

Teachers who use project-based learning amply challenged in summer workshop

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Jim Niedermeier has seen the light – literally. In a professional development workshop this summer, he figured out how to use computer code to make a tiny bulb light up. Even better, he was able to summon a blink.

“Pretty satisfying,” said Niedermeier, who is principal of Tech Valley High School in Albany. In a summer professional development program, he and 16 teachers tackled a variety of technological challenges, including creating circuitry so a bicycle could power a smoothie maker. There were also three-dimensional projects such as building a prosthetic.

Not every teacher had a finished product after three days, but that’s okay. Tech Valley High is a champion of “project-based learning,” in which students are routinely assigned challenging, collaborative projects. Teachers view all educational outcomes, good or not-so-good, as stepping stones of progress. Many signs in the school building say: “Fail often to succeed sooner.”

In the July training, teachers got to experience the same kinds of dilemmas and stresses that students typically encounter in project-based learning. The challenge was to overcome obstacles by relying on one’s skills in critical thinking, teamwork, communicating and thinking unconventionally. “We rarely get a chance to practice those things ourselves,” Niedermeier said.

About to turn 10 years old, Tech Valley High is seen as a highly successful educational experiment; it is routinely visited by educators from around the globe. It was created by two BOCES – Capital Region and Questar III – and has an operating board composed of five members from each of the two BOCES boards. It draws students from 27 school districts in seven counties. Enrollment this fall is expected to be about 130.

While it is common for teachers to



Tech Valley High School teachers John Hartnett, Sophia Hsia and Michelle Sweeny work on a set of musical steps in a professional development program focusing on creative problem-solving in project-based learning. At right, Sweeny and Principal James Niedermeier unspool wire needed in the project.

✦ Photos courtesy of Capital Region BOCES

engage in some kind of professional development over the summer, Tech Valley’s training took place in a more challenging setting than the typical classroom-based course. It was held in the “THINQubator,” a sparkling new makerspace in Troy that offers equipment, education and camaraderie to all sorts of inventor types. You can reserve time to use their laser cutter, wood shop, 3-D printers, electronic shop, machine shop or fiber arts studio. It’s part of the Tech Valley Center of Gravity, an incubator that houses communal workspaces a few blocks from Rensselaer Polytechnic Institute (RPI).

In late July, Tech Valley High’s faculty took over a large chunk of a back room at the Center of Gravity and seemed to transform it into a high tech start-up. Coffee was constantly being brewed. Snacks were regularly present,



too, as if the group was preparing to pull an all-nighter, if necessary.

The fees for the training (\$290 per participant, including three months of access to the Center of Gravity) were paid by the school’s Foundation Board, which is composed mostly of Capital Region business executives. Teachers were “on the clock” as 11-month employees, Niedermeier noted.

On the first day, all of the teachers learned how to use laser cutters and 3-D printers. With the help of Center of Gravity board member, Bridget McGivern, and other staff, Tech Valley’s group broke off into groups to brainstorm projects and figure out the “essential question” for each.

Acquiring the skills and knowledge for how to solve each problem was the next step – sometimes, an agonizing one.

McGivern, a veteran teacher, emphasized the “growth mindset” approach recommended by Stanford University professor Carol Dweck. It was more than OK to ask questions, but not to give up on finding solutions.

When *On Board* visited, Tech Valley teachers were seated at desks listening to Tom Tongue, executive director of the Tech Valley Center of Gravity, explain how to use a microcomputer called

Raspberry Pi. A physicist with an MBA from RPI, Tongue wore a Silicon Valley suit: short-sleeved shirt, shorts and sneakers.

Sure, the little computer was powerful. But could it be programmed to accomplish whatever specific task that a teacher wanted?

Social studies teacher Tom Morrill encountered all kinds of roadblocks as he tried to create a computer game in which students would be able to create their own political party. “A few teachers were noting how we were all pretty spent by the end of the day,” he said.

A team including Principal Niedermeier set a good example as it tackled a simple but challenging project. At a final presentation, teachers stepped into outlines of footprints in cardboard. Beneath lay all sorts of wire and circuitry. Each step – left, right, left, right – triggered music. Teachers smiled as they recognized the “Imperial March” from *Star Wars*. (Da da da, duh da-da ...)

The invention should be installed on a series of steps at the school this fall.

“I definitely hit frustration points,” Niedermeier said. “But that makes you feel that for the students. It was also great to learn about all of the teachers here, and their various skills, too.”



Can a bicycle power a blender and produce a drinkable smoothie? Tech Valley physical education teacher Adam Cohen finds out. ✦ Photo courtesy of Tech Valley Center of Gravity