equitable assessments

- Avoid making assumptions
- Offer students choices to demonstrate their learning
- Offer a variety of assessments to cater to individual student needs

How are equity and diversity related?

- Equity is the process
- Diversity is the outcome

What does a Diverse and Inclusive Classroom mean to me?

- Building a culturally responsive classroom
- Providing equal access to all students
- Promoting a safe learning environment
- Accommodating students with differences in race, gender, socio-economic status, ethnicity, sexual orientation, etc.

Which class to choose?

- Pathophysiology - Biology elective for juniors and seniors
- Focus on modeling biological systems
- How homeostasis is maintained
- How disruption of homeostasis leads to pathologies (symptoms)

How I created equitable assessments

Introduced innovative hands-on assessments to replace some written assessments

- Heart Model Project
- Graphic Novels Project

The Heart Model Project

- Introduced as a replacement for the written cardiovascular unit test
- Intended to remove inherent fear of written assessments
- Gave students an innovative way to express their creativity in applying what they had learned in class
- Gave them an opportunity to reflect on their learning

Heart Model Project Steps

- Blueprint of heart model
- Building the Model
- Demonstrating the Model
- Reflecting on the Model

Student Heart Model Blueprint Example

Overall Dimensions: 4” (H) x 3” (W) x 2.5” (D)

Materials

- Pawfly 7 Feet Airline Tubing Standard Aquarium Air Pump Accessories with Air Stones, Check Valves, Suction Cups and Connectors
- Siphon Hose, 6', 1/2" ID
- Sargent Art Plastilina Modeling Clay, 2-Pound, White
- **White, Red, and Blue paint**
- **String**
- **Glue**
- **Rubber bulb**

Heart Model Blueprint (cont'd)

Components

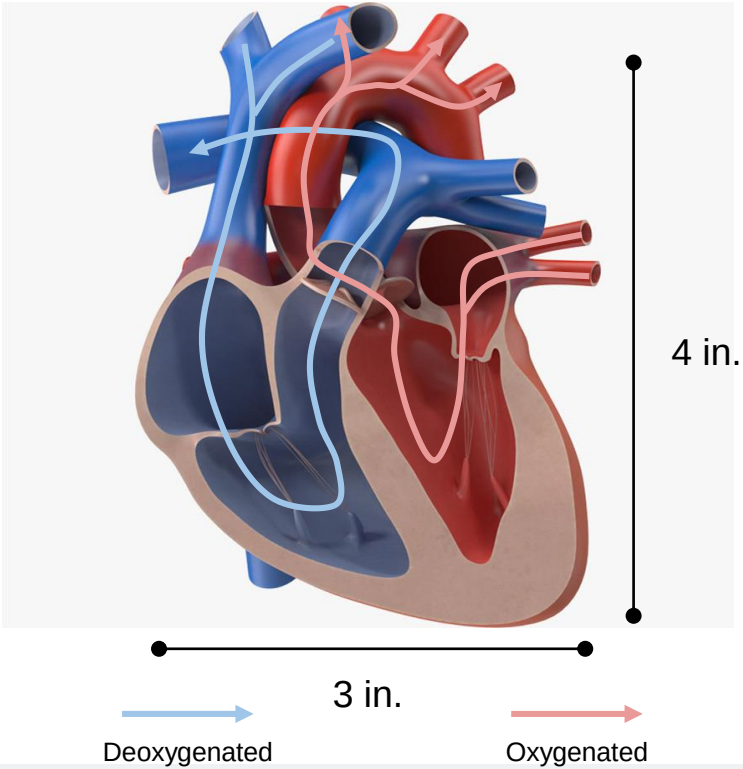
6.5" x 3/16" Airline Tubing for Veins

4" x 3/16" Airline Tubing for Arteries

3" x ½" Plastic Tubing for Aorta

2 Pounds of Modeling Clay for Heart Tissue

Blue and Red Paint for Labeling



Heart Model Blueprint (cont'd)

- **Blood (water with red food coloring) will circulate through a closed-loop system**
- **The liquid will be pushed through using a dropper bulb, putting higher pressure on the inlet side of the one-way check valves to ensure flow is in correct direction**

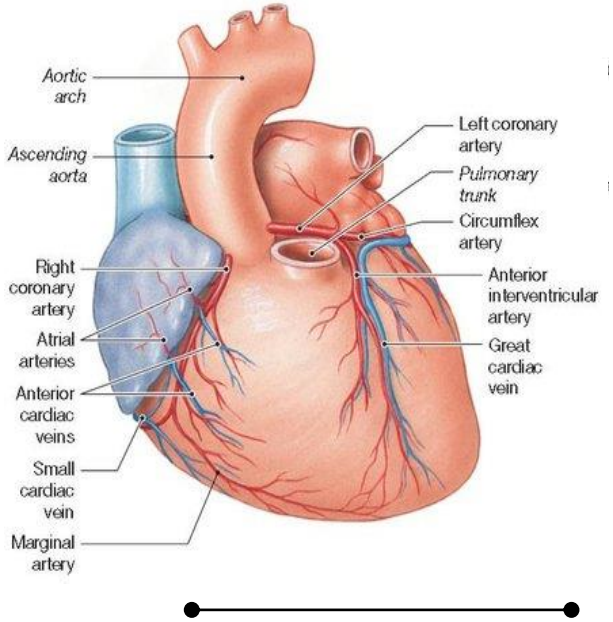
Coronary Circulation

Components

Coronary arteries outlined using red string (5”)

Coronary veins outlined using blue string (4.5”)

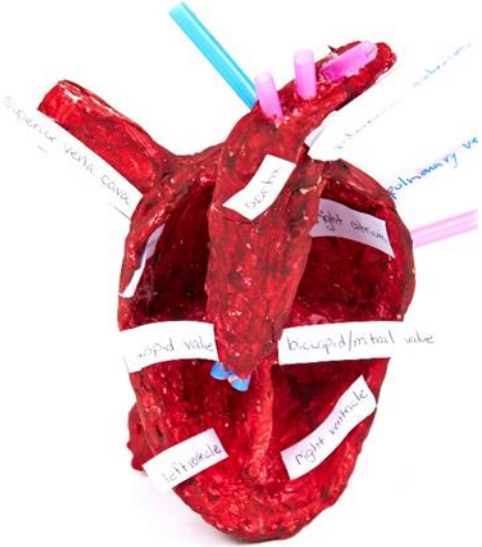
*Outline with red and blue painted strings



Student Procedure

- Model the Atriums and Ventricles with Modeling Clay
- Before the clay dries, conduct a tube fitting to ensure they fit
- Paint the Atria and Ventricles pink on the outside and their corresponding color (as shown on drawing) on the inside after the clay dries
- Insert the tubing and glue them into place on the clay model
- Attach the rubber bulb to the tubing and test the circulation of blood

Student Heart Model Projects



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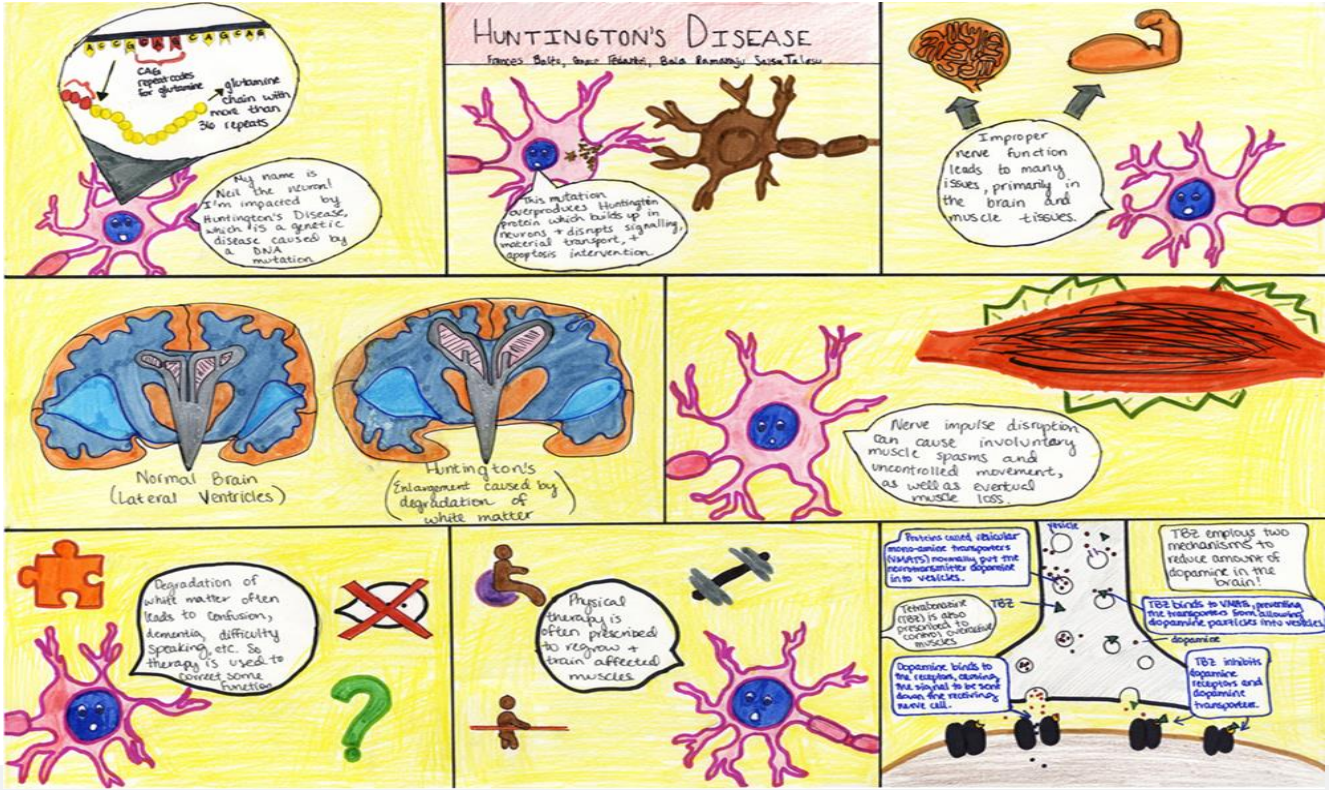
Graphic Novels Project

- Introduced as a novel replacement for oral presentations because most students do not pay attention when their peers are presenting
- Students are encouraged to choose any two organ systems not studied in class and research two diseases of each system
- Students draw comics of the diseases they have chosen in groups of 2-3
- Students reflect on their work in terms of disruption of homeostasis and how the body strives to maintain equilibrium
- Gives students an opportunity to apply what they have learned and extrapolate it to real life examples

Student Graphic Novel Example 1



Balto, F.; Federici, G.; Ramaraju, B.; and Talasu, S. 2019). "Huntington's disease" .Human Diseases Graphic Novels. 28, https://digitalcommons.imsa.edu/hd_graphic_novels/28

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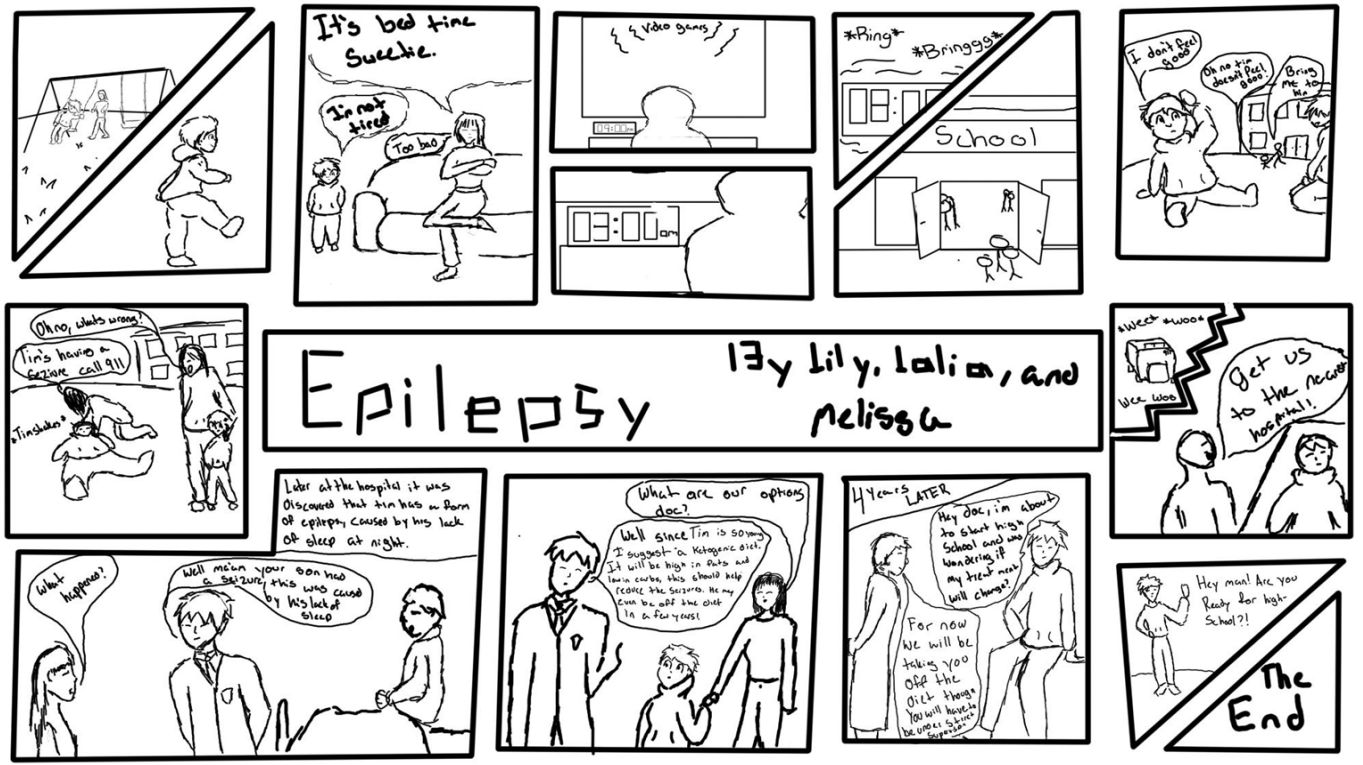
Student Graphic Novel Example 2



Isibue, L.; Myint, M.; and Walton, L., "Patho Graphic Novels: Epilepsy" (2020). *Human Diseases Graphic Novels*. 39.
https://digitalcommons.imsa.edu/hd_graphic_novels/39

How to test the efficacy of my model?

- Student feedback
- Reflection
- Quantitative – pre and post quizzes on the relationship between the structure and function of the heart

Student Feedback

- “This is a cool way to understand Physiology.”
- “I loved making the heart, it taught me so much. I learned that it is okay to fail many times before I succeed!”
- The graphic novels are so awesome, I have never done anything like this before. I learned so much more than just giving a presentation and it was fun too.”
- “I did better on the quizzes because I understood the material better by doing these projects.”
- “I could use my artistic skills to do these projects.”
- “I finally found a class where I could learn material in a different way.”

Reflection

- Students were required to reflect on their models and graphic novels to identify problems, describe how they solved them and how they would modify their design for future purposes.
- I also reflected on how the assessments helped students articulate their understanding better, and what I could do based on student feedback to improve these assessments

Pre and Post Model Assessments

- Naming heart structures
- Understanding their function
- Distinguishing between the systemic/pulmonary circuits and mechanical/electrical systems of the heart
- Being able to solve real life case studies using what they learned in class

You can do it, too!

- Anjur, S. 2011. Improving Student Performance in Inquiry-Based Science Courses. Spectrum(the Illinois Science Teachers Association Journal (Winter 2011 issue), 36(3):23-25. https://ilscience.org/resources/Documents/SPECTRUM/Spectrum-V36N3_2011-Winter.pdf
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- Anjur, S. (2020). Graphic Novels in Biology – A Novel Assessment Idea. The Journal of the Illinois Science Teachers Association, Spectrum, Winter 2020, 42(1): 28-37. https://online.fliphtml5.com/wfyac/iyks/#p=29

Questions?

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Thank you for listening!

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