



TENNESSEE DEPARTMENT OF

EDUCATION



Course Placement Series

Spotlight on Eighth Grade Algebra I

Office of Research and Policy | Policy Brief | January 2015

Executive Summary

The Tennessee Department of Education explored course enrollment patterns in an effort to better understand in which courses students are enrolling and whether course enrollment policies and procedures are promoting students' interests. This memo focuses on eighth grade Algebra I enrollment, which can propel students to take more rigorous math courses in high school, higher ACT scores, and college outcomes such as majoring in Science, Technology, Engineering or Mathematics (STEM) and degree completion.

Key Findings

- Most students who take advanced math courses, such as Calculus or other AP or IB math courses, took Algebra I in eighth grade.
- Eighth grade Algebra I enrollment in Tennessee has decreased over the past four years, going from 31 percent in 2009-10 to 15 percent in 2013-14. During this same period, national enrollment in eighth grade Algebra I has remained steady at around 30 percent.
- Almost all of the top third of students on seventh grade math TCAP scores pass the Algebra I End of Course exam regardless of when they take Algebra I. Yet, less than half of students who are "Algebra I Ready" at the end of seventh grade are enrolled in Algebra I in eighth grade.
- Prepared students who are placed in Algebra I in eighth grade outperformed their peers on the math sections of Explore, PLAN, and ACT with the gap increasing over time.

Course Placement: Spotlight on Eighth Grade Algebra I

Introduction

Research has found that taking more rigorous math courses in high school is associated with college acceptance, attendance and graduation; majoring in Science, Technology, Engineering or Mathematics (STEM); and future employment income.¹ Yet, few Tennessee students are enrolling in higher level math courses. In 2013-14, fewer than 10 percent of Tennessee students took Calculus before graduating from high school.

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One means of increasing the number of students taking more advanced math courses is placing prepared students into Algebra I in eighth grade. Because of the sequential nature of mathematics course work, students who take Algebra I in eighth grade have the opportunity to enroll in more advanced courses in high school. To reach advanced math courses, such as Calculus or advanced placement math, students either need to take Algebra I before reaching high school or “double up” by taking two math courses in a year (see Figure 1).

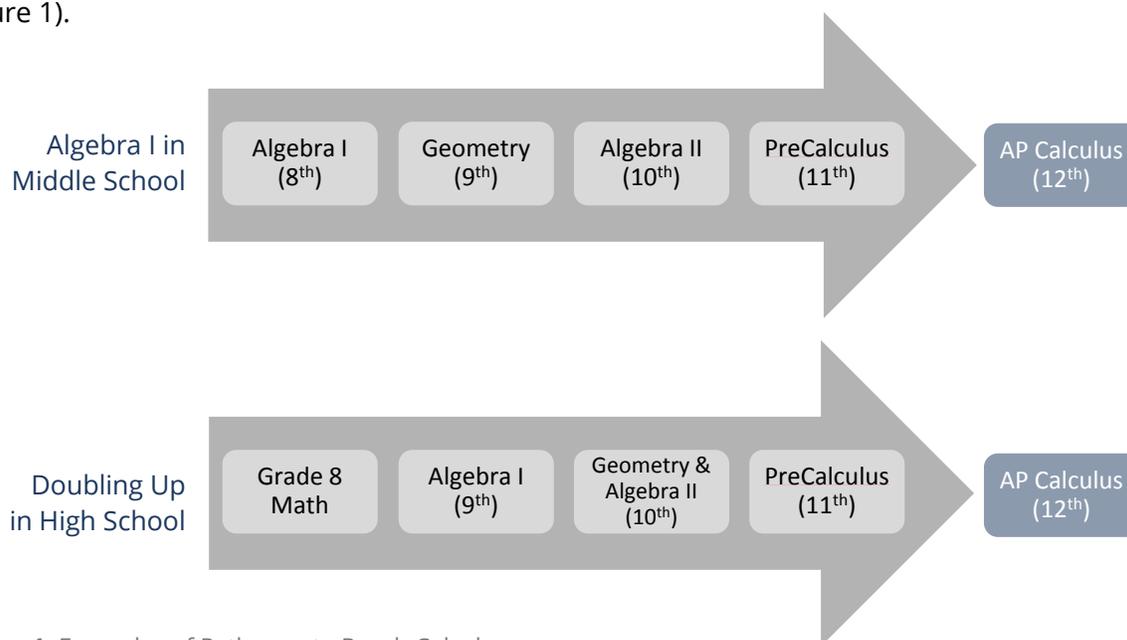


Figure 1. Examples of Pathways to Reach Calculus

¹ Adelman, C. (2006). The toolbox revisited: Paths to degree completion from high school through college. Washington, DC: U.S. Department of Education; Klepfur, K. & Hull, J. (2012). High school rigor and good advice: Setting up students to succeed. Alexandria, VA: Center for Public Education; Rose, H., & Betts, J. R., (2004). The effect of high school courses on earnings. *Review of Economics and Statistics*, 86(2), 497-513.

Of these two pathways to advanced math, taking Algebra I before high school is the most prevalent. Of the graduating students in 2012-13 who took an advanced math course, such as Calculus or other Advanced Placement math, 70 percent took Algebra I in eighth grade.² Thus, enrolling in Algebra I before high school is a critical determinate of whether a student will have the opportunity to go on to advanced math.

How Many Tennessee Students are Enrolling in Algebra I in Eighth Grade?

Eighth grade Algebra I enrollment in Tennessee has decreased significantly over time, going from 31 percent in 2009-10 to 15 percent in 2013-14 (Figure 2). Furthermore, the gap in eighth grade Algebra I enrollment between economically disadvantaged students and their non-economically disadvantaged peers has increased from 9 to 13 percent. According to data from the NAEP, during this same period national enrollment in eighth grade Algebra has remained steady at around 30 percent.

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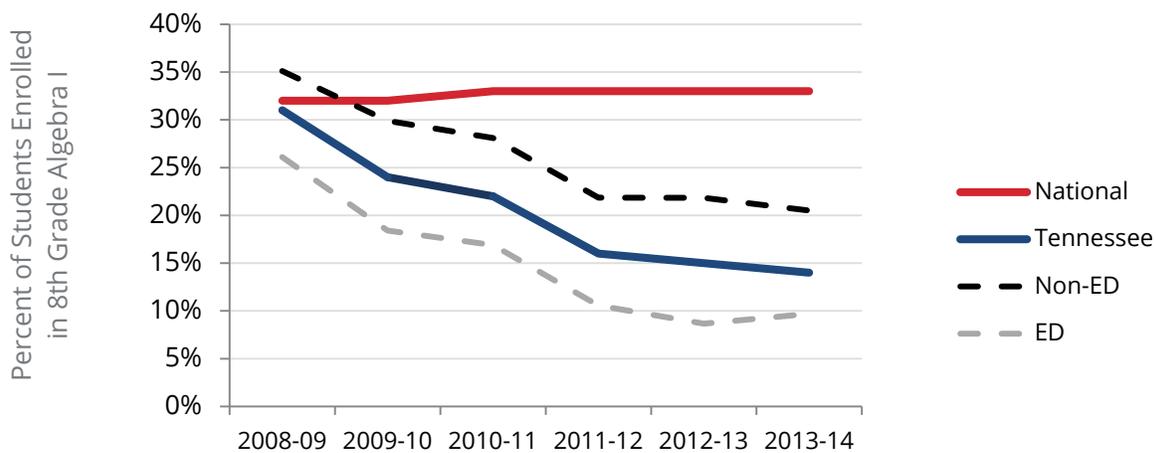


Figure 2. Percent of Students Enrolled in Eighth Grade Algebra I over Time

² The other 30 percent “doubled up” by taking two courses in a year², took AP Statistics immediately after Algebra II, or skipped courses in the sequence.

Who is Enrolling in Algebra I in Eighth Grade?

Given the declines in Tennessee student enrollment in eighth grade Algebra, we next investigated who is enrolling in the course. In 2013-14, most students enrolled in Algebra I in eighth grade scored advanced or proficient on their seventh grade math TCAP. Still, half of students who scored Advanced on their seventh grade math TCAP were not enrolled in eighth grade Algebra I.

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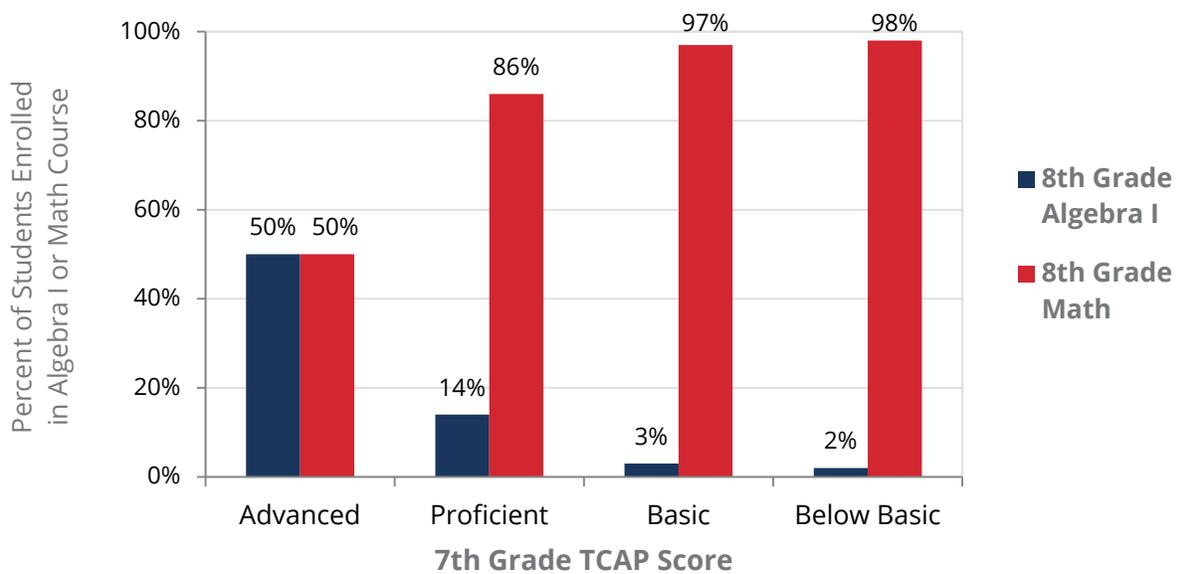


Figure 3. Percent of Students Enrolled in Eighth Grade Algebra I or Math by Seventh Grade Performance Level

Who is Prepared for Algebra I in Eighth Grade?

Preparedness for advanced courses like Algebra I in eighth grade depends on a variety of factors, like prior achievement, study skills, and home support. We used seventh-grade math test scores as one indicator of readiness for Algebra in eighth grade. In 2011-12, 98 percent of the top third of students³ on the seventh grade math TCAP passed their Algebra I End of Course exam (EOC) regardless of when they took Algebra I. This suggests that students scoring in the top third on their seventh grade math TCAP would experience success in Algebra I in eighth grade are therefore considered as “Algebra I Ready.”

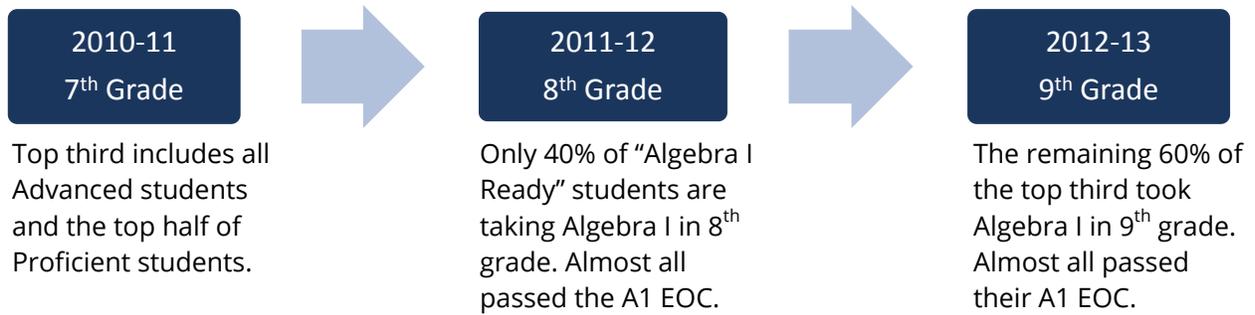


Figure 4. Top Third of Seventh Grade Math Students Pathways to Algebra I

If the Student is Prepared, Does When a Student Takes Algebra I Matter?

In addition to later opportunities to take advanced math courses, research on early access to Algebra I has generally found a positive effect on math achievement.⁴ Our data show that prepared students who are placed in Algebra I in eighth grade outperformed their performance-level peers on the math sections of Explore, Plan, and ACT with the gap increasing over time.

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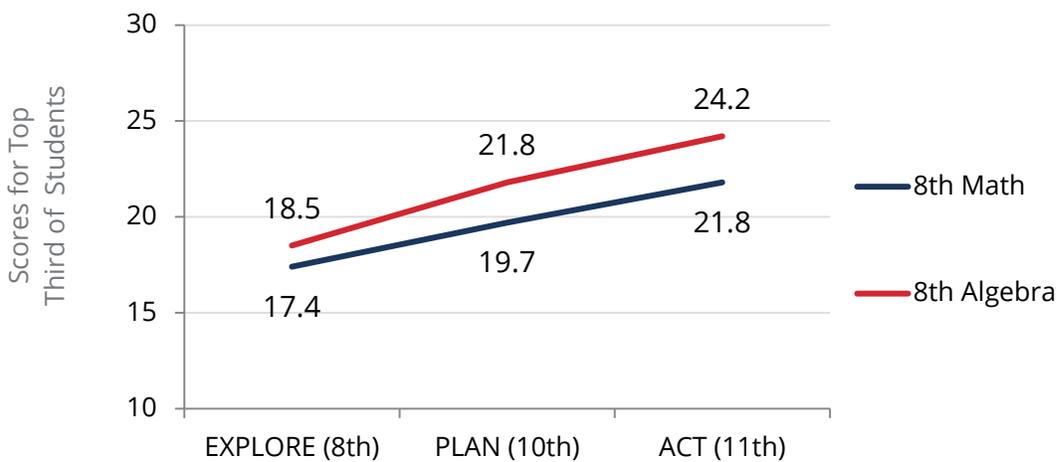


Figure 5. Test Scores of Top Third of Students from Seventh Grade TCAP

⁴ Attewell, P., & Domina, T. (2008). Raising the bar: Curricular intensity and academic performance. *Educational Evaluation and Policy Analysis*, 30(1), 51-71; Gamoran, A., & Hannigan, E. C., (2000). Algebra for everyone? Benefits of college-preparatory mathematics for students with diverse abilities in early secondary school. *Educational Evaluation and Policy Analysis*, 22(3), 241-254; Spielhagen, F. R. (2006). Closing the achievement gap in math: The long-term effects of eighth-grade algebra. *Journal of Advanced Academics*, 18(1), 34-59.

Why Aren't Prepared Students Enrolling in Eighth Grade Algebra I?

Many districts do not place any eighth grade students in Algebra I and the number of districts offering Algebra I in eighth grade has declined over time. While this memo does not delve into the reasons why enrollment has declined, we acknowledge that a number of factors could explain this decline including standards shifts, state accountability policy changes, licensure requirements, and teaching capacity.

Even if an "Algebra I Ready" student is in a district that places eighth grade students in Algebra I, they may not be in a school that does.⁵ Furthermore even if "Algebra I Ready" students have school access to Algebra I in eighth grade, they may not have been enrolled. Only 31 percent of prepared, economically disadvantaged students were enrolled in Algebra I in eighth grade in 2013-14, while 41 percent of prepared, non-economically disadvantaged students were enrolled (see Figure 6).

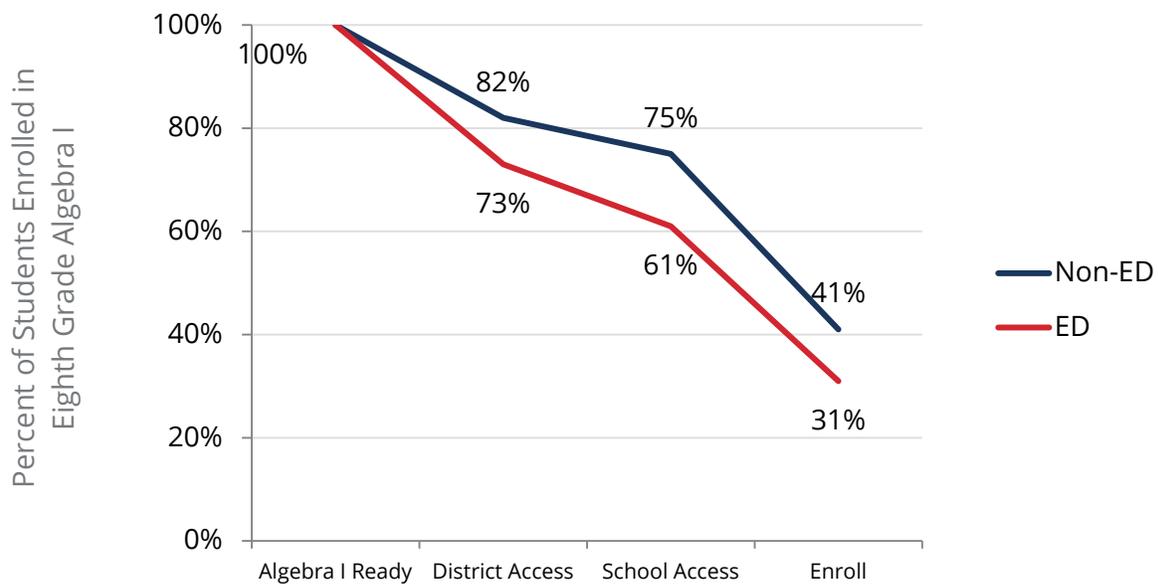


Figure 6. Percent of "Algebra I Ready" Students Who Have Access to and Enroll in Eighth Grade Algebra I

⁵ District access is defined as being in a district that enrolls at least one student in Algebra I in 8th grade. Similarly, school access is defined as a school that enrolls at least one student in Algebra I in 8th grade.

Final Thoughts

Districts and schools should consider whether their current course placement policies and procedures regarding eighth grade Algebra I prioritize students' interests and readiness. However, student-centered course placement should not be a substitute for rigorous, high quality instruction. Together, appropriate course placement and rigorous, high quality instruction can ensure that each course adds value to a students' overall learning experience.

Furthermore, the department advises a review of district curriculum to ensure that to the extent possible, critical content is not omitted when students are placed in advanced courses. For more guidance on making decisions about math course sequences and accelerating students, please click [here](#).

As schools and districts across the state seek to prepare more students for success after high school in college or the workforce, consideration should be given to how course-taking patterns, specifically enrolling students in Algebra I in eighth grade, can impact a student's achievement.

For more details about your district or school's math course-taking patterns please contact your CORE office.