Education

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Helping teachers do the math

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BURLINGTON, Vt. — One recent Friday afternoon at the University of Vermont, Tony Julianelle led a discussion on compound interest rates and exponential decay.

"I'm happy you're going slowly, because I'm a little anxious," said one of his 35 students.

"What about me," Julianelle responded. "I'm up here in front of all of you."

"Yeah, but you're the one who knows the math," replied the student, a Vermont elementary teacher.

Downstairs, Kathy Murphy watched a mock oral exam, an exercise she must complete to earn a master's degree in education with a focus in K-6 math. As a member of the Vermont Math Initiative's first graduating class, Murphy prefers the label "survivor."

"It's been a long three years," she said.

Murphy and her colleagues represent the future of math in Vermont. Their mission: Redefine how students learn it, starting in kindergarten. So for the past three years, 100 elementary teachers have spent their weekends and summers learning calculus, statistics, algebra, trigonometry and geometry, and how to introduce such concepts in the early grades.

The ultimate goal is to train 300 elementary teachers a year and put VMI graduates in every Vermont elementary school as math tutors for other elementary teachers.

The first class of 27 graduates next month. "My math

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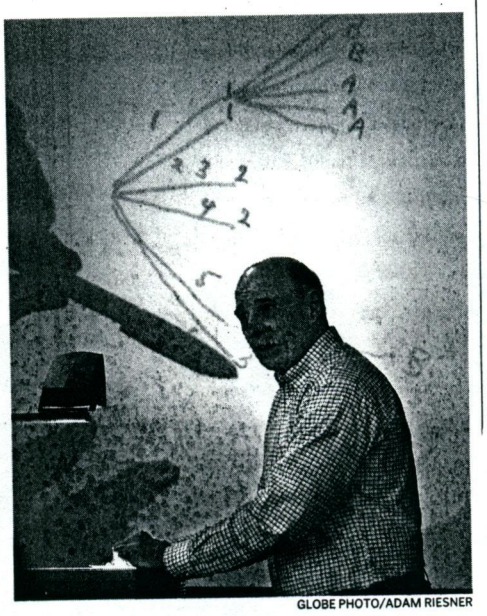

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Professor Ted Marsden speaks to elementary teachers at the Vermont Math Initiative.

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content has increased, but it's definitely been a sacrifice in terms of time," Murphy said.

Like many states trying to boost math scores, Vermont revamped its standards to test students more on problem solving, geometry, and algebra. But a state survey found that the top concern for elementary school teachers was their lack of math knowledge.

"New curricula had been put in place, and teachers didn't know that mathematics," said Ken Gross, a UVM professor and creator of the Vermont Math Initiative. "They hadn't even studied it in school."

Working with the state Department of Education, UVM, and a focus group of elementary teachers, Gross started a program to provide elementary teachers with the high-level math skills typically associated with high school and college courses. The program is funded by federal funds for at-risk children and by the school districts that send teachers to participate.

According to Gross, one of the most important things the program instills in elementary teachers is not math content, but confidence.

"If you don't have the confidence in mathematics, you're scared stiff of the next question that's going to come at you," Gross said. "What we see in the VMI is teachers who are reluctant to go the blackboard and work on a problem, deathly afraid. By the second VMI course, they're raising their hands to volunteer."

In Massachusetts, a similar program at the Harvard Extension School is also taking off, said Daniel Goroff, a professor of the practice of mathematics, and associate director of the Derek Bok Center for Teaching and Learning, which is hosting the program.

The Harvard program began with a Saturday course last fall on number theory and is continuing this spring with a class called "Teaching Algebra." Harvard will continue adding more classes that will work well for teachers, who can combine the courses to earn a Master's in mathematics and information technology, Goroff said.

As members of the Vermont Math Initiative's first-year class, elementary teachers Eileen Dulmer and Jeanne Dumbleton recently found themselves flipping coins in a University of Vermont classroom. The question: How many times did they have to toss a coin before they were sure it was a two-headed quarter and not a regular coin?

In the second-year class, Julianelle took a break from the overhead projector, walked to the back of the classroom, and leaned down before one of his students.

"How am I doing?" Julianelle asked.

Julianelle and other VMI instructors said the benefit of working with elementary school teachers goes both ways. Many expressed a deepened sympathy for elementary teachers who must teach students a variety of disciplines.

"Teaching teachers, you're much more conscious not only of what you're teaching but how you're teaching it," said George Ashline, a math professor at St. Michaels College, who was co-teaching the exponential growth class with Julianelle. "I pick up techniques that I take back and apply to my own classes."

Back in the first-year course on probability, Dulmer and Dumbleton were still flipping coins. Their increased math knowledge, they said, has helped them push their advanced students further and see other students in a different light.

Although elementary teachers will not be teaching calculus to second graders in the near future, Dumbleton said it's important to understand the theory behind even simple math concepts such as subtraction and division in order to come up with new ways to teach and to know what lies ahead for math students.

The VMI courses, Dulmer said, have helped her get out of the "tunnel vision" she used to have, teaching the same subjects in the same way year after year. "When students ask why do we have to do this, I used to have a few answers," Dulmer said, preparing to flip her coin yet again. "Now, I have a plethora of answers."