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Celts find droids they've been looking for

Round robots unlock physics lessons

By **MATT RAWLINGS**
Of the Keizertimes

Jessica Graham has been teaching science at McNary since 2005 and takes pride in having engaging and fun activities in her curriculum.

But she may have hit the jackpot when she introduced Spheros to her science class earlier in December.

A Sphero, roughly the size of an orange and otherwise known

as a spherical robot, is an electronically charged, mobile, ball-shaped robot that is wrapped in polycarbonate and can be controlled using a smartphone or tablet. It was originally released in 2013 and it was featured in *Star Wars: The Force Awakens*.

While several smartphone apps and games have been created for the platform, Graham uses the Spheros to teach the velocity unit to McNary freshmen in her honors physics and chemical systems class.

"It's definitely a unique way to learn," McNary student Vanessa Orlov said. "I'm a big science geek, but I never thought that I would be doing something like this in high school."

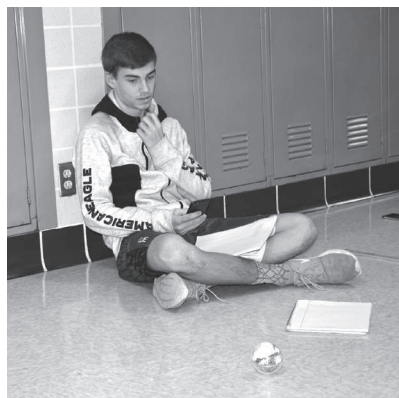
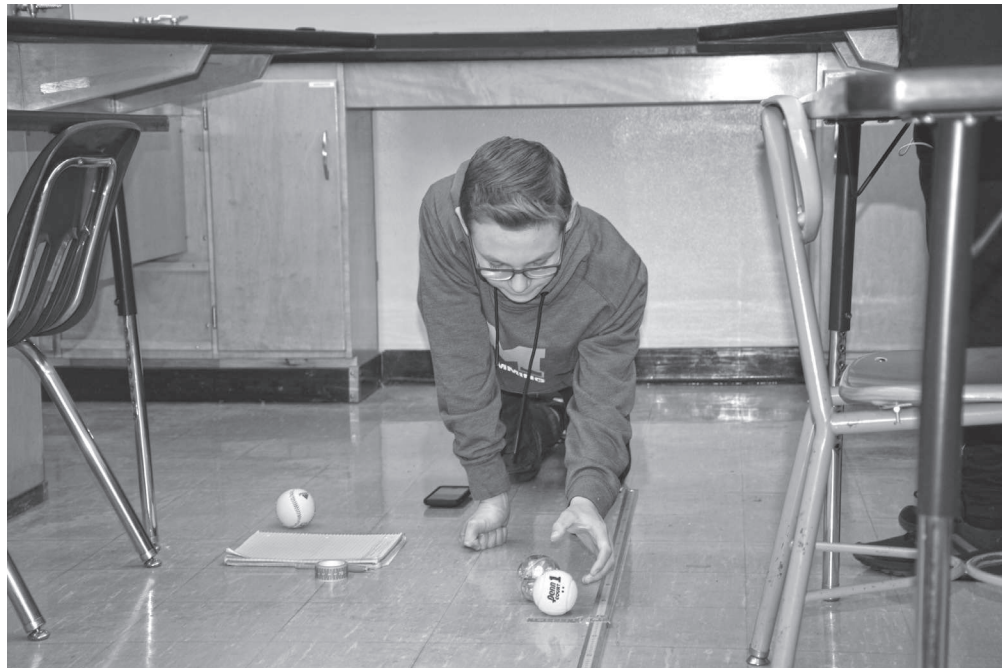
"There's a lot of trial-and-error, but it's really fun." With the tap of a finger, you can command a Sphero to go up to five miles and even get in to move on water. It makes pinpoint turns and can even do several different flips and tricks.

The Sphero can be used as a fun and playful toy, but it also incorporates significant STEM (Science, Technology, Engineering, Arts, and Math) capabilities in the device, which is why Graham wanted to bring them into her classroom.

Graham got the idea to bring Spheros to McNary after going to a conference for the Oregon Science Teachers Association (OSTA) in Newport earlier in the school year.

After borrowing a set of Spheros from the Salem-Keizer School District TAG Department (Talented and Gifted), Graham introduced them to her kids.

"I wanted (my students) to get past just working with an equation," Graham said. "I wanted them to construct the



Hayden Wampler (above) and Jordan Flesch work with Spheros, small round robots as part of their physics lessons.

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Matt Rawlings

a short period of time, they already have done multiple unique group projects with the device — with the most popular being the Martian-Man Challenge.

Graham gave her students the scenario of a martian miner who is stranded on Mars and needs to be rescued using the Spheros.

By writing a computer program to test the velocity of the Sphero over a set distance and learning how to refine the computer program to increase accuracy of data collection, the students were able to "rescue" a stranded martian miner — which is just a small toy person — using the Sphero to get the

miner back to its home-base following a set course that included several stops and sharp turns.

The students also had to construct straws and pipe cleaners together to carry their martian miner on the Sphero.

"There was a lot of independent learning involved. I didn't tell them to program anything beyond the first day. They had to figure it out," Graham said. "It took a lot of problem solving and skill-building within the groups."

Eventually, the project turned into a friendly class competition to determine which team could develop the most accurate and fastest computer program to safely transport the martian miner on the course.

"Learning about velocity and acceleration in the normal way, to me, would be more boring and less fun. But with the Spheros, I actually want to

know how this stuff works," McNary student Sage Allen said. "On the last day, of the Martian-Man Challenge, my group was able to take a couple seconds off our time by just changing some minor things. It was really cool to see how changing the speed of something just slightly could effect the way (the Sphero) goes around the course."

The students have also used the Spheros to test the First Law of Thermodynamics — which looks at the transfer of kinetic energy through collisions.

In the coming months, Graham plans to have her students design a computer program and engineer a corresponding roller coaster to demonstrate kinetic versus potential energy.

Along with the obvious science aspect, Graham has been pleased with how the Sphero projects have allowed the opportunity for her students to successfully work as a team.

"Not only were students working to work out how to program their Spheros with the correct coding and math, but they also taught each other how to problem solve their way through the math and code," Graham said.

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