States Given More Leeway On Test Rule

3-Year Average Allowed On Participation Rates

By Erwin K. Noblen

The U.S. Department of Education's latest move to grant more flexibility under the No Child Left Behind Act, this time aimed at helping schools that narrowly miss the law's requirement for high participation on standardized tests, was generally welcomed last week. But the appetite for further adjustments appears to be growing.

The new policy allows states to average participation rates for a given school over two or three years if that school misses the federal threshold in at least one recent testing. It also permits a student to be excluded from a school's calculation in the case of a serious medical emergency.

"We are listening and making commonsense adjustments," Secretary of Education Rod Paige said in announcing the change on March 29 before the Orlando, Fla., convention of the National School Board Association. At the same time, he emphasized that the law's test-participation mandate is "not some arbitrary policy."

"It is at the heart of No Child Left Behind. It ensures that every child counts," Mr. Paige told the NSBA members.

"Flaws Remain"

Under the federal law, beyond showing academic progress, schools must demonstrate that at least 95 percent of students participated in statewide tests. The rule must be met for students statewide, as well as for subgroups of students, such as those who are poor or are members of racial minorities.

Edward J. McIlravy, the secretary-treasurer of the American Federation of

Shoring Up Math and Science in the Elementary Grades

Teachers Get Heavy Doses Of Advanced Mathematics

By Michelle Galley

Burlington Vt.

Penny Stears knows what her students are going through when they "hit the wall" and feel as if they can't solve a math problem. She's been there herself.

On her first day as a student at the Vermont Mathematics Initiative, she was up until 2 a.m. trying to solve a problem that didn't have an answer.

But then, she's learned how to help set get past that frustration. As a kindergarten teacher turned mathematics specialist for the 3,400-student Burlington, Vt., school district, Ms. Stears says she is also able to show other teachers "where the lessons they are teaching are leading their students."

"Every educator here in this grand stone hall at the University of Vermont on a frigid Friday last month is taking part in a program whose goal is to make mathematics out of elementary school teachers. Responsible for teaching many subjects, teachers of the lower grades often

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Professor Ted Mursden of Norwich University helps teachers with math.

Schools Enlist Specialists To Teach Science Lessons

By Linda Jackson

As science gets squeezed in the elementary curriculum, at least two Florida districts are trying a new approach to keeping hands-on lessons a part of pupils' experiences.

Because of the priority given to federal requirements in reading and math, "we're getting a lot of teachers saying that their principals have come in and literally said, 'Stop teaching science,'" said Gerald F. Wheeler, the executive director of the National Science Teachers Association.

In the past year, though, both the Broward and Palm Beach county districts have increased the number of science specialists

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Math Scholars Turning Elementary Teachers Into Mathematicians

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lack the in-depth math knowledge they need to help their pupils meet the higher benchmarks that state governments have set and the federal government has demanded.

As the teachers here build, over complicated formulas and scintillating calculations on parchment-covered tables, they are submerged in that very math content.

"You can't teach what you don't know," said Kenneth L. Gross, a professor of mathematics and education at the University of Vermont and the director of the initiative.

'Serious Math'
The math program is the outgrowth of a meeting in 1998 that brought together Mr. Gross, representatives from Vermont's state education agency and the University of Vermont's education department, and business leaders.

They came to the conclusion that something had to be done to help teachers learn the higher-level mathematical concepts and skills they need to pass on to students.

At the time of the planning meeting, Mr. Gross was a research mathematician at the university and planning to retire soon to his home woodwork ing shop.

The furthest thing from my mind was that I would be working with elementary school teachers," he said. But he added, he was delighted to be pleased with the outcome.

Each cohort of teachers, usually 30 to 46 participants, attends a two-week session in the summer and three weekend sessions each semester. At the end of the three-year program, teachers earn a master's degree.

It is free to public and private elementary teachers in Vermont. Currently the education department and the teachers' school districts, or private schools, split the $4,000 annual tuition. Thus, however, may change as a result of a roughly $100,000 funding cut from the state education department, according to Mr. Gross. The program's annual budget is about $400,000.

Instructors, a team of math professors from colleges across Vermont, must teach what Mr. Gross calls "serious mathematics.

"We tell the teachers, this is for you to learn mathematics, and we are going to assist you in transferring your newfound knowledge into the K-6 classroom," Mr. Gross said.

And serious mathematics is what they are.

Teachers in their second year of the program are taking a course called Exponential Growth and Decay. They start their day at 8 a.m. by reviewing examples such as \( f(x) = f(x) + g(x) = 2 \times g(x) + 2 \times f(x) \), and \( f(x) = f(x) + f(x) = 2 \times f(x) + 2 \times g(x) \), and by their first year, the program work on their portfolios, prepare for final oral exams and fine-tune their mandatory research projects.

To make the sessions as successful as possible, everything from the punctuation to the tables to the way that chairs are placed on both sides of the rectangular tables to encourage teamwork has been thought out, Mr. Gross said.

Many of the teachers' past experiences in learning math did not include teamwork, he said. Once they see how well they can work together to solve problems, he said, they can go back to their classes and let their students work in teams as well.

While the teachers hammer out problems together, four to five mathematicians who are either team-teaching the course or just on hand to help, wonder the room making sure no one fails behind.

The atmosphere is relaxed and welcoming and it's that appeal—along with the desire to learn more math—that brings Penny Starrs here today. She graduated from the program in 2001.

"I am much more capable of teaching the mathematics behind the curriculum," she said, because of what she learned here.

The program's emphasis on content is one of its core strengths, said Paul Lahti, the executive director of the Vermont Mathematical Initiative. "I felt I was "pedagogically to death" as an undergraduate student, she said.

Certain modifications have been necessary as the 3-year-old program has aged. For instance, the mathematicians weren't prepared initially for what it would be like to teach elementary teachers.

The sequence of courses also needed to be ironed out. Instead of learning calculus during the second week of the first two-week session, teachers now take that course in the third year. "We didn't want to charge those teachers the first year," Mr. Gross said.

3rd Grade Calculus

The master's program has four fundamental parts teachers must complete: learning sophisticated math content, using effective teaching practices, conducting an "action research" project, and building leadership skills.

To combine all four pieces effectively, a team of mentors works closely with teachers. One of the mentors' primary duties is to evaluate how the teachers are preparing and implementing math lessons in their elementary classrooms, and to help them with assignments, by periodically traveling to the teachers' schools.

Homework usually involves translating something the teachers have recently studied into an elementary-level lesson.

For example, two teachers worked together to devise a calculus problem for their elementary school students. To figure out the area of an irregular shape, the students were each expected to lay 1-inch graph paper on top of an outline of one of their feet.

After calculating how many complete squares they had, the students were then to use quarter-inch graph paper to determine the area of the remaining space.

Unlike many of the most popular curricula used in schools, according to Mr. Gross, the lessons that the math initiative teachers prepare utilize higher-level mathematics in a way that benefits their students.

In many cases, he said, the teachers in the Vermont math program will see where the mass-marketed curricula fail to introduce related concepts—such as measuring distance and interpreting graphing skills—that would benefit students.

But teachers would not be able to teach such a lesson without knowing the math concepts behind it, Mr. Gross said. "If the teacher doesn't know the math they are trying to get out of the game or activity, no math comes out of the activity at all," he said.

Like many in the program, Jacqueline Bailey, a 3rd grade teacher at South Burlington Elementary School, was "math phobic" when she enrolled.

Now, she excitedly pulls out colorful examples of the calculus work she has done with her students. "I never imagined I would have come this far," she said.

'Schisms' Still Exist

Finding a balance between constant knowledge and pedagogy has been a crucial part of the evolution of the program, "to feed people content, but they don't always see what that has to do with their classroom," said Ms. Larro point out.

She was a member of the program's inaugural cohort in 1999. By completing the courses, she said, she obtained a "deep understanding of math" and was better prepared to help her students.

"I didn't say the same thing louder and slower," Ms. Laird said. "I had several directions at which I could approach them. I understood what the kids needed to know.

The blending of content and pedagogy, however, has occurred without the input of the university's department of education. Though the department was involved in creating the mathematics initiative, and the program officially operates under its auspices, the education department has little to do with the enterprise now.

The program's offices are located in the mathematics building on campus, well away from the education department's headquarters.

But physical location is not the only divide between them. "A couple of very deep schisms" exist, acknowledged Jill Mattuck Tarule, the dean of the college of education and social services. "The discourse is about emphasis," she said, "and how much you teach content knowledge as a mathematician versus teaching it in relation to pedagogy." Because the math initiative "is concerned with professional development and not preparation, it is not central to the department of education," Ms Tarule said.

The program has garnered attention elsewhere. Educators in New York and Vermont are trying to set up a similar program for teachers in that state, and Mr. Gross now split his time between Vermont and Boston, where he is consulting with Lesley University to design one there. He and Ms. Laird even traveled to Australia earlier this year to talk to educators who are interested in adopting the model.

So far, there is only anecdotal evidence that the program is improving achievement in schools, but more formal research is being planned, according to Mr. Gross.

If its success could be measured by how excited participating teachers are about math, then it would be a hands-down winner.

An hour after their marathon day at the university has officially ended, the teachers remain in the classroom here in Burlington discussing their projects and helping each other work through problems. First thing in the morning, they'll be back, eager for more.