

Progress Report - San Diego INCOSE STEM Funds

Current Status of funds used in the Poway High School Robotics / Engineering Pathway Program:

In December of 2013 we ordered \$600 in VEX Robotics parts to further the Poway High School Robotics and Engineering Pathway Programs. With the \$600 funding allocated by INCOSE, we purchased 4 VEX Keys, 6 2-Wire Motors 393 with Motor Controllers, and 10 Ultrasonic Range Finders. The robot parts become part of our robotics kits used by 70 Robotics students and 70 Engineering Pathway students totaling 140 students combined. The Engineering Pathway courses that the students used the robotics parts in were the Principles of Engineering (POE) and Computer Integrated Manufacturing (CIM), which are both Project Lead the Way (PLTW) courses. Students used the VEX robotics parts to build 7 robots competing in the VEX Robotics Competition and 13 classroom robots as well as physics experiments.

With the implementation of robotics parts into both programs, students were able to learn and follow the design process in conceptualizing, researching, designing, and prototyping the robot. Students also incorporated Physics principles and mathematics (i.e. statics, dynamics, force, loads, Ohms law, efficiency, mechanical advantage, and so on) in the development of their prototypes. Students also mentored middle school level students through the Poway After School Educational System (ASES) program by teaching 6 middle school teams, and will be hosting an ASES middle school competition for them in April.

The results were very motivating and inspiring to students as our Robotics program associated with the Engineering Pathway actually grew in size to 75 students with three females also joining the team. Two of our teams, VEX 1622X and VEX 1622Y won the sportsmanship award and 2nd Service Award at the Chula Vista VEX regional competition in January.

Ultimately the implementation of the robotics parts helped teach STEM in and out of the classroom. Students and educators learned that STEM is the creative applied implementation of Science, Technology, Engineering and Mathematics fostering innovation and invention. Through this process of using all four disciplines into the design process or product development, students were excited as they manipulated their tools of science, technology, engineering and mathematics into the overall process. Student's now see that the four disciplines of STEM are tools as much as a paintbrush or screwdriver. An overwhelming response from students as we finished up our first projects were, "When do we get to do this again? I learned more doing this project than any other learning in high school." Robotics clearly is motivating to students providing the opportunity to be creative with science, technology, engineering and mathematics which students are craving.