STEM

AP BOTTLE RACERS

Doing Science with Air-Powered Bottle Racers

By Greg Reiva, Streamwood High School, Streamwood, IL

Read how teachers and students are finding success with Pitsco Education products in their classrooms

For a number of years, Greg Reiva has conducted presentations at the National Science Teachers Association (NSTA) Conventions showcasing new curriculum initiatives that motivate and engage students to learn science. At the National NSTA Convention in Chicago, he had the opportunity to exemplify the basic elements of doing science by bringing to workshop participants the challenge of scientific investigation through engineering problem solving using the Pitsco Air-Powered Bottle Racer car design.

PROFILE »

SCHOOL: Streamwood High School

LOCATION: Streamwood, IL

TEACHER: Greg Reiva

GOAL: To construct and test an air-powered vehicle and to maximize vehicle performance

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"To be able to emulate the process of doing real science, it is essential for teachers to find themselves immersed in the fundamental process of testing new ideas, thinking critically, and assessing outcomes related to performance," says Greg.

With a sense of curiosity and resiliency, teachers and students at the workshop began the challenge of designing and creating air-powered vehicles. Prototype models were experimented with and their performance was assessed, but real engagement is felt when unique designs are engineered in an effort to significantly improve performance.

Using 20-milliliter bottles, plastic floor boards, plastic spoked wheels, and various craft supplies, science teachers and a few students ventured off into the convention room to solve problems related to performance. During testing, the high-pressure launcher propels the AP Bottle Racer down a drag strip and through a high-speed timing gate.

The workshop participants discussed the launcher mechanics and scoured through a wealth of available supplies to build their own car and think through an engineering process where success is measured by one's ability to create something new that is worthy of the effort needed to produce it.

The two grade school kids in the room, with their science teacher dad, became very focused on the task to make a fast car. They were full of energetic ideas and they saw this as a really fun and exciting challenge. First-year science teachers, veteran teachers, male and female teachers, like the kids, became very much involved in this effort to express their ideas and abilities through an engineering process.

The purpose of this engineering-based scientific inquiry is to determine the motion of a car experiencing acceleration due to an applied force. The goal is to describe the motion of the car and to quantify the velocity, acceleration, and applied force. This scientific investigation will yield greater understanding of the variables in physics defining the relationship between applied force and acceleration.

With great excitement, one of the grade school kids blurted out, "What store can I go to to buy this?" Wide-eyed enthusiasm and sheer emotion were evident as his car was loaded into the launcher and readied for testing. Emotions ran high as the car blasted out of the launcher, accelerated to amazingly high speeds, and streaked through a high-speed timer gate, yielding results to the nearest 10-thousandth of a second!

"Science has always been about doing. Focus, emotional attachment, engagement, and critical thought are driving forces that can move the curriculum and learning process forward. The AP Bottle Racer workshop opened the door for many new and veteran teachers to experience the emotion associated with STEM educational initiatives in their classroom. Change is the new norm for science education. Teachers that work with engineering challenges, such as the AP Bottle Racer, in their classrooms will begin to reach for Next Generation Science Standards and the rigor and relevancy it professes for all of our students in the science classroom," says Greg.

> "CHANGE IS THE NEW NORM FOR SCIENCE EDUCATION."
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> ***– Greg Reiva***

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