

Science changes, so do teachers - Republican, The (Springfield, MA) - December 20, 2020 - page 001

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It was one of the first questions educators faced when the COVID-19 pandemic forced classes to go remote. Months later, it remains one of virtual learning's most significant challenges.

Simulating a classroom lecture is tough enough – but how do you replicate a lab online?

"In some ways, the spring was trial and error for us," said Westfield State University science professor Tarin

Weiss, who, along with fellow instructors, developed science courses using basic, ordinary materials for lab projects done remotely. "We knew we could not enter the fall semester and hope to piece together a curriculum. We had to have a plan."

Westfield State professor Frank Giuliano said they had just a few weeks to figure out that plan, adding, "How do you adapt?"

Part of the solution was to look around the house or yard for everyday materials that could be assembled in a lab kit. These kits, the professors reasoned, would allow the next generation of teachers to not only understand principles of science but how to teach them to elementary, middle and high school students.

"We can use simple resources like soil samples, an air thermometer, a light meter. We sent out two lab kits with what we thought they might need for hands-on work," Weiss said.

The goal was to make sure students did more than staring at Zoom boxes on their computer screens. Weiss said they wanted to challenge students to learn science "by observing and analyzing real materials and phenomena."

But pre-packaged lab kits cost \$100 or more each, straining students' budgets. So, Weiss said, professors made their own kits and rewrote all of the labs in a "nonstop effort."

Weiss spent August and September collecting 600 rock and mineral samples for the lab kits – "locally and legally," she said.

"This way, students could behave like geologists and authentically inquire about Earth processes and materials," Weiss said. "In the end, students' only extra course expense is to mail the samples back using a pre-labeled envelope, so that we can re-use the samples in the next semester."

Westfield State sophomore Makayla Sanville said her lab activities were fun, in part, because they were fundamental. They taught basic principles with ordinary materials, one of which was her own

friendship bracelet in a pulley system.

Physical science and science methods are required courses for Westfield State education majors. It's become clear that the next generation of teachers will need skill in virtual instruction, even after the pandemic ends.

The challenge was how to do that in a modern, relevant format that does not eliminate textbook work but encourages what is called "three-dimensional learning." State and national science standards were updated in 2016 to encourage this more creative, activity-based approach.

"The emphasis is not just on getting the correct answer, but on the process," adjunct Professor Kerri McKinstry said.

As almost any grade-school graduate knows, science projects don't always produce the desired result. That might be even more true with remote learning, but Giuliano says that is actually a positive influence.

"There is a huge misconception as to how science works. It's not step-by-step like a cookbook. It's messy. But that is what spurs students' curiosity," he said.

Last spring was a difficult time for educators as well as students.

"The students saw us trying to get everything online in a hurry. We were saying, 'How do we deal with this?' I didn't know (then) how to put together a little kit," McKinstry said.

By summer, the instructors were getting a better handle how to teach hands-on science remotely.

"You don't need super, ultra-modern, high-tech materials. You want everyday materials that you might have at home or can get at the dollar store," Giuliano said.

The need to identify low-cost, easily accessible materials was obvious. At any school, materials will need to come from somewhere: the school budget, student fees, or in some lucky cases, perhaps a grant.

Students may have to collect their own materials, as has been done with elementary school science projects for decades. Simplicity also makes science understandable, especially for younger students, who find it fun to watch an ordinary household item prove a scientific principle.

Distance science learning is not without obstacles. Westfield State began the year remotely, then opened its dorms, only to return to online learning in November.

Senior Stephanie Lutz, a childhood education major, ran into technology issues in October, when bad weather knocked out power in her South Hadley neighborhood. She also found it challenging to coordinate a partner project, and said some students with jobs may not be able to contact their professors until late at night, when they might not answer quickly.

Lutz still found the course valuable, as did Sanville, a special education major who spent part of the

semester in a dormitory, then went home to Marlborough. She found the course easier to manage at home, where materials were easier to get.

The social aspect of in-person learning is also compromised. Courses include both lecture time and labs, and “(Giuliano) actually missed telling students to stop talking,” Sanville said. “The professors miss the social aspect as much as we do.”

Yet Sanville said her projects were enjoyable, both in learning fundamental science and in how to teach it. Both students said communication with professors was critical, and that many instructors went above and beyond to be available.

“Always, always, always ask questions,” Lutz said she would tell future students.

Among the science department’s specialties are secondary science licensure in chemistry at the high school level and general science for grades five to eight. The same strategies are being used in the secondary science methods course.

For all the challenges and extra work, “it’s been a blast,” Weiss said: “We’ve been receiving images of students’ ramp constructions and pulley configurations, pH test results, and home-made instruments as evidence of their inquiries into force and motion, acids and bases, and the nature of sound.”

“We had to pull together in very short order,” Giuliano said. “But science itself changes, and we have, too.”

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