All students, regardless of their prior mathematical skills, benefit from taking algebra, a study by researchers at the University of Wisconsin-Madison concludes.

That finding, published in the fall issue of *Educational Evaluation and Policy Analysis*, a journal of the American Educational Research Association, should add weight to the recent push to encourage all students to take the course, one of the researchers said.

"The findings indicate that general-math classes should be eliminated because those are low-level classes that lack a strong pathway to the future," said Adam Gamoran, who conducted the study with Eileen C. Hannigan. "Students learn less in them, no matter how low their test scores are, than if they took algebra."

The study, titled "Algebra for All: Benefits of College-Preparatory Mathematics for Students With Diverse Abilities in Early Secondary School," is based on data from the first two phases of the National Educational Longitudinal Study, conducted in 1988 and 1990. The researchers measured changes in achievement in mathematics among a sample of 12,500 students.

Tenth graders who took algebra scored higher—and showed greater improvement between 8th and 10th grades—on a math test developed for the national survey than those who did not take the subject. Students who took algebra improved their scores by about 8 points by 10th grade; those who did not take the subject improved by about 4 points.

Benefits to taking algebra were found regardless of students' race or sex, or whether their classmates had similar skills in the subject matter or a range of skills. Students with poor math skills tend to benefit less from the course than those with higher skills, "but they still benefit more than those not taking algebra," Mr. Gamoran said.

Requiring all students to take algebra has become a central part of many efforts to improve low-performing schools.

But some critics have argued that algebra is not a necessary course for all students, particularly those who have little mathematical talent or do not plan to go on to college. Moreover, some math educators argue, the traditional algebra course—offered in 8th or 9th grade without providing students with the prerequisite foundation in algebraic thinking—only sets students up for failure.

**Too Hard for Some?**

"The overall success of trying to teach algebra to everyone, particularly in the way it has historically been taught, has not been..."
Algebra Benefits All Students, Study Finds

successful. The failure rate is very high, teacher burnout is very high," said Jim Kaput, a professor of mathematics at the University of Massachusetts Dartmouth. "The kinds of efforts that attempt to shove algebra down the throats of all students distract us from improving the way we do algebra in the long run."

Some experts have called for supplanting elementary and middle school math programs, which tend to focus on basic math skills, with a curriculum that builds algebraic-reasoning skills beginning in the early grades.

Yet even in a traditional program, Mr. Gamoran argues, some algebra is better than none at all.

"Algebra is an important domain of intellectual knowledge which has application in a number of areas," he said.

Reason enough, he adds, to encourage all students take the subject.

FROM THE ARCHIVES
See the accompanying chart, "It All Adds Up," Nov. 15, 2000.


Algebra Benefits All Students, Study Finds

"Lawmakers Hear Both Sides in 'Math Wars,'" Feb. 9, 2000.


RESOURCES ON THE WEB


Algebra-Online and Algebra.com offer tutoring, message boards, lists of books on algebra, and other useful information related specifically to algebra.

Read a 1996 report from the National Center for Education Statistics, "Eighth-Grade Algebra Course-Taking and Mathematics Proficiency."

Read about the development, scoring, and design of the Educational Testing Service's product, an algebra end-of-course assessment, including sample questions and a list of concepts covered.