Putting Innovative Math and Science Teachers in Local Classrooms

By CIENNA MADRID

While there has been a national push over the past decade to encourage students to study the subjects of science, technology, engineering and mathematics, otherwise known as STEM, local secondary schools have long struggled with how to best engage students in these hard sciences.

The reality is that there simply aren’t enough qualified applicants to fill the Treasure Valley’s growing need for STEM teachers.

Now Boise State’s IDoTeach program is providing a successful solution. IDoTeach is a pedagogical program designed for undergraduate students studying in STEM fields who wish to one day share their expertise in a middle- or high-school classroom.

“It’s an organized effort to provide concentrated teacher preparation specific to math and sciences,” explains Dr. Michele Carney, co-director of IDoTeach. “We want future teachers thinking about what it means to engage students deeply in math and science concepts and processes.”

Unlike traditional education programs where students work toward a degree in secondary education — essentially stressing the job of teaching over specific content — the IDoTeach program allows Boise State students to major in specific areas of science, technology, engineering or math while also earning their teaching certificate.

“The degree affords options,” said Dr. Laurie Cavey, who co-directs the program with Carney. “Most of our graduates choose to teach but they’re also prepared to apply for graduate school in their chosen field if they decide to take that route. Throughout the program our
teacher candidates are engaged in learning about teaching in their chosen field, from both the theoretical and practical sides of teaching.”

Here’s how it works: Undergraduate science, engineering and mathematics majors sign up for IDoTeach, typically during their freshman or sophomore year. From that point onward, they concurrently take classes in their chosen STEM major as well as education classes taught by faculty from multiple colleges. Disciplinary coursework is blended with early inquiry-based teaching experiences led by these master teachers. What this means is that instead of learning to teach by opening a textbook and assigning reading, these future teachers are learning how to draw students into the hard sciences by posing thoughtful questions or designing experiments.

“Growing up, I would sit in a math classroom and write down everything the teacher wrote on the board,” explained Kelci Lester, a senior in materials science and engineering who plans on teaching after graduation. “Now math classes take a more hands-on approach with the students. The kids are given concepts or problems and they try and solve them without any direct teaching. This allows the kids to explore and truly understand what they are doing. In the end, you will always have some direct teaching where you guide the students in the right direction, but this method has the students actually thinking about what they are doing instead of blindly copying down notes.”

Recent IDoTeach graduate and current Capital High School math teacher Josh Watson agreed: “The biggest conceptual shift I’ve seen is the idea that teachers are more effective as facilitators than as lecturers,” he said. “Most of my classes when I was a K-12 student involved day-long lectures while taking notes. In the IDoTeach program, I was involved in many good discussions and activities.”

“We’re trying to shift the culture of what it looks like to teach math and science,” Carney said. “It’s not about opening your textbook, reading it and saying, OK now I’m going to lecture … it’s more about engaging them in the practice of these subjects. It’s about helping students see themselves as mathematicians and scientists.”

Carney has two degrees in mathematics and a Ph.D. in math education, and has worked in teacher education for 14 years. She currently teaches math courses for the mathematics students enrolled in IDoTeach. Carney taught math in the Treasure Valley for years before earning her Ph.D. in education. The women see themselves as facilitators of educational change, but more than that, they are working in service to the school districts.

“We want to fulfill the needs of our local communities by providing them with great teachers,” Cavey said. “It’s as simple as that.”

IDoTeach just celebrated its first class of six graduates, four of whom currently are working in local schools.

“The program is still young, but it’s increasing both the quality and quantity of teachers we’re producing,” said Carney. She estimates 20 students will graduate from the program this year.

“Our goal is to get about 40 people per year graduating from our program to meet local demands. Our next step is thinking about how we recruit students who come from rural communities and want to return to them, as that is our biggest need in terms of secondary and elementary math and science teachers.”

IDoTeach is based on the UTeach STEM teacher preparation program created at the University of Texas, Austin. The program has been replicated on at least 50 college campuses across the country. Now in its fifth year at Boise State, IDoTeach is housed within the College of Education. However, Carney and co-director Cavey stress that the program’s success is due to its collaborative relationship with other colleges on campus as well as the science, math and engineering professors who agree to educate tomorrow’s STEM secondary teachers. The in-the-field teaching experiences that students are provided throughout the program also are vital.

“Going to elementary, middle and high schools to observe, co-teach and teach on their own is embedded all throughout the curriculum,” explained Cavey.

“Instead of waiting to introduce our students to the classroom toward the end of their program, they start taking those courses right when they arrive here at Boise State.”

Carney and Cavey said local schools are eager to partner with their program. Each year, IDoTeach hosts a stakeholder meeting and invites local school administrators to attend and provide the program with feedback. That stakeholder meeting is growing in attendance every year. Recently, the program developed a partnership with Timberline High School for an intensive semester-long field-based classroom instruction project.

“Schools are interested in partnering with us because they want to hire these future teachers,” Carney said. “There still is a significant need at the secondary school level for these teachers, but we’re working hard on filling it.”