**Southwest Valley**

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# Robots replace books, help Avondale students learn math concepts

by **Eddi Trevizo** - Oct. 17, 2011 09:26 AM
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Eight high school students crowded around desks on a recent Monday.

They were alert and excited, which can be unusual for a morning math class, but that's because most math classes don't build robots for class assignments.

Robots are replacing textbooks and helping students learn about math relationships and how they can be applied to real-life situations at the Arizona Agribusiness and Equine Center, an Avondale charter school that partners with Estrella Mountain Community College.

"They've been assembling the robots for four days," said Scott Hogan, a teacher in the school's mathematics department.

Teams of two or three students in his classrooms built seven robots out of wood. They used screws to attach thin appendages to the main body of the robot. The levers are controlled by water-pressure. Students were busy making the robots move small wooden cubes from one side of the table to another. The robots were about the size of a Gatorade bottle.

"I read the whole (instruction) book. The hardest part was figuring out the screws," said Matthew Barnes, 15, who worked hard to find the right mobility for the robot's arms.

The class was engaged in a competition of sorts, although the prize was unknown, the group that transferred blocks most quickly would win.

So, how does building a robot teach math?

Students learned hydraulics, axis rotation and force ratios to assembled the robots.

"We seek to integrate a whole new way of thinking about mathematical relationships by doing practical activities that incorporate math. Robotics is part of this extension," said Hogan.

But the project was also part of the school's foray into STEM education, an initiative that advocates science, technology, engineering and math in classrooms to prepare children for workforce development.

Science Foundation Arizona, a non-profit that consists of multiple educational and business partners in the Valley advocates STEM. The non-profit began the initiative in 2008 and uses state and private donations to research and grant money to programs that build a competitive workforce.

The school implemented the initiative this school year, in an effort to make it more attractive to students and parents. AAEC at Estrella Mountain Community College is in its second school year. The school has 195 students this year and wanted to increase the programs and specialization it could offer students.

"If you look at it, those are the areas that challenge us globally and make our kids competitive," said Principal Mona Ramirez.

This year the school invested between $25,000 and $30,000 in new equipment and materials that bring STEM learning to classrooms, said Ramirez. That includes equipment such as data collectors, which can interpret sets of data ranging from speed, sound, temperature and other variables and produce graphics that allow students to better visualize relationships.

Other supplies go to hands-on projects such as a building haunted house, in which students must make blueprint models of the proposed building, provide volume capacity of each room in the haunted house, and budget their project.

Students say practical approaches to math and engineering help them retain information better.

"When you apply it to something, you remember it more," said Spencer Brickell, 16, who participated in the robot project.

Most students in the class said project-based learning trumps the more traditional education they had at schools that usually assigned textbook assignments.

"You're not just starting at black and white here," said Stevie Hosner, 16, another student.

Hogan said he has planned several other STEM projects that incorporate math into real life:

Those projects include crosswalk math, which determines if people have enough time to make it through a crosswalk by comparing time and rates; building scale-model homes for architecture basics; and using trigonometry to figure rocket heights, after building water and air rockets.