

Successful Inquiry Based Activities in High School Physiology

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ABSTRACT:

Physiology and Disease students at the Illinois Mathematics and Science Academy in Aurora employ inquiry driven activities to improve their understanding and articulation of the discipline. Students make heart models and make correlations with heart rate, lung capacity and blood pressure measurements. Students seemed to gain a better understanding of the cardiovascular unit as reflected in their heart unit assessment scores.

INTRODUCTION:

- Students take responsibility for their own learning by designing and constructing heart models which they use to demonstrate blood circulation by the heart to their peers.
- Students also measure heart rate, blood pressure and lung capacity using various activities of their design to study the neuronal controls behind these parameters.
- The goal of these activities is to help students better understand and articulate their understanding of the cardiovascular system on assessments.

MATERIALS AND METHODS:

- Students submitted a design for their heart models, and upon approval of the design, proceeded to build models that showed “blood” circulation by the heart.
- Students wrote a formative on their understanding of their measurements in the heart rate, blood pressure and lung capacity labs.
- Student test scores on the heart unit assessment were correlated to the time spent on building the heart model.
- Figures 1, 2 and 3 show student work.

RESULTS :

- Student understanding of the cardiovascular system as assessed by a combined formative on the three labs (heart rate, blood pressure and lung capacity) was correlated to their scores on the heart unit test. (Figure 4)
- Student heart unit test scores were shown to be significantly correlated with their heart formative scores ($P=0.040984$, $df=36$) (vassarstats.net/rsig.html).

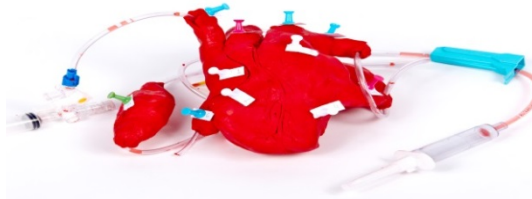


Figure 1: Student depiction of a working heart model



Figure 2: Some examples of student heart models



Figure 3: Student depiction of a working heart

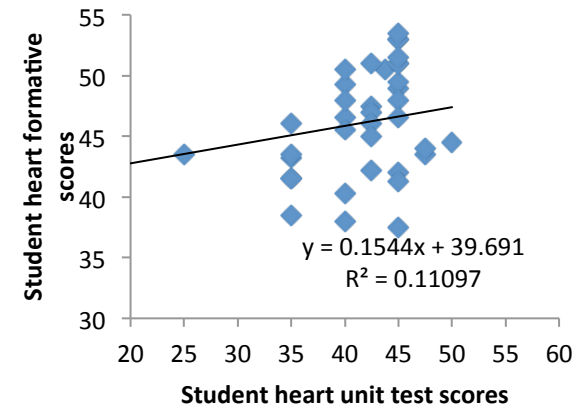


Figure 4: Correlation analysis between student scores on heart model quality (design, construction and working) and cardiovascular system understanding (formative report).

DISCUSSION:

- Students seemed to gain a better understanding of the cardiovascular system through continual reflection and writing of their understanding.
- Student surveys indicated that students enjoyed studying better through hands on experiences and articulated better on assessments.
- Further research is under way to make a significant conclusion between building heart models and transfer skills over the next two years.
- Since it is observed that more time spent on reflecting upon laboratory experiments seems to enhance test scores, more hands on activities will be incorporated into the course to enhance student understanding and articulation skills.