



Increasing Equity in Accelerated Math Pathways in Middle School



District Leadership Forum

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1) Executive Summary

Key Observations

Improving Equity in Accelerated Math Pathways

Provide multiple opportunities for students to enter accelerated math pathways. Multiple entry opportunities allow students who may not meet placement criteria in sixth grade to qualify later to enter the accelerated pathway. Summer bridge courses that review content not covered in unaccelerated pathways help students who enter later succeed in accelerated courses. Administrators at District A, District C, and District D all increased the number of entry points to accelerated math pathways to increase equity in student access.

To place students in accelerated math pathways, use multiple placement criteria and consider adjusting required performance thresholds. Employing multiple assessments provides students who might not enter the accelerated pathway based on one assessment with varied opportunities to demonstrate their skill in math. Placement criteria can include student grades, internal readiness assessments, and third-party diagnostic exams. In addition to requiring multiple assessments, administrators at District A also adjusted the assessment score thresholds for pathway entry. Contacts report this action increased the representation of Latinx students in accelerated pathways.

Eliminating Accelerated Math Pathways

Provide in-class challenges and opportunities to accelerate in high school to support high achieving students in math. Teachers in District E employ task-based learning in all math courses (i.e., teaching math concepts via student problem solving instead of asking students to watch teachers solve problems). During learning tasks, teachers can challenge high-achieving students through learning extensions. Also, while administrators at District E eliminated the accelerated math pathway in middle schools, the district provides opportunities for high-achieving students to accelerate in high school. In some high schools, high-achieving students may take two math courses simultaneously. Also, high-achieving students can take a single compressed course (two years of math in one year) in 11th grade to accelerate.

Communicate pathway and curriculum changes to parents through parent nights with education experts. Parent nights explain the new pathway and curriculum to parents, show parents what their student will learn under the new curriculum through sample lessons and math tasks, and bring in experts to explain why administrators changed the math pathway structure and curriculum. Administrators at District E organized 20 parent nights during the first year of the new math pathways, and contacts report parents left parent nights with a better understanding on why administrators eliminated the middle school accelerated math pathway.

2) Inequality in Accelerated Math Pathways

Motivation

Research Suggests Accelerated Math Pathways Underrepresent Minority Groups

Though scholars debate the costs and benefits of tracking students in accelerated math pathways or non-accelerated math pathways, most scholars acknowledge African American students, Latinx students, and students of low socioeconomic status are much less likely to enter accelerated math pathways than White, Asian, and high socioeconomic status students.¹ In addition, suburban schools with predominately wealthy, White, and Asian students are far more likely to offer accelerated math pathways than urban schools with poor, African American, and Latinx students, which further limits those students' access to accelerated math pathways.²

National Public School Eighth Grade Enrollment³

25%

Of eighth graders enrolled in public school are Latinx

18%

Of eighth graders enrolled in Algebra 1 (accelerated course) are Latinx

17%

Of eighth graders enrolled in public school are African American

11%

Of eighth graders enrolled in Algebra 1 (accelerated course) are African American

Placement methods contribute to the underrepresentation of low socioeconomic status students and student of color. Most schools assign students to a curricular pathway (e.g., non-accelerated, accelerated) based on student achievement test scores.⁴ Thus, gaps between White and Asian student performance and African American and Latinx student performance on those exams contribute to the inequitable demographics of accelerated math pathways.⁵

Decision to Improve or Eliminate

Consult Stakeholders and Experts to Consider Various Criteria Before Altering Your Math Pathways

Before altering their districts' math pathways, administrators from profiled districts consulted a range of stakeholders—including teachers, peer school districts, and education experts—for their input on math pathway design. For example, administrators at District B collaborated with district teachers, administrators at District E, and a consulting firm to determine whether they should eliminate or restructure their accelerated math pathways.

Administrators at school districts that improved their math pathways and districts that eliminated their accelerated math pathways weighed multiple criteria with input from experts and stakeholders. The below graphic outlines the key considerations for administrators at both types of districts: those that adjusted their accelerated math pathways, and those that eliminated their accelerated math pathways.

1) Tom Loveless, "Tracking and Advanced Placement," The Brown Center Report on American Education (The Brookings Institution, March 24, 2016), <https://www.brookings.edu/research/tracking-and-advanced-placement/>.

2) Loveless.

3) Carolyn Jones, "Latino, African-Americans Have Less Access to Math, Science Classes, New Data Show," EdSource, accessed January 8, 2020, <https://edsources.org/2018/latino-african-americans-have-less-access-to-math-science-classes-new-data-show/598083>; "2015-2016 Civil Rights Data Collection: STEM Course Taking" (U.S. Department of Education Office for Civil Rights, April 2018).

4) Loveless, "Tracking and Advanced Placement."

5) Loveless.

Considerations for Either Improving or Eliminating Accelerated Math Pathways



Adjusting Accelerated Math Pathways

- Administrators do not wish to alter existing math curriculum.
- District stakeholders prefer improving, not eliminating, accelerated math pathways.
- Administrators think eliminating the accelerated math pathway will cause stakeholder resistance that distracts from overarching goals (e.g. improving equity within math courses).
- Administrators observe some students benefit from an accelerated math pathway.



Eliminating Accelerated Math Pathways

- Administrators wish to implement a single math curriculum.
- Administrators can provide funds for teacher professional development and training to support the new curriculum.
- Administrators express concerns over the ability for students, but particularly African American, Latinx, female, and low socioeconomic status students, to eventually enter higher-level math courses if placed in the non-accelerated math pathway in middle school.

This report explores strategies used by districts that improved their middle school accelerated math pathways and districts that eliminated their middle school accelerated math pathways. Administrators at four profiled districts (District A, District B, District C, and District D) identified with the considerations on the left column in the above graphic. They chose to maintain accelerated pathways, but adjusted placement criteria, provided support strategies for students in the non-accelerated pathway, and in the case of District B, offered an alternative pathway for students outside of the accelerated pathway to reach advanced math courses in high school (**pages 7-16**).

Administrators at District E identified with the considerations in the right column of the above graphic. They chose to eliminate accelerated math pathways entirely in middle school and developed a new, single-pathway, rigorous curriculum to replace their accelerated and non-accelerated math pathways (**pages 17-23**).

3) Improving Equity in Accelerated Math Pathways

Development

Consult Education Experts and District Stakeholders to Help Adjust Accelerated Math Pathways

After deciding against eliminating accelerated math pathways, administrators at District A convened a math pathways committee of 75 different stakeholders to discuss adjustments to the districts’ accelerated math pathway. The committee convened four times over the course of three months and relied on interspace-bargaining (i.e., a negotiation technique that asks stakeholders’ to share their specific interests, rather than take a position) to allow stakeholders to contribute to the design of the accelerated math pathway. Administrators at District A, based on feedback from committee meeting, took steps to adjust the design of their accelerated math pathways and overarching structure.

Math Pathways Committee Membership at District A



Middle School and High School Administrators



Community College and University Professors



Middle School and High School Mathematics Teachers



High School Student Representatives



Parents

Structure

Provide Multiple Entry Points for Students to Access Accelerated Math Pathways

Multiple entry points afford students in non-accelerated math courses, including Latinx, African American, female, and low-income students, increased opportunity to enter the accelerated pathway. Without multiple entry points, students who failed to meet initial placement criteria for accelerated pathways would remain in non-accelerated pathways for the duration of their middle school career, even if their mathematics aptitude improves.

Math curriculum administrators at District A, District C, and District D structured their accelerated math pathways to provide students with multiple opportunities to place into the accelerated track. Contacts at District A, District C and District D all emphasized allowing students multiple opportunities to accelerate was one of the ways they structured their accelerated math pathways to increase equity, but contacts could not confirm whether implementing multiple entry points improved the representation of underrepresented students in accelerated math pathways specifically.

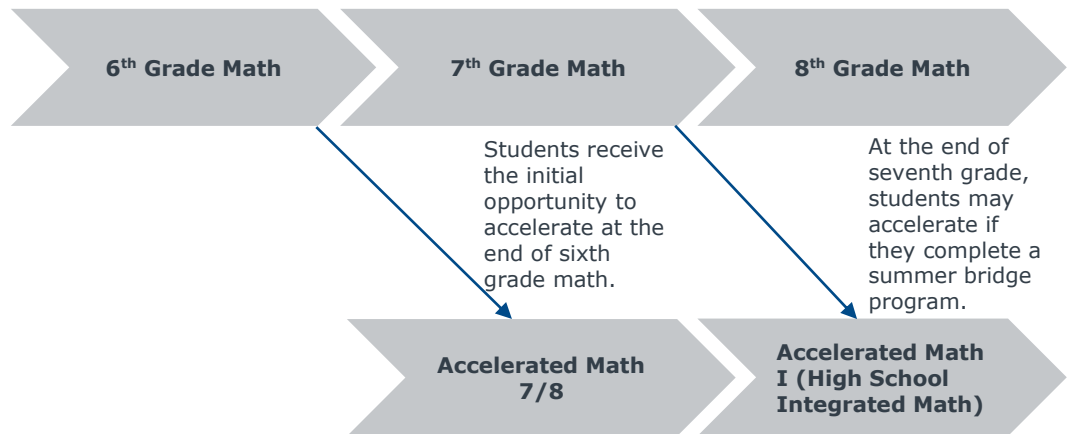
The [Common Core Standards for Mathematics Appendix](#) outlines options for middle school math acceleration: compaction or double courses.

Compaction covers the same math content as a non-accelerated course, but in less time (i.e., two years of math in one year, or three years of math in two years). All profiled districts use compaction in middle school accelerated pathways.

Middle School Accelerated Math Pathway Structures at Profiled Districts

District	Structure
District A	<ul style="list-style-type: none"> 6th Grade: single, non-accelerated math pathway 7th – 8th Grades: both a non-accelerated and accelerated math pathway <ul style="list-style-type: none"> Students can place into the accelerated pathway at the end of sixth grade or at the end of seventh grade. Students who place in at the end of seventh grade must complete a summer bridge program to cover missed content.
District B	<ul style="list-style-type: none"> 6th – 8th Grades: a non-accelerated pathway, an accelerated math pathway, and an enhanced pathway <ul style="list-style-type: none"> Students can place into the accelerated pathway at the end of fifth grade and at the end of sixth grade. Students can enter the enhanced pathway at the start of any year with no placement requirements. The enhanced pathway, like the accelerated pathway, prepares students to take AP Calculus in high school.
District C	<ul style="list-style-type: none"> 6th Grade: single, non-accelerated math pathway 7th – 8th Grades: both a non-accelerated and accelerated math pathway <ul style="list-style-type: none"> Students can place into the accelerated pathway at the end of sixth grade or at the end of seventh grade. Qualifying students can enter the high school accelerated pathway by completing a summer bridge program to cover missed content.
District D	<ul style="list-style-type: none"> 6th – 8th Grades: both a non-accelerated and accelerated math pathway <ul style="list-style-type: none"> Students can place into the accelerated pathway at the end of fifth grade, sixth grade or seventh grade. Students can double accelerate (i.e., take algebra in seventh grade and geometry in eighth grade) at the end of sixth grade and at the end of seventh grade.

Middle School Math Pathway Structure at District A⁶



6) District A, "Math Pathways and Placement," Mathematics Instruction, November 28, 2017.

Provide a Summer Bridge Course for Students Entering Accelerated Pathways through Later Entry Points to Cover Missed Content

At District A, students who test into the accelerated pathway from the non-accelerated pathway at the end of seventh grade participate in a blended (i.e., both online and in-person) summer bridge program. Administrators designed this program to teach students topics not covered in the seventh grade non-accelerated math course, but covered in the seventh grade accelerated math course. Students attend this program for four weeks, and attend daily, two to three-hour sessions led by district teachers. Though many of these sessions occur online, students and teachers meet six times in-person.

Administrators at District C offer a similar summer bridge program for students who complete the eighth grade non-accelerated math course with a B or better. The program covers topics not covered in the eighth-grade non-accelerated math course but covered in the accelerated math course (e.g. the Pythagorean Theorem). Students who successfully complete the summer bridge course can skip the first-entry high school math course (i.e., Integrated Math 1) and begin high school in Integrated Math 2 alongside students who took the accelerated pathway in middle school. The summer bridge course spans three weeks, and students attend for four hours a day. Approximately 250 students attend the program.

Consider Supplementing Accelerated Math Pathways with an Open-Access Enhanced Math Pathway

Enhanced math pathways eliminate entry requirements and allow any student to opt-in to participate. Students then follow a different curriculum than students in both unaccelerated and accelerated pathways that enables students to take AP Calculus in high school, as if they had completed an accelerated pathway.

In addition to unaccelerated and accelerated math pathways, administrators at District B offer an enhanced math pathway. Administrators developed the enhanced pathway to address inequities administrators saw in the district's accelerated pathways.

Unlike the accelerated pathway, which teaches the same curriculum as the unaccelerated pathway at a faster pace, the enhanced pathway asks students to solve fewer, more in-depth problems through the [Illustrative Mathematics Curriculum](#), a problem-based core math curriculum designed to promote student argumentation and the application of mathematics to real-world problems. While the pathway is relatively new, contacts note that the demographic make-up of the "enhanced" math courses reflects school demographics.

Placement

Consider Using Multiple Criteria to Determine Placement into Accelerated Math Pathways

Though placement criteria for accelerated pathways vary across profiled districts, administrators typically rely on some combination of external math assessments, internal math assessments, and student grade history. Each profiled district employs at least two different measurements or assessments to determine student placement into an accelerated math pathway. By considering multiple criteria for admissions to accelerated math pathways, administrators may gain a more complete view of a students' mathematical knowledge. For example, a student who struggles with

Pages 41-61 of EAB's study [Closing the College Access Gap](#) describes strategies to increase underrepresented students' access to AP courses. Rather than relying on one to two datapoints, the study recommends districts consider eight data points to place students.

standardized tests—and thus might not be able to qualify for acceleration—could enter accelerated pathways based on their performance on internal math assessments or in-class performance.

External Assessments

Administrators at District C and District D both employ third-party exams to place students into accelerated math pathways. Administrators at District D rely on:

- [Northwest Evaluation Association \(NWEA\) assessments](#), assessments that identify discrete math skills with which a student struggles.
- [Mathematics Assessment Resource Service \(MARS\) task assessments](#), assessments that measure both student mathematical knowledge and mathematical reasoning.

Administrators analyze results from measures on an annual basis to place students into math pathways. Similarly, administrators at District C view students' state exam performance scores at the end of fifth grade to help place students into the appropriate math pathway in sixth grade. Additionally, students at District C take [iReady](#) diagnostic exams—adaptive assessments that identify areas for student growth—at the beginning, middle, and end of each school year. Administrators consider scores from the first two diagnostic exams to place students into the appropriate math pathway for the coming year.

Internal Assessments

At District A, District B, and District D, administrators assess students with internal exam (i.e., exams developed within the school district and not by a third party) to determine appropriate math pathway placement. Administrators at District D rely on a Common Core Standards Based Assessment, which measures students' ability to meet the prerequisite math content knowledge for the accelerated math pathway. At District B, administrators partnered with a consulting firm to develop a district wide-assessment to gauge student math skills at every grade level. Students take this assessment each year.

At District A, administrators consider three separate internal assessments.

1. At the end of sixth grade, students at District A must sit for a basic skills exam to ensure they mastered foundational math skills before moving to the accelerated math pathway.
2. Students must complete District A's internal Appraisal of Standards for Mathematical Practices, which measures student mastery of eight mathematical practices from the common core on a Likert scale at the end of sixth and seventh grade. The appraisal factors in students' ability to make sense of problems, persevere through problems, and be precise in their language and work.
3. Students at District A also take an end of course exam each year to help determine math pathway placement for the following year.



Evaluate Student Pathway Placement by Committee Where Assessments Fail to Properly Measure Student Math Ability

Administrators at District B allow a committee composed of a principal, counselor, and teacher to evaluate student pathway placement on a case-by-case basis. Allowing a committee to evaluate students can mitigate the negative consequences of an incidental poor placement exam score.

Student Grade History

In addition to assessments, administrators consider student grade histories when placing students into math pathways at District A and District B. Students must both score well on standardized exams and earn strong grades in math to enter accelerated pathways.

Contacts at District C, however, express concern that considering grades incorporates additional bias into the placement process. Grades may obscure a student's math ability with non-math related criteria, such as turning homework in on time. A student may answer each question correctly but turn in the assignment two days late, resulting in a grade that does not reflect the student's math skills. Instead of employing grades as a metric to determine student math pathway placement, administrators at District C consider teacher feedback when placing students. Teacher feedback questions include, "Would the student benefit from a math support class?" and "Does the student have an attendance problem?"

On **page 21** of EAB's report [Expanding Access to Dual Enrollment](#), contacts at profiled districts report that entry requirements for advanced courses create an unnecessary barrier for student success. Contacts at profiled districts endeavored to eliminate unnecessary prerequisites and entry requirements where possible.

Consider Eliminating Thresholds to Enter Accelerated Pathways to Increase Representation of Underrepresented Students

If students of low socioeconomic status, female students, or underrepresented students consistently perform worse on the assessments used to determine access to accelerated courses, using multiple assessments may not improve the representation of those students in accelerated courses. In response, administrators at District E allow any student to enter the district's high school accelerated pathways if they so choose. Thus, underrepresented students who wish to pursue advanced math can do so without facing unnecessary barriers imposed by assessments.

Preferred Assessments and Thresholds to Determine Student Acceleration at District A and District D⁷

	6 th Grade	7 th Grade	8 th Grade
District A	No acceleration in 6 th grade	<p>Students must meet three of four criteria to accelerate in seventh grade:</p> <ul style="list-style-type: none"> Score an 'A' or higher each trimester (6th grade) Score 80 percent or higher on end of course exam Score 90 percent or higher on a basic skills exam Appraisal of Standards for Mathematical Practices (internal measurement) 	<p>Students must meet two of three criteria to accelerate in eighth grade:</p> <ul style="list-style-type: none"> Score 90 percent or higher each trimester (7th grade) Score 85 percent or higher on end of course exam Appraisal of Standards for Mathematical Practices (internal measurement)
District D	<p>Students must meet two of three criteria to accelerate in sixth grade:</p> <ul style="list-style-type: none"> Score in the 75th percentile on NWEA (will replace with iReady) Score a '2' or higher on both MARS tasks Score 75 percent or higher on the Common Core Standards Based Assessment (taken in fifth grade) 	<p>Students must meet two of three criteria to accelerate in seventh grade:</p> <ul style="list-style-type: none"> Score in the 75th percentile on NWEA (will replace with iReady) Score a '2' or higher on one MARS task and a '3' on the other Demonstrate proficiency on the Common Core Standards-Based Assessment <p>Double Acceleration: Students must meet all three criteria to accelerate to algebra in seventh grade:</p> <ul style="list-style-type: none"> Score in the 90th percentile on NWEA (will replace with iReady) Score a '3' on both MARS tasks Demonstrate proficiency on the Common Core Standards-Based Assessment 	<p>Students must meet these criteria to accelerate to algebra in eighth grade:</p> <ul style="list-style-type: none"> Score in the 75th percentile on NWEA (will replace with iReady) Demonstrate proficiency on the Common Core Standards-Based Assessment <p>Double Acceleration: Students must meet all three criteria to accelerate to geometry in eighth grade:</p> <ul style="list-style-type: none"> Score in the 90th percentile on NWEA (will replace with iReady) Complete algebra course Demonstrate proficiency on the Common Core Standards-Based Assessment

Contacts at District D note administrators plan to replace [NWEA](#) assessments with the [iReady](#) assessment. Administrators plan to switch so they can eliminate their Common Core Standards Based Assessment, minimizing student testing. Contacts at District C found that [iReady](#) diagnostic scores accurately, if not conservatively, estimate student math competencies.

7) District A; District D, "Mathematics," accessed January 17, 2020.

Set Accelerated Pathway Thresholds to Increase Equity and Maintain a Predictable Class Size

Contacts at District A, District B, District C, and District D noted that administrators can adjust exam thresholds to both promote equity and manage class sizes. To ensure a consistent number of students enroll in both accelerated and non-accelerated math courses, District C tasks a small committee of teachers to help set their accelerated pathway thresholds. The committee considers the previous year's class size and aims to place approximately 25 percent of the incoming class in the accelerated math pathway. At District A, administrators aim to enroll approximately 33 percent of students in the accelerated math pathway.

Initially, administrators at District A set the threshold for their seventh grade end-of-course assessment at 90 percent or higher. The 90 percent or higher threshold only placed 25 percent of the student population in the accelerated pathway. Administrators adjusted the threshold to 80 percent or higher and increased accelerated enrollment to 39 percent of the class. This change also increased the percentage of Latinx students who could enter accelerated pathways.

Increase in Representation of Latinx Students at District A after Threshold Adjustment

15%

Percent of Latinx Students in Accelerated Math Courses in 2016

With 90 percent or higher threshold on end of course assessment.

22%

Percent of Latinx Students in Accelerated Math Courses in 2019

With 80 percent or higher threshold on end of course assessment.

Though administrators at District D previously maintained high accelerated pathway thresholds, they lowered their accelerated pathway thresholds to the percentages presented in the matrix on **page 12** ([NWEA](#) percentiles). Contacts at District D reported administrators lowered thresholds not only to increase racial group equity, but also to increase gender equity. Contacts at District D report that adjusting placement thresholds improved the gender balance in accelerated classrooms.



Solicit Feedback from Teachers on Student Test Fatigue

In addition to acceleration assessments, District A also administers a universal screener three times a year for K-8 students ([STAR Renaissance](#)). Teachers at District A reported to administrators that students are over-tested. Administrators at District A are thus considering eliminating their universal screener in favor of their end of course assessment mentioned in the matrix on **page 12**. Contacts at District D report similar concerns related to over-testing students.

Allow Caregivers and Teachers to Appeal Math Pathway Placement Decisions

Informal meetings and formalized appeals processes allow adults to advocate for students underestimated by placement methods. Teachers can identify and appeal for underrepresented students. Contacts at District A report committees grant most substantiated appeals (i.e., students with evidence of math competency apart from the district’s assessments) with the understanding that traditional assessments may put students from underrepresented racial groups, female students, and students of low socioeconomic status at a disadvantage when trying to enter accelerated math courses.

Administrators at District A and District C allow parents/caregivers to appeal their child’s math pathway placement. Contacts at District C note that when parents request information about their child’s pathway placement, administrators meet with the parents to share the metrics and assessment they used to place the student, along with their rationale. If, after the parent meeting, parents still want their student in the accelerated pathway, administrators will honor the parent’s request.

District A employs a more formalized parent appeals process. After students receive a letter placing them into a math course, parents can appeal the decision. While the recommendation comes from the district office via an online portal that gathers student assessment results, parents appeal to their child’s specific school. In their appeal, District A asks parents to provide additional evidence (e.g., state exam scores or marks from a math tutoring academy) to support why their child should enter an accelerated math course. A committee of three to four teachers and administrators at the school reviews parent appeals to determine if a student should enter the accelerated math pathway.

Parent Appeals Committee Membership at District A



School principal



One or two math teachers



An assistant principal or teacher on special assignment (TOSA)

Though appeals processes increase student access to accelerated courses writ large, they may not increase the proportion of underrepresented students in accelerated courses. Affluent parents may have more time and resources to complete a parent appeals process than do parents of low-socioeconomic status, who may lack transportation or work inflexible hours. Thus, contacts at District A note that administrators encourage teachers to appeal placements on the behalf of students, knowing that teachers might be more aware of racial, gender, and socioeconomic inequities that assessments may exacerbate. Teachers may point to in-class student math performance as evidence to support acceleration, which allows them to recommend students without the means to attend outside math tutoring.

Provide Supplemental Math Support for Struggling Students in Non-Accelerated Courses

Both District A and District C provide additional support for students struggling in non-accelerated courses. Administrators did not design supplemental supports to propel struggling non-accelerated students into an accelerated math pathway. Rather, administrators designed the supports to ensure struggling students meet non-accelerated course expectations, so students are prepared for non-accelerated high school mathematics.

Supplemental Supports for Struggling Students at District A and District C



Math Support Classes/Pullouts

Both District A and District C offer additional support for struggling students during school. Schools across District A offer different types of math pullout sessions. For example, two schools in the district hold a 25-minute tutorial period three times a week. While other students might go to the media center during this time, struggling students spend the time reviewing math content.



Academic Saturday School

Students at District C can voluntarily attend academic Saturday school to review content with math teachers and retake tests if needed.



Summer Math Camp

District C offers a six-week long (four hours a day) math camp for eighth grades who received a 'C' or lower in eighth grade math. Teachers use [MathLinks Essentials](#) (a modular math program designed for struggling students) and Jo Boaler's [Week of Inspirational Math](#) (interactive tools and math activities for teachers) to review content, so all student are prepared for high school math (Integrated Math 1). Approximately 300 students attend the summer math camp.

Provide Smaller Non-Accelerated Class Sizes to Create Opportunities for Reteaching

When restructuring their accelerated math pathways, contacts at District D decided to lower the enrollment thresholds for their accelerated math pathway. Contacts report that lowering accelerated pathway thresholds decreased class size for the non-accelerated courses, as more students were able to join the accelerated pathways. Contacts note that these smaller class sizes allow teachers to focus more on re-teaching and reinforcing difficult concepts with struggling students.

Beyond smaller class sizes, administrators at District D and District A adopted in-class instructional strategies to give teachers the opportunity to spend more time with struggling students. Teachers can employ these techniques and curricula in either accelerated courses or non-accelerated courses, but teachers at profiled districts primarily use them to benefit struggling students in non-accelerated math courses.

Sample Instructional Strategies that Allow Teachers to Support Struggling Students



In-Class Online Learning

Administrators at District A encourage teachers to incorporate class time dedicated to students working on an online math curriculum. This time allows teachers to help struggling students, while other students can work at their own pace. Teachers across District A use [Dreambox](#), [iReady](#), and [Khan Academy](#) for in-class learning.



Math Workshops

Teachers at District D run [math workshops \(College Preparatory Mathematics\)](#) during class. The workshops emphasize group problem-solving, but workshops also contain mini lessons in which students work independently. During the independent work, teachers can pull aside small groups of students to review concepts.

Performance Disparities

Profiled Districts Employ Grades and Academic Performance in Middle School to Predict Achievement in High School Math

Profiled districts employ different metrics to assess the impact of accelerated and non-accelerated math pathways in high school. Administrators at District B, with a consulting firm, developed a district-wide assessment to benchmark student math proficiency in their common, “enhanced,” and accelerated math pathways. A district-wide assessment allows administrators to compare the performance of any sub-group in the district at any grade level over any period depending on data availability (e.g., White vs. Latinx students or accelerated pathway vs. non-accelerated pathway students). In addition to the district-wide common assessment, administrators at District B collect data on student grades in high school math and the number of students who take a fourth year of math in high school to measure the effectiveness of the district’s math offerings. That said, no contacts, including those at District B, report that their district explicitly analyzes performance gaps between students in accelerated pathways and students in non-accelerated pathways.

Contacts at District A and District C do note anecdotally that a student’s success in middle school approximately predicts a student’s success in high school math. That observation implies that any gaps in performance between non-accelerated students and accelerated students would persist beyond middle school. For example, contacts at District C anecdotally report that half of students who fail eighth-grade math also fail ninth-grade math. Aware of this trend, administrators at District C give students an [iReady](#) assessment at the end of eighth grade. Administrators then share the results with high school teachers to help high school teachers identify and address student gaps in instruction.

4) Eliminating Accelerated Math Pathways in Middle School

Development

Consult Education Experts to Develop an Evidence-Based Single-Pathway Curriculum

Administrators at District E asked experts for advice on how to develop their new math pathway curriculum structure. Once administrators determined the curriculum outline, they then tasked three to four groups of teachers at each grade level across the district to design units and lessons within the expert-designed curriculum. Administrators did *not* include input from teachers and parents when developing the curriculum structure. Administrators at District E prioritized input from math curriculum experts over parent preferences.

District E consulted special education experts to implement universal design in the curriculum framework. For more information on universal design, see the EAB report [Universal Design for Learning and Other Inclusive Practices](#).

Experts and Administrators Consulted by District E to Inform the New Math Curriculum



Administrators from District E



Administrators at Other School District in the State



Math Education Partners from [SERP Institute](#)



Consulting Firm



An Author of the Common Core



University Professors



Special Education Experts



Math Coaches

Structure

Incorporate Some Algebraic and Geometric Concepts into Middle School Courses to Prepare Students to Take Algebra in High School

Before administrators at District E eliminated the option for acceleration in middle school, students could take either Pre-Algebra (non-accelerated) or CA Algebra 1 (accelerated) in eighth grade. The Pre-Algebra course reviewed content taught in previous grades: fractions, decimals, percentages, ratios, equations, and geometric measurements, while the Algebra 1 course covered proportional relationships, linear equations, systems of equations, roots and exponents, polynomials, and quadratic equations.⁸

Under the new single middle school pathway, students do not take Algebra 1 until high school. All middle school students gain exposure to a mixture of pre-algebra and some Algebra 1 topics in a new eighth-grade math course: CCSS Math 8. CCSS Math 8 covers the following Algebra 1 topics: proportional relationships, linear equations and inequalities, systems of equations, roots and exponents, along with a brief introduction to functions. In addition, the new CCSS Math 8 covers geometry and some Algebra 2 topics that high school courses previously covered. For example,

8) ⁸ "Middle School FAQ," District E Mathematics, accessed January 8, 2020.; "Middle School Scope and Sequence," District E, accessed January 17, 2020.

students now learn about geometric transformations and congruency in eighth grade instead of high school.⁹

The two courses that precede CCSS Math 8—CCSS Math 6 and CCSS Math 7—now cover the prerequisite skills and content necessary for all students to begin learning some algebra concepts in eighth grade. The graphic below outlines the specific content each course covers.

Sixth and Seventh Grade Math Content at District E¹⁰



CCSS Math 6 Content

The course covers:

- Ratio multiplication and division
- Understanding negative and rational numbers
- Developing and interpreting expressions and equations
- Understanding statistical thinking



CCSS Math 7 Content

The course covers:

- Proportional relationships
- Operations with rational numbers
- Linear equations
- Geometric constructions and problems solving
- Statistical inferences from population samples

Incorporate Rich Tasks into Curricular Units to Improve Student Understanding of Math Concepts

Teachers at District E constructed task-centered lessons to accompany the new curriculum. Each unit incorporates multiple math tasks, which require students to answer a question or set of questions on their own or in groups to learn math concepts. Task/problem-based learning requires students to explore problems before teachers show students how to solve the problem. For example, in a math task related to radicals and integer exponents, teachers may ask students, “how many \$3.75 Chicago style hot dogs can a baseball fan buy with a hundred thousand (10^5) dollars?” Research compiled by District E suggests task/problem-based learning increases students’ ability to reason mathematically, use prior knowledge to develop new ideas, and to solve unfamiliar problems.¹¹ Contacts assert this rich, problem-based curriculum better serves higher-achieving students than formerly accelerated courses, which asked students to race through or skip content rather than exploring it in-depth.

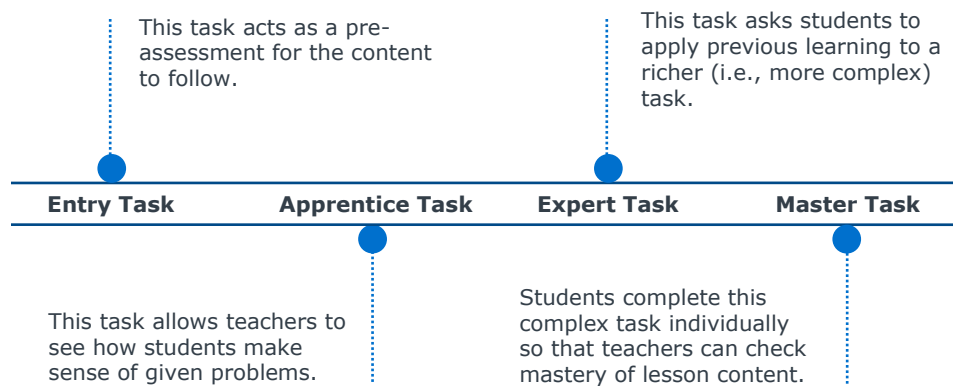
Each unit within math courses at District E incorporates four math tasks followed by a set of lessons. Students perform the first three tasks in groups but perform the final task individually.

9) “Middle School FAQ”; “Middle School Scope and Sequence.”

10) “Middle School Scope and Sequence.”

11) “Teaching Through Problem-Solving,” District E, accessed January 14, 2020; “Teaching Through Problem-Solving,” The Lesson Study Group at Mills College, accessed January 14, 2020, <https://lessonresearch.net/teaching-problem-solving/overview/>.

Math Unit Structure at District E¹²



In addition to math tasks, teachers at District E lead math talks with students. In math talks, a teacher sets up a math problem on the board and asks students how they would solve the problem. For example, a teacher may ask students to identify which is bigger: “14 divided by 19, or six divided by seven?” Students individually brainstorm strategies to solve the problem, then together discuss their various strategies. Research compiled by District E argues math talks help students make connections between their approach to solving problems and approaches by other students. The process of presenting their solutions bolsters students’ ability to develop arguments supporting their approach to the problem, as well as critique reasoning by other students.¹³

Provide Extensions to Unit Math Tasks to Challenge High Achieving Students

Contacts at District E note the district’s task-based curriculum with accompanying math talks allows teachers to provide additional challenges and extensions for high-achieving students who previously would have taken accelerated coursework. For example, teachers can ask students to justify their solution to a math task in multiple ways. In the context of algebra, a teacher can ask a student to solve a system of equations with a different technique from the one the student already used to get the correct answer.

Provide Multiple Opportunities for Students to Accelerate in High School

While District E does not allow students to enter an accelerated math pathway in middle school, students can access multiple opportunities to accelerate in high school. Contacts at District E stressed that administrators do not impose assessment thresholds or other entry requirements for students to accelerate in high school. Contacts note that administrators at District E want families—not grades or teacher recommendations—to decide if their student should accelerate in math. Contacts argue that removing grade thresholds and teacher recommendations for accelerated math pathways in high school improves racial and gender equities in those accelerated courses. Removing these barriers allows underrepresented students to

12) “Rich Math Tasks,” District E, accessed January 17, 2020.

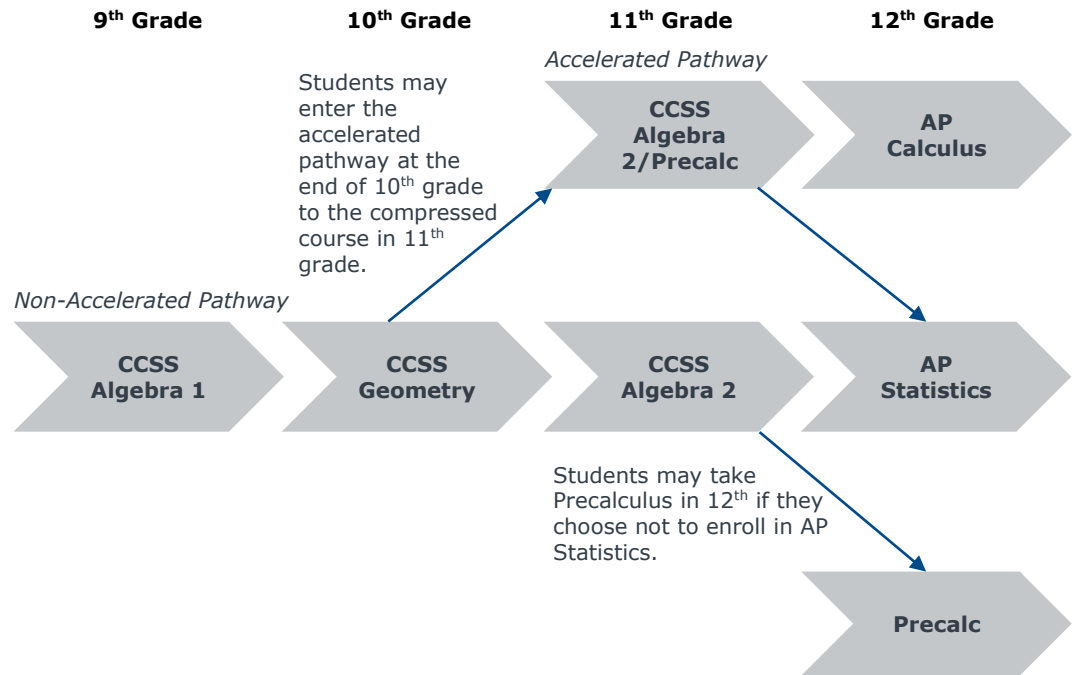
13) “Teaching Through Problem-Solving.”

enter their desired math course without a bad grade or disgruntled teacher holding them back.

Administrators at District E consulted the permissible acceleration options from the Common Core profiled in the [Common Core State Standards Mathematics Appendix A](#).

All high school students at District E can choose to accelerate after completing CCSS Geometry in 10th grade by taking a compressed CCSS Algebra 2 and Precalculus course in 11th grade. Students who enter this accelerated pathway can complete AP Calculus in 12th grade. (see [Common Core State Standards Mathematics Appendix A](#) for acceleration options).

High School Math Pathways at District E¹⁴



Administrators also offer two additional opportunities for students to accelerate to AP Calculus without taking the compressed course. Students at some schools in District E can take multiple math courses in one year. Specifically, students can take both CCSS Algebra 1 and CCSS Geometry in 9th grade, or both CCSS Geometry and CCSS Algebra 2 in 10th grade. In addition, administrators at District E received funds from their local mayor’s office to institute a summer geometry lottery. Selected students take CCSS Geometry between ninth and 10th grade.

Communication

Hold Parent Nights with Math Content Specialists to Justify and Communicate New Curriculum to Parents

The math curriculum team at District E organized 20 meetings with parents during the first year they implemented their new math pathways and math curriculum to explain the rationale behind the changes. The math curriculum team described the new course sequence, profiled the new curriculum, and brought in experts to speak with parents. Contacts note that parents left parent nights with a better understanding of how the curriculum prepares students to succeed in both middle school and high school math through its rigor.

¹⁴) "High School Pathways," District E, accessed January 17, 2020.

Parent Night Content at District E

The math curriculum team also compiled a one page fact sheet with information on eliminating accelerated math pathways in middle schools to help parents understand the change. The team provided translations in Spanish and Chinese as well.



New Courses

Contacts at District E stress the importance of helping parents understand the names of the new math courses, their content, and their sequence. The math curriculum team generated online graphics and explained them during parent nights to help parents understand the new rigor of the common core courses. Contacts note graphics like these helped the math curriculum team address parent concerns about eliminating the accelerated pathway.



New Curriculum

At parent meetings, the math curriculum demonstrated the rigor of the new math curriculum by asking parents to complete sample math talks and math tasks.



Expert Talks

At one parent night, the math curriculum team at District E brought in a math education expert to address parent questions about eliminating the accelerated math pathway for middle school and the new math pathway structure in general. Administrators then published all parent questions and answers from the expert parent night. Contacts report 300 people attended this parent night.

Assessment

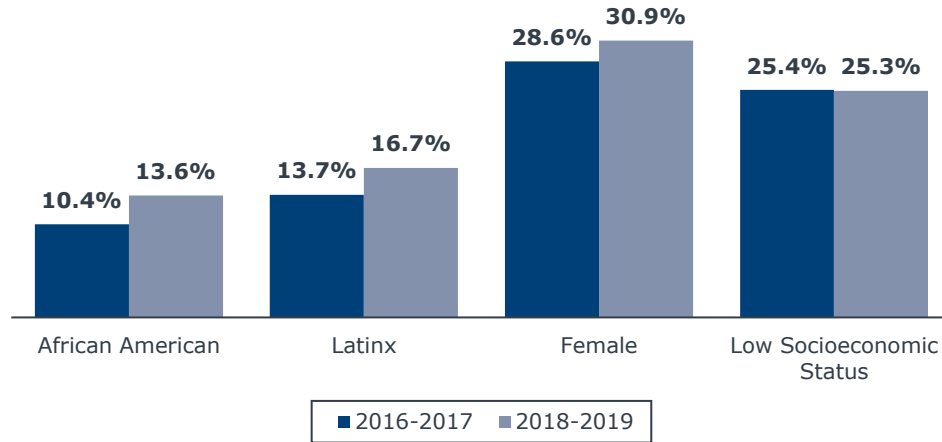
Employ Multiple Metrics to Assess the New Pathway and Curriculum's Impact

After implementing the new pathway structure, administrators at District E assessed the impact of the new math pathways with three measures: the number of students taking math courses beyond Algebra 2, total student math credit hours taken, and Algebra 1 repeat rates.

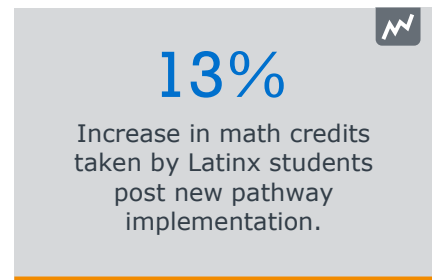
District E collected student data from student cohorts over three years (approximately 16,000 students per cohort).

From the 2016-2017 school year to the 2018-2019 school year, administrators observed a 2.2 percentage point increase in the number of African American student taking math courses beyond Algebra 2. The percent of Latinx students taking math beyond Algebra 2 increased three percentage points and the percent of female students increased 2.3 percentage points. The percent of low socio-economic status students taking math beyond Algebra 2 remained relatively constant with only a 0.1 percentage point change over three years.

Students Taking Math Beyond Algebra 2 in District E¹⁵



Additionally, students in the class of 2018 (students in the new math pathway) earned more math credits than the students in the class of 2017 (students in the old math pathway) across all demographic groups. Students in the class of 2017 earned, on average, approximately 25 math credits by the end of 11th grade. Conversely, students in the class of 2018 earned, on average, approximately 27 math credits each. African American students in the class of 2018 out-earned their class of 2017 counterparts by approximately five credits, Asian students by four credits, Latinx students by three credits, and White students by two credits.¹⁶



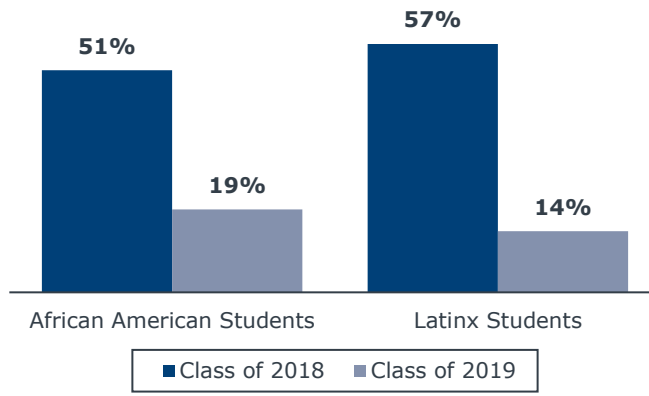
Lastly, after implementing the new pathways structure, administrators observed a large drop in the percentage of students repeating Algebra 1. In the class of 2018, 40 percent of all students in District E repeated Algebra 1. In the class of 2019 only eight percent of students repeated Algebra 1.¹⁷ Additionally, administrators observed large decreases in the number of African American and Latinx students repeating Algebra 1 (see below). Contacts at District E note they do not expect the large drop in Algebra 1 repeat rates to recur. Administrators attribute the drop to the initial implementation of the new math pathways and accompanying curriculum.

¹⁵) Presentation on Outcomes," District E. November 16, 2019.

¹⁶) Presentation on Outcomes.

¹⁷) Report on Outcomes," District E. 2019.

Algebra 1 Repeat Rates at District E¹⁸



62%
decrease

75%
decrease

¹⁸Presentation on Outcomes.

5) Research Methodology

Project Challenges

Leadership at a partner district approached the Forum with the following questions:

For Districts that Maintain Accelerated Math Courses in Middle School:

- What accelerated math course sequences do contact districts offer in middle school?
- How do contact districts select students for accelerated or non-accelerated math pathways?
- What steps have contact districts taken to improve equity in access to accelerated math courses? Have these efforts been successful?
- How do contact districts ensure that non-accelerated math courses adequately prepare students to succeed in high school math?
- Do contact districts assess the impact of accelerated and non-accelerated math pathways on student achievement in high school? If so, how?
- Have contact districts considered eliminating accelerated math courses in middle school? If so, why did they choose to maintain accelerated pathways?

For the District that Eliminated Accelerated Math Courses in Middle School:

- For what reason did the contact district choose to eliminate accelerated math pathways in middle school?
- With what course sequence did the contact district replace accelerated math pathways?
- How does the contact district ensure that new middle school math courses meet the needs of high-achieving students?
- How did the contact district communicate the change to parents?
- Did the contact district collect parent and teacher feedback to inform the change? If so, how did the contact district incorporate their suggestions into the new pathway?
- How does the contact district ensure that students can still reach higher-level math coursework by the end of high school?
- How has the decision to eliminate accelerated math pathways impacted student outcomes at the contact district?

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Research Parameters

The Forum interviewed administrators at school districts with accelerated math pathways at the middle school level and one school district that eliminated their accelerated math pathways at the middle school level.

A Guide to Districts Profiled in this Brief

District	Region	Approximate Enrollment	Student Demographics
District A	Pacific West	Approximately 35,000	<ul style="list-style-type: none"> • White – 42% • African American – 2% • Latinx – 10% • Asian – 42%
District B	Pacific West	Greater than 75,000	<ul style="list-style-type: none"> • White – 44% • African American – 7% • Latinx – 29% • Asian – 16%
District C	Pacific West	Greater than 50,000	<ul style="list-style-type: none"> • White – 35% • African American – 5% • Latinx – 43% • Asian – 13%
District D	Pacific West	Approximately 20,000	<ul style="list-style-type: none"> • White – 29% • African American – 1% • Latinx – 5% • Asian – 62%
District E	Pacific West	Greater than 50,000	<ul style="list-style-type: none"> • White – 41% • African American – 5% • Latinx – 15% • Asian – 34%