

## INCOSE STEM Grant Status Report: January 2014

### **School name:**

Vista Magnet Middle School (VMMS)  
151 Civic Center Drive  
Vista, CA 92084

### **Teacher: Donna Markey**

Thank you for the grant. With the monies the grant provided, we purchased four “Investigating Alternative Energy: Hydrogen & Fuel Cells” kits. These were produced by the Science Education for Public Understanding (SEPUP) Program at the Lawrence Hall of Science, University of California in Berkeley. All of the 225 eighth grade students at VMMS either were able or are going to be able to use the kits. Not all of the classes have been able to rotate through them as of January 2014.

The six activities that comprise each kit took three weeks for students to complete. They began by examining the pros and cons of gasoline powered internal combustion engines and alternative fuel vehicles. They discovered there is no perfect fuel. It is either expensive to produce, contributes to global warming or the range of the vehicle is severely limited.

In the second activity, students decomposed water into hydrogen and oxygen. Chemistry concepts were reinforced as students saw twice as much hydrogen as oxygen being produced. Next, students used the hydrogen they produced to power a fuel cell and run an electric motor that turned a propeller. They were able to measure the fuel cell’s voltage and the electrical current.

In the fourth activity, students used models of oxygen and hydrogen molecules to model the fuel cell reaction. The fifth activity measured the efficiency of the fuel cell and in the culminating activity, students analyzed additional information about hydrogen and fuel cells. They held a simulated City Council Meeting, where they considered the various issues relating to hydrogen fuel and fuel cells, and discussed the trade-offs involved in their use.

Students gained a better understanding of alternative fuels, particularly hydrogen fuel cells. At the beginning of the unit, many students had the misconception that alternative energy sources were the answer to our energy shortage, air pollution, mitigating global warming and a host of other problems. It was interesting to watch their ideas change as they realized that there are no perfect solutions or fuels - they all have trade-offs. Eighth grade student, Melissa, summed it up well when she said, “The unit was interesting, but I am really excited about hydrogen fuel cells. Imagine - creating energy from water! I realize the technology is not cost effective right now but it will probably be in the future.” As students work through simulations like this kit provided, they will become better informed citizens and hopefully it will spark their interest in studying STEM subjects and pursuing STEM careers.