CALIFORNIA COLLABORATIVE on District Reform

Policy and Practice Brief

Pursuing Equity and Excellence in Mathematics

Course Sequencing and Placement in San Francisco

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About the California Collaborative on District Reform

The California Collaborative on District Reform, an initiative of American Institutes for Research, was formed in 2006 to join researchers, practitioners, policymakers, and funders in ongoing, evidence-based dialogue to improve instruction and student learning for all students in California's urban school systems.

Introduction

California school districts have long struggled to help their students reach high levels of skill and understanding in mathematics. Yet outcomes on both state and national assessments continue to reveal a combination of low overall performance, slow growth over time, and persistently large achievement gaps among student groups. A push for improved achievement and greater equity has prompted districts to enact a variety of changes in policy and practice to counteract historical obstacles to access. These approaches have yielded varying levels of success, and educators continue to seek solutions with the potential to produce dramatic improvements in student outcomes.

On the heels of an Algebra for All model that failed to generate desired results for students, and as the Common Core State Standards came into effect, San Francisco Unified School District (SFUSD) adopted a policy in 2014 that significantly changed its sequence of mathematics courses at the secondary level. The district completely de-tracked its middle school classes, enrolling all students in the same heterogeneously grouped courses for Grades 6, 7, and 8. SFUSD's approach represents a significant departure from traditional approaches to organizing mathematics courses, but early outcomes appear to validate the step in a new direction. This brief describes the rationale behind the district's decision, the nature of the new policy, and the promising results the district has experienced so far.

The Pursuit of Equity Stalls

SFUSD has long seen the importance of course sequencing and placement in achieving equity in mathematics, but the district has taken two distinct approaches over the last decade. Driven by a commitment to promote success for all students, the district had previously chosen to enroll all eighth-grade students in Algebra I in keeping with California's Algebra for All recommendations. Ensuring access to high-level mathematics at an early age, instructional leaders reasoned, could combat historically inequitable practices and give all students exposure to the coursework they would need for

success in high school and access to a range of postsecondary options.

Student results, however, revealed that the strategy did not achieve its desired outcomes. By the end of eighth grade, fewer than half of SFUSD students in the class of 2014 achieved proficiency on the Algebra I California Standards Test. By their sophomore year, only one third of students enrolled in Algebra II and took the Algebra II California Standards Test, and by the end of that year, fewer than one fourth of those students tested proficient. These troubling results were even more pronounced for the district's African American and Latinx students (see Figure 1).

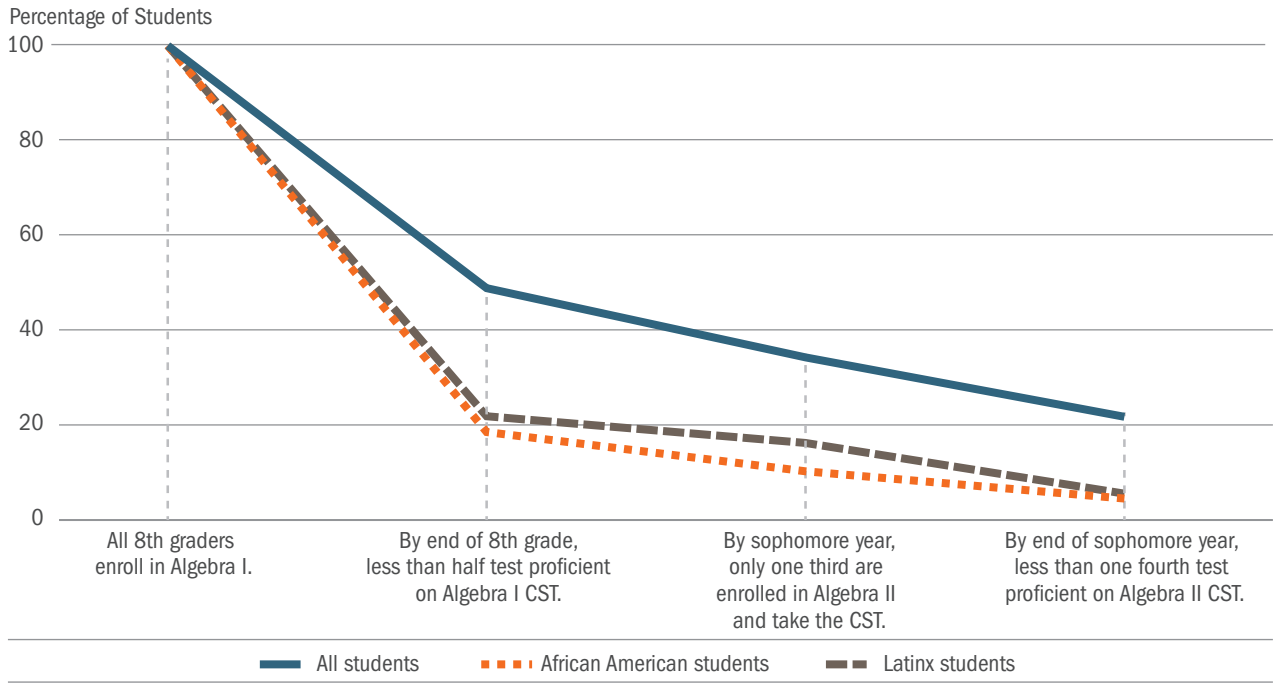
Faced with these disturbing trends, district leaders consulted with experts, reviewed research, and explored the Common Core State Standards in mathematics to consider an alternative approach.[1] Referring to conversations with the SFUSD school board, one district leader recalled making the argument, "This is what we're doing now and it's not serving our students," and reflected, "I firmly believe our board came along with this policy because they saw these data."

A New Policy Creates a Path Forward

To respond to the shortcomings of the prior policy and take advantage of the state's transition to the Common Core State Standards, SFUSD designed a new approach to course placement and sequencing. The district now enrolls every middle school student in the same mathematics class: Common Core Math 6 in sixth grade, Common Core Math 7 in seventh grade, and Common Core Math 8 in eighth grade. That policy, passed unanimously by the SFUSD school board in 2014, aligns with the vision statement guiding the work of the mathematics department: "All students will make sense of rigorous mathematics in ways that are creative, interactive, and relevant in heterogeneous classrooms."

The district has deliberately designed these middle school mathematics courses to articulate algebraic concepts across multiple years and to position students for success in higher-level mathematics. In contrast to eighth-grade mathematics under the previous California standards, which served

Figure 1. SFUSD Mathematics Outcomes for the Class of 2014 From the Start of 8th Grade Through the End of 10th Grade



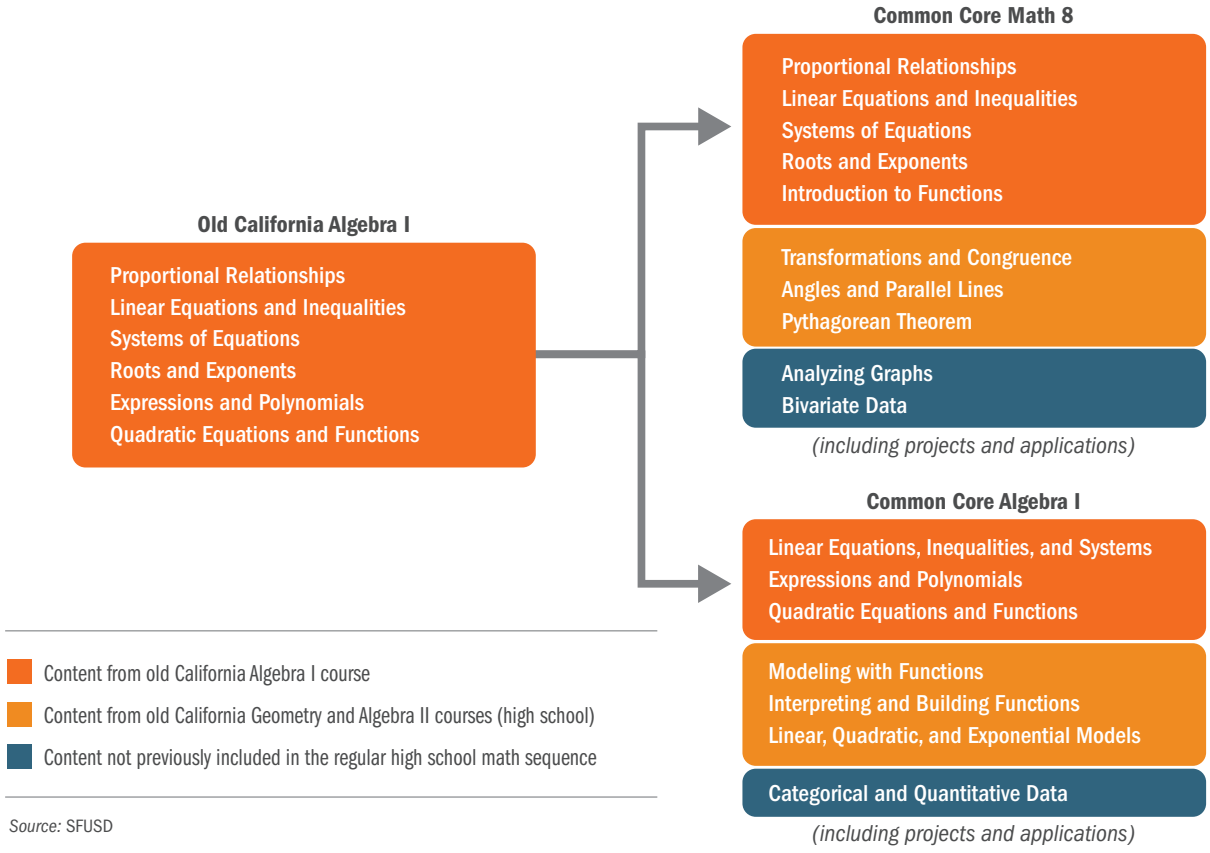
Source: SFUSD

primarily as a review of content that had been introduced earlier, Common Core Math 8 features essential building blocks for future coursework. It includes content that once appeared in Algebra I, Geometry, and Algebra II classes, as well as some content that the prior standards omitted entirely (see Figure 2). As a result, any opportunities for acceleration happen only in high school, after having established a strong mathematics foundation.

The new policy also directly addresses the district's equity goals. District leaders observed that honors courses prior to 2014 consisted almost entirely of White and Asian students, and a robust body of research documents the negative outcomes associated with tracking. The district decided to heterogeneously enroll all students in the same math course throughout the middle grades to respond to research findings and to address equity concerns.

When students reach high school in SFUSD, they follow a traditional course pathway; that is, students progress from Algebra I to Geometry to Algebra II (see Figure 3).[2] During their high school careers, students interested in more advanced coursework have opportunities for compression or acceleration. After taking Common Core Algebra I in ninth grade and Common Core Geometry in 10th grade, students can choose to take a compressed course that covers Common Core Algebra II and precalculus content in 11th grade. These students can then take either Advanced Placement (AP) Calculus or AP Statistics in 12th grade. Alternatively, students can progress into Common Core Algebra II in 11th grade and then choose between AP Statistics or Precalculus in 12th grade. As another option, students can double up coursework or take classes over the summer while in high school if they wish to progress further or more rapidly in mathematics content.

Figure 2. Comparison of Mathematics Content in the 1997 California Standards and the Common Core State Standards—Mathematics



Source: SFUSD

The course placement policy is part of a comprehensive effort to improve student learning opportunities in mathematics. The district selected a curriculum package that leaders believed would support the kind of deep understanding students need to succeed.[3] Transitioning from a textbook that district leaders described as entirely procedural, the new curriculum is task based. It creates space for teachers to check for gaps in understanding among students, to address students' language needs, and to publicly validate the work students are doing.

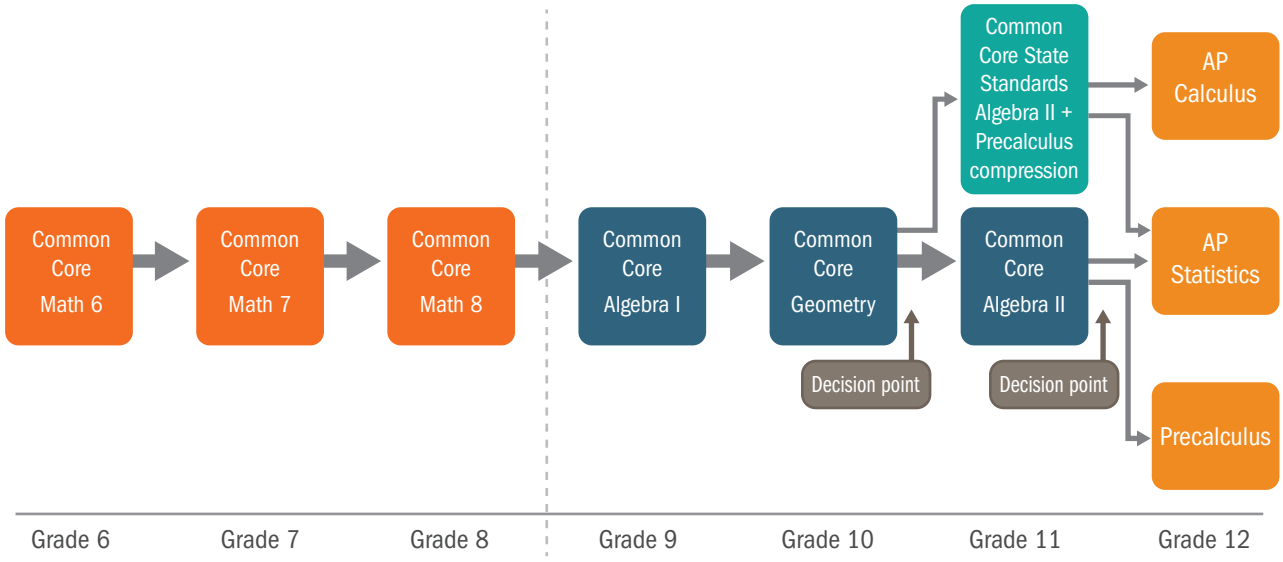
Approaches to build educator capacity are also central to SFUSD's work. Combinations of site learning communities, collaboration days, site-based coaching, and teacher leadership have helped the district redefine what it means to "do math" and equip teachers with the knowledge and skills they need to improve student learning.

Results Demonstrate De-Tracking's Promise

Since SFUSD began implementing the new policy in 2014–15, enough students have progressed through the course sequence to examine preliminary student outcomes. Looking specifically at the middle school experience, for example, the district has seen a jump in the percentage of students earning the highest score possible on eighth-grade tasks from the Mathematics Assessment Resource Service. The Algebra I repeat rate also decreased from 40% for the class of 2018—the last class to pass through the previous course sequence approach—to 8% for the class of 2019 (see Figure 4).

Promising results are also emerging beyond the eighth-grade year. In the 2018–19 school year, 4,660 students are taking courses beyond Algebra II, which is 456 more students than in the previous school year. This number has increased from 27% of all high school students to 30% of all high school students. These gains are especially noteworthy among students who have been historically underserved in mathematics, including African American (from 10% to 14%), Filipino (from 25% to 34%), Latinx (from 14% to 17%), and English learner (from 15% to 20%) students. The district has also seen an increase in the number of mathematics credits earned by the end of 11th grade between 2017 and 2018; this increase happened for students of all racial/ethnic backgrounds (see Figure 5). In addition, SFUSD saw an increase of 6% in AP mathematics course enrollment between 2016–17 and 2018–19, including an increase of 79% for Filipino students and 27% for Latinx students. AP Statistics enrollment

Figure 3. SFUSD Mathematics Course Sequence (adopted February 2014)



increased by 48% over a two-year period, and AP Computer Science enrollment increased by 31% during the same period.

Taken together, these findings indicate that the new course-sequencing policy is not only contributing to stronger student outcomes overall but also helping the district to address the disparities in student access and performance that undermined equity goals.

Considerations for Sequencing and Placement Changes

The case of SFUSD raises questions and considerations for districts across the state about course sequencing and placement policies.

Changes in Policy and Practice

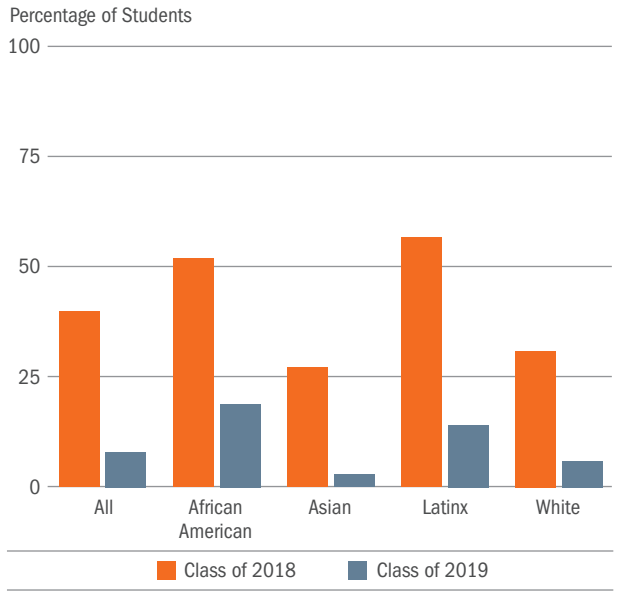
For an approach like the one in San Francisco to succeed, any change in policy must go hand-in-hand with changes in practice. When the district changed its course sequencing, it aligned that decision with changes in curriculum to promote and facilitate the kind of instructional environment it believed would help students master mathematical content. It also created professional learning opportunities through trainings and ongoing site-based supports to build teacher knowledge and skills to deliver high-quality instruction.[4] Through a comprehensive approach to mathematics, the district sought to ensure that new practices were not merely adjustments in scheduling, but improvements in quality.

Advancing the quality of higher-level mathematics teaching and learning begins long before students reach high school. Success requires a strong foundation in elementary mathematics. Preparing students to thrive in high school and beyond extends throughout the K–12 experience. To that end, unified school districts like SFUSD are well-equipped to think across a student's mathematical career, but their approaches must be comprehensive in nature to achieve positive results for all students.

Preparation for Higher Education

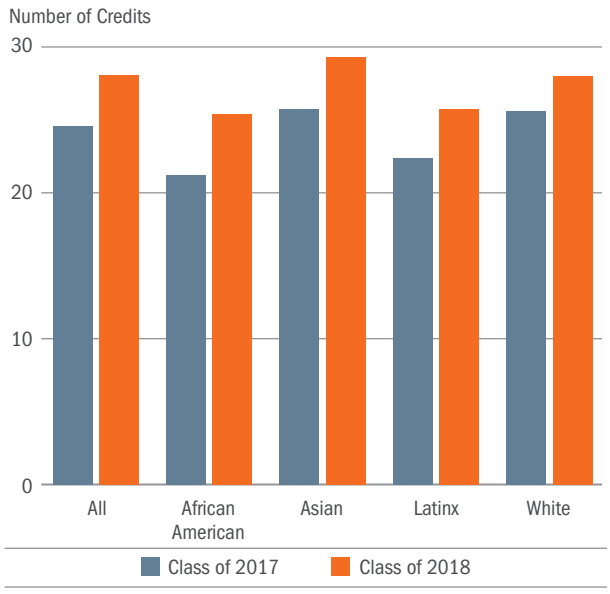
Districts may experience tension between doing what they perceive to be best for student learning in mathematics and addressing the pressures of high-stakes decisions in higher education. School systems may seek, for example, to build conceptual

Figure 4. SFUSD Algebra I Repeat Rate for the Classes of 2018 and 2019, by Race/Ethnicity



Source: SFUSD

Figure 5. SFUSD Number of Mathematics Credits Earned by the End of Grade 11 for the Classes of 2017 and 2018



Note. Students earn five credits for each semester of a mathematics class. If a student takes two years of mathematics courses, for example, they will earn 20 credits.

Source: SFUSD

The descriptions of SFUSD's course placement policies and the early outcomes it has produced come from a presentation by Lizzy Hull Barnes of SFUSD at a December 2018 meeting of the California Collaborative on District Reform. For more information about mathematics in SFUSD, please visit www.sfusdmath.org. The considerations for course sequencing and placement changes emerged from conversation among Collaborative members and invited guests from the policy, practice, and advocacy communities who participated in the meeting. For additional resources about mathematics and a summary of the complete meeting, please visit https://cacollaborative.org/meetings/meeting37.

understanding in students through deeper and more methodical exploration of mathematical content and to avoid the negative outcomes associated with tracking. In doing so, however, districts confront the common perception that to be competitive for college admission, students must take higher level mathematics courses as early as possible in secondary school. Addressing this tension requires attention not only to pedagogy but also to the communication and messaging needed to navigate local politics.

Communication With Local Stakeholders

Policies like the one passed in SFUSD can prompt anxiety and even backlash among some parents, especially if they believe that their children are being disadvantaged by practices that strip them of opportunity. This kind of unrest can undercut the confidence and satisfaction that any district leader hopes for parents to have in their schools. In some contexts, it poses a bigger threat if dissatisfied parents take their students out of the traditional public school system to enroll them in private or charter schools.

As district leaders promote changes to longstanding practices, communication based on evidence is essential. Data and research can provide powerful rationale and motivation for moving in new directions. In SFUSD, for example, district leaders emphasized research and the differences between expectations in the previous California standards and the Common Core State Standards. Although many parents focused on the loss of the course title "Algebra I" at Grade 8, much of the content from the old Algebra I course is actually covered in Common Core Math 8—as is content from the old Geometry and Algebra II courses. Moreover, some content that was not previously taught at all has been added. (See Figure 2.) Building a critical mass of support among teachers and enlisting their help in communication can be an important component of managing change with the public.

Specific communication strategies for working with families on policy changes are also a critical consideration for school districts. Even in 2017–18, four years after SFUSD passed its new policy, the district held 15 family and public events and delivered 22 presentations at conferences or within community partnerships. Highlighting the message that district leaders need to deliver in this kind of outreach activity, one district leader asked, "How do we help families see that there's nothing being taken away, that it's actually an enhancement and an enrichment?" In working with families, principals should be equipped to answer questions, as schools are the first place most families will turn. School and district leaders alike need to be able to defend a new policy and explain its rationale. In all these efforts, having cultural competence is key so that district leaders can engage members of their community with understanding and respect, taking into consideration their priorities and perspectives as well as those of the district.

Despite ongoing communication efforts, SFUSD school board elections in fall 2018 highlighted persistent criticisms of the sequencing and placement policy. Multiple candidates ran on a platform of "restoring Algebra I" to the district. Although these candidates lost their elections, their perspectives reminded district leaders of the need for ongoing communication with stakeholders, even years into the implementation of a new approach.

Policies and Messaging From Higher Education

Messages from higher education play an essential role in supporting district-level change. Developments within California, for example, help to support course sequencing changes by shifting the focus away from accelerated access to advanced content. According to an April 2016 statement, the University of California Board of Admissions and Relations "strongly urges students **not** to race to calculus at the cost of full mastery of the earlier math curriculum.... Choosing an individually appropriate course of study is far more important than rushing into advanced classes without first solidifying conceptual knowledge."[5] Commentary from Stanford University reflects a similar shift. Until 2017–18, Stanford admissions literature recommended four years of high school mathematics, including calculus; the university still recommends four years but now with significant emphasis on fundamental mathematics skills. Updated language about the undergraduate admission process says, "The students who thrive at Stanford are those who are genuinely excited about learning, not necessarily those who take every single AP or IB, Honors or Accelerated class just because it has that designation."[6]

Despite this messaging, some remain skeptical about whether admissions practices have actually changed. Evidence from SFUSD presents a compelling case about the effectiveness of its approach for the district overall. To supplement the outcomes about the student population overall, evidence of success for high-achieving students—especially in college admissions—may be key to assuaging parent fears about change.[7]

Attention to Equity

A fundamental driver of the SFUSD policy change was a desire to address inequities in student experiences and outcomes. Although course sequencing approaches can help to address equity issues, they cannot supplant attention to them. Conversations about sequencing and placement, especially when a policy departs from traditional approaches to tracking, can reveal differences in opinion among community members about who is entitled to learn mathematics and about the peers with whom parents want their children to learn. An administrator from another school district cautioned against ignoring these critical equity issues:

> "I'm concerned that no matter what we do, without confronting the root cause of student performance as it relates to efficacy and expectations, we are not going to fix the problem.... If a car has a flat tire, but you're changing the oil, that's good for the car, but you're not fixing the problem. Teachers make assumptions about students who come into the classroom dirty or hungry or have a different language; they automatically think these kids aren't smart."

In light of persistent issues of equity, access, and bias, trainings and policies about bias may be important for both the teachers who instruct students in classrooms and the counselors who serve as gatekeepers in course placement decisions.

Other Opportunities and Challenges

Conversations about sequencing and placement also reveal additional issues for districts to address. For example, SFUSD's middle and high school course offerings connect naturally with one another because the district oversees student experiences from kindergarten to 12th grade. Many students elsewhere change districts after eighth grade, moving from a K–8 system to a high school district that pulls students from multiple elementary districts, often with nonaligned mathematics policies. The challenges in these contexts are potentially more complex than those in SFUSD and may require a different approach or additional supports. For example, elementary and high school districts might develop specific resources for teachers to support students who are making this transition.

Issues related to mathematics courses might connect to California's teacher shortage, which is pronounced in special education and mathematics. One former superintendent recalled that the number of Algebra I teaching positions in his district was larger than that of any other teaching role in the system. If policies like the one in SFUSD can

dramatically reduce the failure rate in Algebra I, then districts can then reduce the number of Algebra I course sections they offer, and therefore reduce their need for additional mathematics teachers at a time when the supply is low.

Conclusion

The allure of tradition is powerful, especially in public education. Influential leaders inside and outside of our school systems are often people who thrived in their own formal education settings. In SFUSD, however, traditional approaches to mathematics course sequencing and placement, even when amended to address key equity issues, failed to generate desired student outcomes. Building on a foundation of research evidence and a coalition of educators who understood and supported the move, the district developed a new policy to de-track its middle school courses and emphasize quality over acceleration. It supported the new policy with instructional materials and professional development designed to foster deeper student understanding. The early results are encouraging: enrollment and passage rates of higher mathematics classes have grown dramatically. As other districts look for ways to address overall performance and inequitable results, SFUSD provides a promising model to consider.

ENDNOTES

1 A 2014 position paper from SFUSD outlines the research base and justification for a change: http://www.sfusdmath.org/uploads/2/4/0/9/24098802/sfusd_course_sequence_recommendation.pdf.

2. The Common Core State Standards lay out two pathways for designing course pathways after Grade 8. The traditional pathway includes two algebra courses and a geometry course; content related to data, probability, and statistics are incorporated into each course. The integrated pathway follows a model often used internationally and creates a sequence of three courses, each of which features number, algebra, geometry, probability, and statistics. For more information, see http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf.

3 In partnership with several external partners, the SFUSD Math Department has developed a core mathematics curriculum that guides all courses from prekindergarten through Algebra II plus precalculus compression. The K–5 Elementary Math Core Curriculum is being released to the public under a Creative Commons License. The Secondary Math Core Curriculum incorporates proprietary resources including CPM Education Program and the Interactive Mathematics Program, and is not slated for public release. For more information on the development of the SFUSD math curriculum, see http://www.sfusdmath.org/history-of-the-sfusd-curriculum.html.

4 Work with networks and outside partners has facilitated these improvement efforts. SFUSD's participation in the Math in Common community of practice (see www.mathincommon.org) enabled it to take a collection of teachers and schools who were already focused on complex instruction, task-based curriculum, and collaborative group work and bring their efforts to scale. Collaboration with the Strategic Education Research Partnership (SERP) and with partners like Jo Boaler, Phil Daro, and David Foster has similarly been powerful.

5. University of California. (2016, April). *Statement on the Impact of Calculus on UC Admissions UC Board of Admissions and Relations with Schools (BOARS).* Retrieved from https://senate.universityofcalifornia.edu/_files/committees/boars/documents/BOARS_Statement-Impact-Calculus.pdf

6. Stanford University. (2018). *Our selection process: Academic preparation.* Retrieved from https://admission.stanford.edu/apply/selection/prepare.html

7. The first class of SFUSD students to take Common Core Math 8 under the new policy will graduate in spring 2019. Tracking the progression to higher education for this cohort will enable the district to examine postsecondary outcomes for the first time.

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