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Low Performers Found Unready to Take Algebra

By Sean Cavanagh

As state and school leaders across the country push to have more students take algebra in 8th grade, a new study argues that middle schoolers struggling the most in math are being enrolled in that course despite being woefully unprepared.

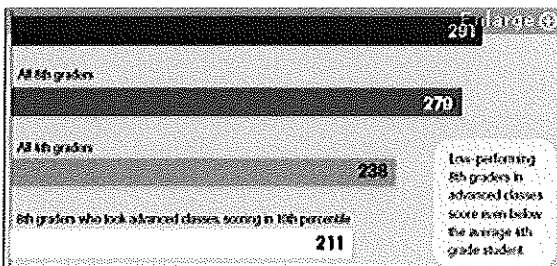
"The Misplaced Math Student: Lost in Eighth Grade Algebra," scheduled for release by the Brookings Institution this week, finds that an increasing number of the lowest-performing students have been thrust into algebra as 8th graders in recent years. Yet the study concludes those students are as far as six grades below grade level in math.

Efforts to require all students to take introductory algebra, or Algebra 1, in 8th grade are well-meaning but ultimately misguided, argues the study's author, Tom Loveless of the Washington-based Brookings Institution. Policymakers would be better off concentrating on grounding elementary students in the math they need for algebra and intervening with the ones who need extra help.

"Preparing students for algebra is the culmination of many, many years of teaching and learning, and the product of hard work by students, teachers, and families," writes Mr. Loveless, the director of the think tank's Brown Center on Education Policy. "Mandating algebra in 8th grade is the equivalent of mandating, by policy, that all buildings immediately erect a fiftieth floor—regardless of their current height."

Some Students Far Behind

A new study shows that a proportion of 8th graders, despite being enrolled in advanced math courses like Algebra 1, score well below the average for their peers.



SOURCE: Brown Center on Education Policy

The report emerges a few months after California policymakers approved a controversial mandate that all students be tested in Algebra 1 as 8th graders, which will effectively require that they be enrolled in that class at that grade, state officials have said. ("Experts Question Calif.'s Algebra Edict," July 30, 2008.)

Mr. Loveless bases his study on data from 8th graders' test scores on the 2005 National Assessment of Educational Progress, often known as "the nation's report card," as well as the courses those students reported being enrolled in when they took the exam. The results show a disconnect between the lofty goal of enrolling as many students as possible in introductory algebra in grade 8 and student performance, he contends.

The study notes that the average 8th grade NAEP math score for all students was 279 on a 500-point scale. Students who reported being in an “advanced” 8th grade math class—which is defined as Algebra 1, geometry, or Algebra 2—scored even better, reaching 291.

But Mr. Loveless also isolates the performance of students scoring in the 10th percentile—the bottom tenth—on the 2005 NAEP who also reported being enrolled in algebra or another advanced class. The results show that those 8th graders struggled mightily on NAEP, scoring only an average of 211, far below the overall 8th grade average. They also scored below the equivalent average for 4th graders on NAEP, which was 238.

Those struggling students taking algebra and other advanced courses, whom the study describes as “misplaced,” are working at roughly the 2nd grade level, Mr. Loveless concludes.

Diluted Subject Matter?

Many policymakers and educators have argued that enrolling students in algebra early increases their odds of moving on to more advanced math and succeeding in college, and that for years, many students, particularly those from disadvantaged backgrounds, were not asked or encouraged to take algebra.

Proponents of earlier study of algebra have also pointed to research showing that students in some high-performing countries tend to be exposed to algebra before their U.S. peers. Although the motives for moving more students into 8th grade Algebra 1 are sound, Mr. Loveless says, resulting policies have forced some of them into the class before they are ready.

An obvious question, which cannot be discerned from the NAEP data, is the extent to which students who say they are enrolled in Algebra 1 are actually taking a class that offers true algebra content, said Jeremy Kilpatrick, a professor of mathematics at the University of Georgia, who has studied the history and teaching of math. States and districts have allowed for a proliferation of different kinds of algebra courses, without regard for their content, he said.

Helping struggling students would require schools to streamline the math curriculum in elementary and early-middle school, while also introducing students gradually to some algebraic concepts in the 6th and 7th grades, he said.

“The middle grades—6, 7, and 8—have been, historically, repetitive,” Mr. Kilpatrick said. “It’s mostly arithmetic, and then bang! You’re into algebra.”

But Mr. Kilpatrick questioned the study’s attempt to compare 4th graders’ NAEP scores on an 8th grade scale—and its assertion that low-performers are at roughly the 2nd grade level—saying those conclusions rely too much on projections for students who are given different exams.

Mr. Loveless, in an interview, countered that such estimates were on target, given struggling students’ extremely low marks on NAEP. He also noted that his previous research has shown that NAEP 8th grade math content is relatively unchallenging; students who struggle on that test are almost certainly performing at a very low level, he said.

The goal of increasing all students’ access to algebra, including those from disadvantaged backgrounds, has been supported by the [Algebra Project](#), a Cambridge, Mass., organization that works in schools around the country. Robert P. Moses, its president and founder, views algebra as a “civil right,” as the study notes.

The study does not disprove the argument that students from all backgrounds can succeed in 8th grade algebra, but it reinforces the idea that schools need to recommit to preparing them, Mr. Moses said in an interview. If

anything, the benefit of taking Algebra 1 early is clearer, because the future economy will require stronger math skills, in addition to literacy, he argued.

“That point, there’s no getting around it,” Mr. Moses said of the value of “quantitative skills.” If students do not meet that challenge, the United States’ workforce and society will suffer, he said.

“If the kids can do it, they should be given an opportunity to do it,” he said of 8th grade algebra.

Catching Up Is Hard to Do

Policymakers across the country have seemed attuned to that message in recent years. Thirty-one percent of 8th graders nationally were enrolled in algebra last year, nearly twice the proportion that were taking that course in 1990, Mr. Loveless reports.

But that trend does not appear to tell the whole story. Many of the states with the highest percentages of students enrolled in 8th grade algebra have the lowest average math scores in that grade on the 2007 NAEP, the study notes, while the opposite effect plays out in other states.

In California, for instance, almost 60 percent of students reported taking Algebra 1 or another advanced course as 8th graders, but the state had one of the country’s lowest average scores, 270. Vermont, by contrast, had only 26 percent of students enrolled in those rigorous classes, but its average NAEP score was one of the best in the nation, at 298.

The effort to enroll more students in 8th grade algebra is evident among low-achieving students, the study says. The proportion of 8th graders who scored in NAEP’s 10th percentile yet said they were enrolled in Algebra 1 or a similarly advanced math course rose from 5 percent in 2000 to 17 percent in 2005, it found. A disproportionate percentage of the “misplaced” are minority students, the study says.

To help struggling students, Mr. Loveless said he favors having schools concentrate on building necessary skills in elementary math, particularly whole numbers and fractions, an emphasis recommended this year in a [report](#) by the National Mathematics Advisory Panel, on which he served. (“[Poor Math Scores Posted on Unusual 3-State Exams](#),” March 19, 2008.)

He also said that schools must intervene with such students, though he noted that those efforts—whether they focus on summer and after-school programs, or “algebra readiness” materials—must start early. Scant research has been conducted supporting the idea that students far below grade level can be brought up to speed quickly, he said in an interview.

Students couldn’t be expected “to learn seven years of math [in a year or two] if they’re that far behind,” Mr. Loveless said. But without effective research, “we don’t know how to do it.”