Teachers gounded in math
UVM initiative gives educators better tools

By Tim Johnson
Free Press Staff Writer

As a kindergarten teacher, Nancy Rogers isn't taking calculus this summer just for her own enrichment. She's taking it because it will be useful in her classroom.

That's not as much of a stretch as it might sound. Her 5-year-old students do algebra sometimes when they play around with numbers, although they don't call it that: You have three balls. How many more do you need to have five?

Rogers and 21 other Vermont teachers, were in a classroom at the University of Vermont on Tuesday for a daylong introduction to calculus. How many more days before they will get into derivatives? One.

As for working calculus into their curricula, that will have to wait till fall. Figuring out a way to do that is part of their homework.

So it goes for third-year veterans in the Vermont Mathematics Initiative, a master's program designed to improve math teaching in grades K-8. The premise of VMI, founded in 1999, is that to teach math well, the instructor has to be well-grounded in the subject - a grounding that many primary-grade teachers, generalists responsible for everything from language arts to science, do not have. That means exposing them to "serious mathematics" - number theory, algebra, geometry, probability, trigonometry and the daunting capstone, calculus.

Why should a first-grade teacher know anything about "higher mathematics?" For the VMI participants have to be mathematicians, and in the past 20 years required teachers in most grades to teach math across a range of subject areas in which they had not been trained.

"If you don't do it right at the elementary level," Gross said of math instruction, "then it's a median in all they way up" through high school.

VMI participants have to be mathematics, many of them have to pay half the cost, with their school districts picking up the balance. (Tuition for a three-credit course is about $1,300.)

No one expects all of the state's 3,000 elementary school teachers to go through the intensive, costly regimen; VMI's hope is that graduates will return to their home districts to become resources and curriculum consultants - disciples of better math teaching. One hundred eighty-two teachers have graduated, and 70 more are enrolled.

Nine years after VMI's founding, the approach is bearing fruit - for educators and administrators. "I'm graphic in the '90s with some mathematical concepts, but techniques for conveying them in the classroom. Every class has children who learn in different ways, so a teacher adept at introducing a concept in alternative models is more likely to reach everyone - but to be able to do that, a teacher has to be comfortable with the concept to begin with."

"Math was always a struggle in school for me," she said.

"I was math phobic all through school," said one of her lunch partners, Melanie Farrow, who teaches third- and fourth-graders in Holland. "When I'd see a math sheet, my heart would race."

Now she's over that, mercifully. The sheets handed out Tuesday were filled with limit notations and quadratic functions and parabolas in waiting.

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MATH: UVM initiative helps teachers

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same reason that someone teaching beginning readers should able to read, enjoy and understand literature far more than that's what's being taught. That's more than what's being taught. That's more than what's being taught. That's more than what's being taught.

Gross never thought he'd use math through language. He was one of three national winners of the Haimo Award for outstanding post-secondary teaching. He was one of three national winners of the Haimo Award for outstanding post-secondary teaching.

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The No.1 thing teachers said they needed, Gross recalls from a focus group, was to know more math. The result was VMI, a master's program offered under UVM's auspices: 12 courses over three years (two each summer, one each fall and spring), beginning with "Mathematics as a Second Language," which Gross designed to lay the groundwork for everything that follows and that focuses on understanding algebra and arithmetic through language.

Take the task of adding fractions - say, 2/7 + 3/7. Some students might be inclined to add the 2 and the 3, then add the 7's, and come up with an answer of 5/14.

But suppose, Gross said, that the problem is posed this way instead: Add 2 sevenths to 3 sevenths. (The 2 and 3 become "sevenths.") Then it's easier for many students to see their way through to the answer, 5 sevenths.

VMI stresses not just basic mathematical concepts, but techniques for conveying them in the classroom. Every class has children who learn in different ways, so a teacher adept at introducing a concept in alternative models is more likely to reach everyone - but to be able to do that, a teacher has to be comfortable with the concept to begin with."

Take fractions again. As Amy Nadeau, a second-grade teacher from Derby explained during the calculus class's lunch break, you can explain the idea of a fraction using an area model (like a pie chart), or a linear model (a segmented line) or a set model (a group of objects). Some students might get it in one way; some, in another.

After two years in VMI, Nadeau said, she does more graphing in the classroom than she used to.

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More information
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L. MINDI WIMETT of South Royalton hangs on to her son Isaac, 4 months, while she and other primary school teachers study calculus in the Vermont Mathematics Initiative at the University of Vermont.