Energy Week: Outreach Events Geared Toward High School and Middle School Students

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Abstract

The education and influence of students in the STEM fields has great importance in modern society, especially with our ever-increasing reliance on new technologies. A collaboration between the University of Pittsburgh and Robert Morris University that was funded by Constellation Energy engaged over 40 students in a weeklong workshop named Energy Week. Dr. Kerzmann and Dr. Sanchez designed a curriculum that allowed middle school and high school students from around the greater Pittsburgh area to actively participate in innovative hands-on energy challenges that focused on enabling teams of students to design and build energy technology prototypes. The curriculum exposed students to fundamental science and engineering concepts by synthesizing a curriculum around energy labs. Student-teams were engaged in a 3-tiered energy challenge by designing and fabricating prototypes that demonstrate: (1) Energy generation and conversion, (2) Increased energy efficiency, and (3) Energy use monitoring and control. These prototypes consisted of a fiberboard vehicle design, the wiring of Arduino circuits and the fabrication of a solar Lego vehicle.

The design and physical modeling using energy technologies requires students to practice high-level thinking (e.g. analysis, synthesis, evaluation) in teams while building a culture geared toward energy technology innovation. The students were introduced to concepts from traditional engineering curricula such as thermodynamics, fluid mechanics and dynamics, while working with principles of renewable and non-renewable energy technologies used in industry, such as the photovoltaic effect. The students were given a pre-test and post-test to evaluate the success of Energy Week in developing their awareness and understanding of energy and engineering, measure their level of engagement with the activities, and evaluate their attitudes towards team work. This presentation will cover the energy curriculum, hands-on energy laboratories, design and fabrication challenge and the preliminary results from the pre- and post-tests.