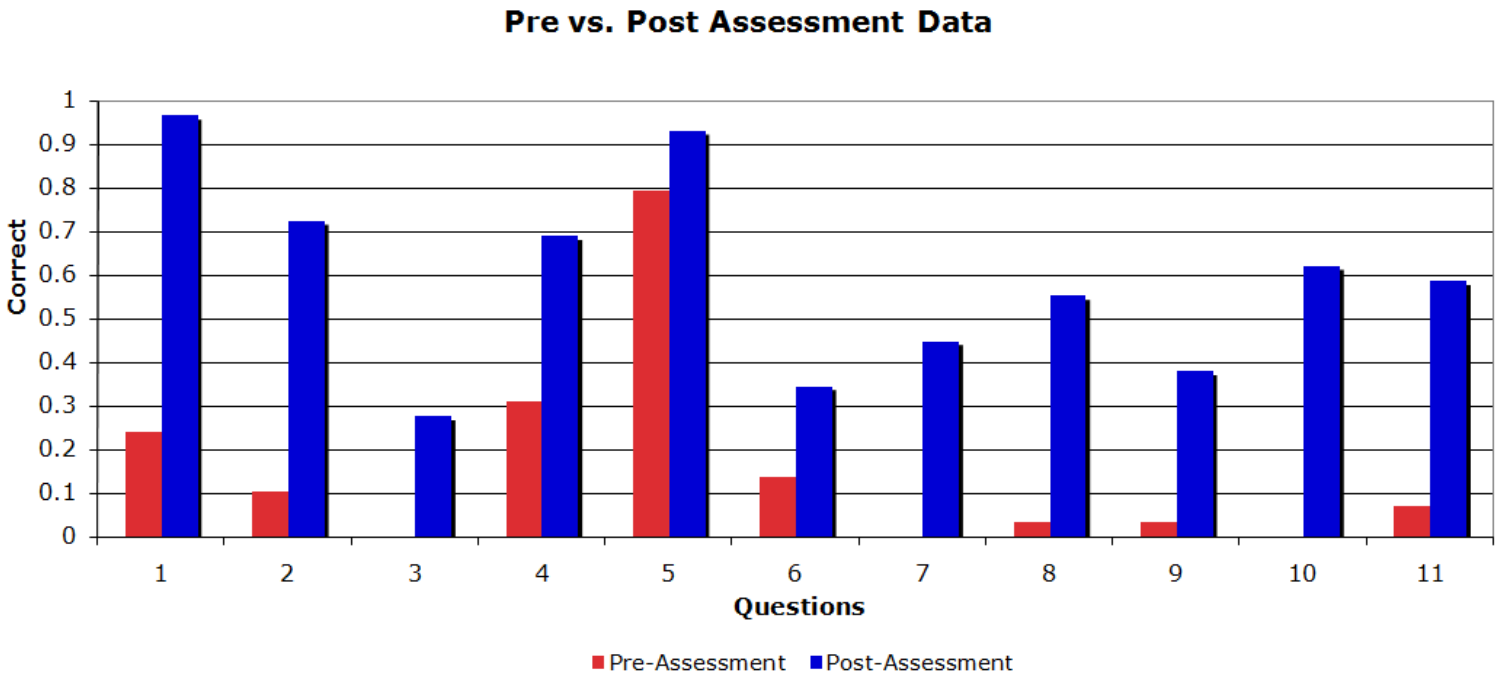
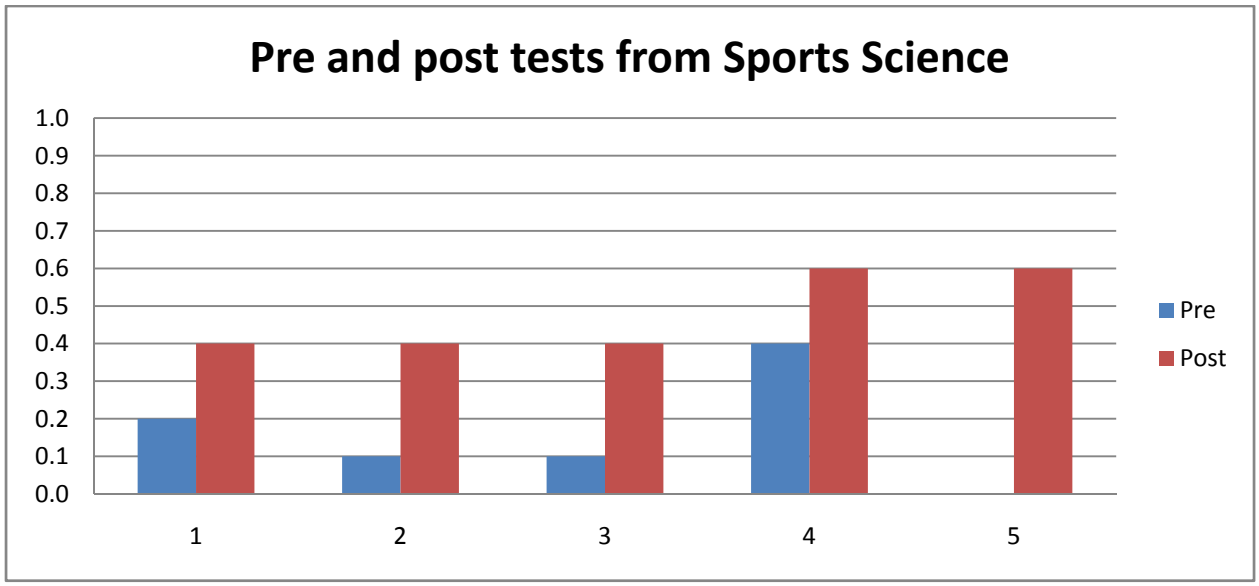
Michelle Kim, ISE
Jared Salin, AME
Animal Locomotion, Spring 2009, ENGR 490



A series of four sessions on Animal Locomotion was conducted with 30 6th grade students from Synergy Charter Academy. Students were introduced to concepts of "engineering as redesign", thrust, action-reaction, density, buoyancy and viscosity. The pre and post assessments were geared to measure change in understanding of these concepts. The first question was "What does an engineer do?". Unlike in the pre-assessments, answers from the post-assessments widely included the words "problem-solvers," "inventors," and even "he or SHE." The answer to Q5 was intuitive, which is shown by the nearly 80% who got it right in the pre-assessments, but there were many more correct answers in the follow-up questions about *why* the phenomena occurs. Thus it is clear that many of the students understood the content and could reasonably explain phenomena of concepts they had not been introduced to before.

Brittany Martello, ISE
Robert Ward, AME
Sports Science, Spring 2009, ENGR 490

We taught a 6th grade classroom at Synergy Elementary School (33 students) about the Science of Sporting Equipment and science and engineering in general. The scientific topics we taught them included elasticity, deflection, vibration, water absorbency and pressure, which we related to sporting equipment. In order to track their comprehension of the lessons we taught them, we gave them an assessment quiz (which consisted of 5 questions) before we taught them anything. We then gave them the same exact quiz after the fourth and final lesson that we taught them. The 1st question had to do with engineering and what it entails. We wanted to see if the students had any misconceptions about what engineers do and who is considered an engineer. Referencing the charts, it seems as though they did have many misconceptions since only 17.4% of the students answered this question correctly before we taught them anything. However, 42.9% of the students gave a correct response after our final lesson. Questions 2, 3 and 5 were based on our first lesson on elasticity and what materials allow a ball to bounce well. Referencing the charts, it is evident that the children did not know much about this concept since only 13.0%, 8.9% and 4.3% respectively answered these questions correctly before we taught them. However, there was a drastic change in overall comprehension of this specific concept since 46.4%, 39.3% and 57.1% respectively responded correctly when they were given the test again. Question 4 focused on how deflection and vibration come into play when hitting a ball with a baseball bat. This lesson also had the children test the vibration and deflection of different materials (including wood, aluminum and steel) in order to determine which would be the best for hitting the ball farther. Before we taught the students anything, 39.1% answered correctly and 57.1% answered correctly afterwards. It was encouraging to see the percentages increase because it suggests that the students were actually learning during our lessons ☺



ENGR 490 Iridescent
Cardiovascular Mechanics at Synergy Kinetic Academy Pre- and Post-Assessment Analysis
Instructors: Bharat Reddy and Mercedes Perez (BME)

In the 2009 spring semester, a four session course of Cardiovascular Mechanics was taught to sixth grade students at Synergy Kinetic Academy. The four sessions consisted of teaching the students about the following concepts: The Heart is a Pump, How Blood Flows through the Four Chambers of the Heart, Engineers Make Accurate Models to Understand How Things Work, and Cardiovascular Disease. The data obtained from the pre- and post-assessments, shown in Fig. 1, were collected from the 30 students who participated in the course. All 30 students were present for the pre-assessment and 29 of those students were present for the post-assessment. As can be seen from the graph, there was a significant improvement in student performance over the trajectory of the cardiovascular mechanics course. By the end of the course, the majority of students were able to accurately explain what an engineer was and did. This improvement was more than likely due to our third session, which was a great way to get students to understand what an engineer was by having them problem solve and fix their pre existing heart model to be an accurate heart model. There was also a significant improvement in the students' ability to describe the anatomy of the human heart in detail, demonstrated by their ability to accurately draw and label the four chambers of the heart. Though there was improvement in performance, the assessment the students took was not strongly geared towards the topics we taught; there were three questions devoted to pressure and no questions related to cardiovascular disease. An assessment closer in line with our sessions in the future would more accurately demonstrate the students' understanding of the lessons. All in all, however, the students at Synergy Kinetic Academy demonstrated notable understanding of our cardiovascular mechanics topics.

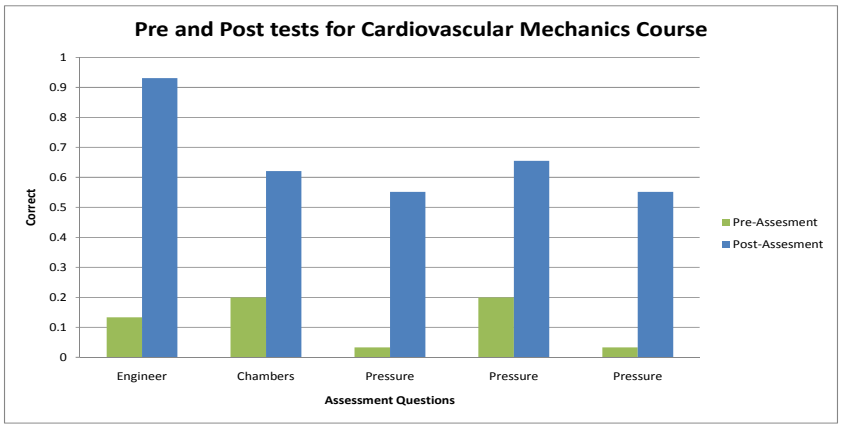


Figure 1: Impact chart for Cardiovascular Mechanics Course at Synergy Kinetic Academy during the spring 2009 semester