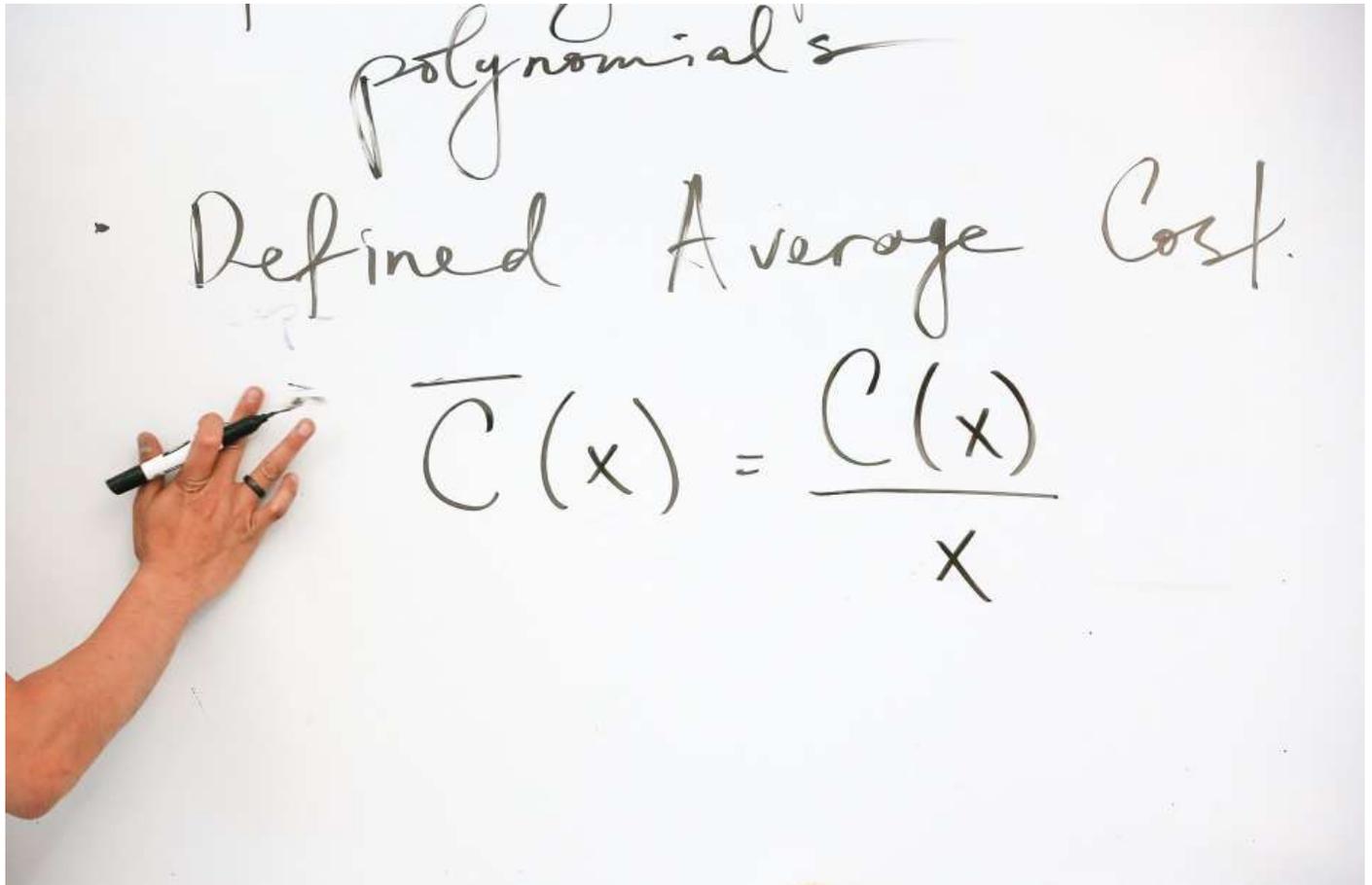


## OPINION // OPEN FORUM

# New math pays dividends in SF schools

By Alan Schoenfeld and Jo Boaler

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A scene from a business calculus class at San Francisco State.

Photo: Amy Osborne / Special to The Chronicle

Many people think that the best way to prepare students in science, technology, engineering and math, known as STEM, is to skip or accelerate through middle-school mathematics and get as quickly as possible to advanced math courses. This requires that students skim through material and acquire a shallow understanding of ideas.

But a shallow curriculum is exactly the problem in American schools. Compared with high-performing countries, the American curriculum is a mile wide and an inch deep. Skipping content, missing conceptual understanding and reducing rigor has produced negative side effects in American math education.

Countries such as Japan and Finland have learned that speeding through middle school does not result in higher achievement. The top countries have shown that going deeper and maintaining more rigor in middle school is the key to later success in advanced math. Students who want to go far in mathematics need a deeper, more rigorous treatment.

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The San Francisco schools did something unusual: They studied the research that shows the ineffectiveness of a shallow curriculum and made bold decisions on that basis. School district leaders thought deeply about when to accelerate students and what to do beforehand.

They found a unique balance that is now seen as a national model. They decided to challenge students earlier with depth and rigor in middle school. All students in the district take Common Core Math 6, 7 and 8, a robust foundation that allows them to be more successful in advanced math courses in high school.

The key is conceptually rich courses that benefit everybody, including those who go on to STEM majors in college. In-depth instruction helps all students and provides a more solid base for later math courses. All students get a solid foundation, and acceleration is offered in the 11th and 12th grades.

The middle-school courses provide the indispensable building blocks upon which a solid foundation is established. If any of these blocks is missing, the foundation is weakened. Skipping or accelerating through these courses would be harmful. The current program provides much more success for students interested in STEM fields.

There is a common misunderstanding that the Algebra 1 course taught under No Child Left Behind was the same course that is currently taught in the city schools. The Common Core State Standards raised the level and rigor of eighth-grade mathematics to include Algebra 1 content as well as geometry and statistical topics previously taught in high school. It is fair to say the content of the district's eighth-grade math course was college-prep, high-school-level math for most of the current students' parents. The current Algebra 1 course is more conceptually demanding and requires that students have the foundational background of the math taught in eighth grade.

San Francisco's policy shift began in earnest five years ago. As of last year, low performance among students in middle-school math (getting D's and F's) had been reduced by one-third. The share of students needing to repeat Algebra 1 in high school – the classic pathway to dropping out of math – has declined from 40 percent in 2017 to only 8 percent in 2018. As a result, more students than ever are taking a fourth year of high school math and advanced classes beyond Algebra 2. Going for depth of understanding in the foundational years, and accelerating only when students have solid backgrounds and identified goals, has paid off. This is progress we can't risk undoing by returning to the failed practices of early acceleration.

It's especially promising that gains are being made by the full range of students in the San Francisco schools. Groups that traditionally underachieve – for example, students of color, female students, students of low socioeconomic status, bilingual students and students with special needs – have all experienced increases in achievement. We congratulate the district for its wisdom in building course sequences that serve all students increasingly well.

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