



From Coding a Robot to COVID-19: Technology Enhances a Lifetime of Learning

by Gina O'Malley

Tiny raincoats and pint-sized backpacks are tucked into cubbies shared with friends, and crayons worn by scribbles and imagination are nestled in bright plastic cups. Carpet squares are stacked neatly in the corner, and jumbo containers of animal crackers and juice sit alongside a coding robot on the countertop.

One of these things may not seem like the others, but thanks to the efforts of Duquesne alumnae Lauren Harter, A'16, E'16, GE'17, and her colleagues at VEX Robotics, the landscape of the pre-k classroom may soon change. Somewhere between circle time and snack time, 4-year-olds will code robots, building confidence and laying the groundwork for a positive academic future.

VEX Robotics makes this possible with VEX 123—a kid-friendly robot that introduces preschoolers to coding principles. It takes coding off of adults' computer screens and into the hands of eager children.

Harter, who holds three degrees from Duquesne and is working on her fourth (a doctorate in instructional technology and leadership), serves as senior educational developer at VEX Robotics.

"By the time students reach middle school, they have this pre-determined feeling of whether or not they're going to be successful with mathematics," says Harter. "You can include problem-solving and STEM techniques for really young

students when they are more malleable and resilient. This allows them to be extremely successful down the road in math and their school careers in general."

Many parents and some educators aren't aware that computer science can be teachable to students at very young ages, and many have a misconception that these concepts can't be taught until middle or high school.

"The shift has been very eye opening. It went from thinking that maybe these kids aren't mentally capable or mature enough to us finding through research that they are," says Harter.

One of VEX 123's main benefits is its low barrier of entry for STEM education and computer science. "The robot is so accessible because you only need the robot. You don't need an iPad or hardcore technology," says Harter.

Since the robot requires no additional equipment aside from a charger, students can dive in, sequencing movements, lights and sounds with the touch of a few buttons.

"The robot ties in social emotional learning, a vital pre-k concept. Kids program the robot to flash lights and play sounds representing different emotions, like act happy; act crazy," says Harter.

VEX 123 also develops spatial reasoning skills—directions like "on top of" or "next to"—a concept that correlates to academic achievement.

A woman with glasses and a pearl bracelet is holding a small white robot with a screen. She is looking at the robot with a slight smile. The background is blurred, showing other people in a classroom setting.

“I want my students to have that experience of what it means to communicate using a digital application. I want them to offer that opportunity to their future students.”

Sandra Quiñones works with students in a FlexTech classroom, a collaborative space designed for active learning.



Lauren Harter (right) highlights the benefits of VEX 123 at a tradeshow.

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Young students crave immediate success and have short attention spans, and this was considered as the robot and associated curriculum were developed.

“This robot allows students to be inquisitive, but in a structured manner. Problem solving, computational thinking—all things they don’t realize they’re doing playing with this robot,” says Harter.

She recognizes that not everyone is cut out for a career in computer science, but notes that everyone benefits from the skills that early STEM education provides.

“A good STEM curriculum helps you become a better problem solver, better computational thinker and more successful in your career,” she says.

Part of what makes VEX 123 so effective is the accompanying curriculum, and Harter believes this is the key to enhancing STEM education.

She says, “I can download a million STEM activities, but those are just activities. There’s a difference between activities and curriculum that builds on previous concepts and has learning objectives.”

NOT “JUST ACTIVITIES”—CREATING CONNECTIONS THAT MATTER

Duquesne’s School of Education prepares future teachers to not only use the latest robots, gadgets and apps, but to use the technology to teach effectively.

“What a teacher does is build scaffolds that help you go from current level to next level,” says David Carbonara,

clinical assistant professor. “As you learn, you build these scaffolds yourself. A good teacher knows how to build them, and a good instructional technologist knows how to build those scaffolds with technology.”

Carbonara wants his students to evaluate how useful a technology can be and how easy it is for instructors and students to learn. “Some of it is intuitive,” he says. “Some of it you need a little practice.”

For Carbonara, it’s not essential to use every piece of available technology, but he encourages his students to explore their options. “If it works? Great. If it doesn’t work, then it’s OK. In the long run we will have more successes than we have failures,” he says.

Sandra Quiñones, associate professor and program director, recently introduced her students to free social-learning tool Flipgrid. With Flipgrid, children can express themselves by recording and sharing short videos. Students also can edit using video styles, text, emojis, inking and more.

“I want my students to have that experience of what it means to communicate using a digital application. I want them to offer that opportunity to their future students,” said Quiñones.

Her students are excited to use Flipgrid in their own classrooms. “They see this working because it offers multi-modal ways of expressing your learning. And the younger kids love using their phones to become superstars,” she says with a smile.

AN UNPRECEDENTED RELIANCE ON TECH

The COVID-19 pandemic brought educational technology to the forefront as schools across the globe shifted to remote learning. Duquesne faculty and staff responded swiftly and implemented technologies that kept learning on track and enhanced human connection.

Quiñones started a weekly online writing group to better support doctoral students who are working and writing dissertations from home. “Having the extra accountability of meeting as a group on Wednesday nights, you know you have three hours that you’re going to devote to working on your research project,” she says.

Participants also appreciated the camaraderie during a time that could feel isolating. “There’s a sense of human connection, whether the students are in the professional doctorate in educational technology program or in a different program. We have students joining us from Duquesne University and the University of Pittsburgh,” says Quiñones.

Public and private K-12 schools also made the shift to remote instruction, with Duquesne affiliates leading the way locally and across the country.

As news of school closures loomed, Duquesne School of Education doctoral student and principal of Central Catholic High School Brother Anthony Baginski, FSC, knew that the first conversation he needed to have with his team was how to keep everyone connected.

“It’s not enough to put content online or transition your class from in-person to online. The idea of education is the connection you make with students,” he says.

Baginski notes that teachers and administrators were fortunate that this shift occurred in March when teachers