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Governance Brief

Disproportionality in Math Placement

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Introduction

Equitable, specific district policies are a critical safeguard to ensure that all students are in classes that will help them meet their goals in all areas of the curriculum. And while student mathematics achievement is the sum of a variety of factors, math placement—the math courses to which students are assigned over many years—is one of the key components. Math placement is less straightforward and more important than it might seem. Placement is not always correlated with past performance, particularly for low-income underrepresented students of color, and not all students have access to the most advanced courses because they are less frequently offered in schools with higher percentages of non-white students. In the end, how students are placed—and misplaced—in math courses has long-lasting ramifications.

This brief provides an overview of the issues of math placement and math misplacement, explains why math misplacement is an equity issue, includes statistics on inequitable access to courses, and discusses recent progress California has made toward addressing it. It also outlines strategies that districts have used to work toward fair placement policies. School boards can use this information, and the accompanying recommendations at the end of the brief, to partner with families, teachers, and administrators to promote equitable math placement policies.

In this brief you will find:

- Why math misplacement is an equity issue;
- Recent progress toward better placement practices;
- The role of assessments in math placement, including evaluating math proficiency for English learners;
- Data about inequitable access to advanced math coursework;
- How school districts and school boards can create equitable math placement policies; and
- Recommended questions for board members to ask about math placement in their districts and county offices of education.

Math Misplacement: An Equity Issue

Why Algebra I Matters

Placement into algebra is integral to postsecondary success for several reasons. Algebra I is a gateway to higher-level classes; students who take Algebra I in middle school are typically on track to take calculus by 12th grade,[1] which in turn increases students' likelihood of acceptance into selective California colleges and preparedness for STEM careers.[2] After the Common Core State Standards for Mathematics were adopted, integrated math courses emerged as an alternative to the traditional sequence of Algebra I-Geometry-Algebra II (prerequisites for Calculus). These courses can support accelerated advancement; students who take the first integrated math course in eighth grade will be on track to take Calculus in 12th grade. This trajectory is similar to taking Algebra I in eighth grade in a non-integrated math curriculum.[3] Regardless of the course sequences adopted in a student's middle and high school,

being placed in an accessible yet challenging math class boosts student confidence.[4] Furthermore, ensuring that all students have opportunities for advanced math placement is a critical strategy for closing achievement gaps, since research suggests that providing advanced coursework for adequately prepared students may have an outsized positive impact on underrepresented students of color and low-income students.[5]

However, the solution is not as simple as placing all students in the same advanced mathematics courses, thereby ensuring everyone has taken Algebra I by the time they reach high school. Students need instruction in the earlier grades that prepares them to succeed in these demanding courses once they reach middle and high school. Students who are not proficient in seventh-grade math rarely demonstrate proficiency in algebra if they take it in eighth grade.[6] Furthermore, when these students have to repeat Algebra I in ninth grade, they typically do not perform better the second time they take the course.[7] It is important, then, to ensure that all students who are prepared for Algebra I in eighth grade have an opportunity to take it without mandating it for students who are not yet ready to do so. It is equally important to ensure that all students have the opportunity—through high-quality instruction and support—to succeed in Algebra I and beyond. Since students are consistently less successful when they repeat Algebra I, schools must provide students with the support they need to succeed the first time they take the course. Proven methods of support include offering double periods of Algebra I (either during the school day or outside of school),[8] using instructional techniques that build conceptual understanding and fluency (such as engaging students in predicting, exploring, modeling, and justifying),[9] and using visual representations to deepen understanding, particularly for English learner (EL) students.[10]

Math Misplacement

The problem of placing students into classes that are not advanced enough for their abilities and their demonstrated prior achievement is known as math misplacement. The Silicon Valley Community Foundation defines it more precisely:

> *Math misplacement occurs when students are held back in math even though objective measures such as grades and test scores indicate they should advance to the next course. When this happens, students are frequently derailed from being able to complete all the courses they need to be competitive applicants for California colleges and universities during four years of high school.*[11]

Differences Between Diagnostic and Summative Assessments

Student performance is typically gauged by diagnostic assessments, which evaluate student knowledge to help inform teaching, and summative assessments, which are designed to assess what students have learned at the end of a lesson, course, or school year. Diagnostic assessments are focused on improving student learning and produce information about specific areas where students are struggling. Summative assessments, by contrast, are often meant to provide a more general overview of student knowledge at the end of a given time period. They do not typically produce information that allows teachers to understand exactly why students are struggling with specific concepts. Instead, they offer an evaluation of a what students have learned.[12] Summative assessments, like the California Assessment of Student Performance and Progress (CAASPP), receive significant attention because they are often used in school accountability systems, and they are also frequently used to guide student placement decisions. However, diagnostic assessments like the Mathematics Diagnostic Testing Project, which is discussed later in this brief, can provide valuable insight into whether a student is prepared to succeed in a given math course, such as Algebra I. Such diagnostic assessments merit inclusion in any placement policy that includes the use of student test scores.

The issue of misplacement often arises with Algebra I in California. Research shows that many ninth-grade students are forced to retake Algebra I despite achieving high state test scores and/or passing the class in eighth grade.[13] This phenomenon of math misplacement is applied more frequently to underrepresented students of color than to their White and East Asian peers,[14] which means underrepresented students of color are more likely to fall prey to the aforementioned negative effects of math misplacement: decreased access to California postsecondary schools and STEM careers, and little likelihood of performing better in the course the second time around.

Because California educators and researchers are currently awaiting data on postsecondary math performance from the first group of students who completed high school with four years of Common Core math classes, information on the standards' impact on high school math education is limited. However, previously existing data on student placement and achievement suggest that although math

misplacement is not the only—and arguably not the most significant—factor that negatively impacts the math achievement of underrepresented students of color, it is a serious occurrence that may be applied more frequently to these students and, thus, may have a disproportionate negative effect on them. School boards would do well to adopt placement policies that eradicate math misplacement, and suggestions for how to do so are provided later in this brief.

Two studies that address math misplacement suggest that it strikes underrepresented students of color more often. The Noyce Foundation's Pathways Report examined math placement for nine school districts in the Bay Area and found that 52 percent of East Asian students advanced to ninth-grade Geometry after taking eighth-grade Algebra I, but only 17 percent of Latino students did.[15] For students deemed "successful," meaning they earned a grade of B or better, advancement was still disproportionate—77 percent of East Asian students were advanced to ninth-grade Geometry the next year, but only 66 percent of Latino students and 40 percent of Filipino students moved to ninth-grade Geometry.* Another study on algebra access followed students who achieved top math test scores in fifth grade. It found that just 35 percent of Black students in that group went on to take Algebra I or higher in eighth grade, whereas 94 percent of Asian students, 68 percent of Latino students, and 63 percent of White students did so.[16]

Recent Progress Toward Better Placement

Legislative Solutions

The State Legislature passed the 2015 California Math Placement Act (CMPA) to address the problem of misplacement. The act requires that:

> *[g]overning boards or bodies of local educational agencies, as defined, that serve pupils entering grade 9 and that have not adopted a fair, objective, and transparent mathematics placement policy as of January 1, 2016, to, before the beginning of the 2016–17 school year, develop and adopt, in a regularly scheduled public meeting, a fair, objective, and transparent mathematics placement policy for pupils entering grade 9 with specified elements…*[17]

However, this legislation is only a solution insofar as districts comply with it. Researchers found that small and rural districts were less likely to be aware of the law or to have a compliant policy by spring 2016, perhaps due in part to having fewer staff members to address the requirement.[18] Low-performing districts were also less likely to have had a policy in the 2015–16 school year than their higher-performing peer districts.[19] For districts that have policies in place, researchers found that high-performing and large districts put more weight on student test scores and less on students' academic and career goals, and 80 percent of districts that use tests for placement use more than one test.[20] Researchers also noted that 22 percent of districts reported enrollment capacity issues, regardless of location, size, and performance, and that math misplacement occurred in response to staffing constraints.

Movement toward Equitable Placement

However, there is good news as districts work to increase equity in math placement. Across California, 86 percent of districts had a policy in place for the 2015–16 school year. San Francisco Unified School District, the sixth-largest school district in California, de-tracked math placement entirely (i.e., removing honors, traditional, and remedial math pathways in favor of providing the same rigorous courses for everyone) in an attempt to level the playing field for all students. The decision, which has been controversial with some families, came in response to a years-long policy in which all ninth-grade students took Algebra I, and many did poorly.[21] Data from the 2017–18 school year in San Francisco Unified show that students of all races were dramatically less likely to retake Algebra I after the de-tracking policy took effect, and students were taking more rigorous math courses. Underrepresented students of color, girls, EL students, students with individualized education programs (IEPs), and students who qualify for free and reduced-price lunch were all taking math beyond Algebra II at higher rates than before, and AP Math enrollment had increased 96 percent among EL students. Not only has the new policy in San Francisco Unified led to greater success and increased course attainment in math, but students of all races are successfully completing a greater number of science courses, too.[22] San Francisco's strategy has focused on increasing access to mathematical content for students who might not have taken the most rigorous courses under the old system, incorporating student voice in math course decisions, and using diagnostic assessments to guide instruction.[23] Oakland Unified, another large urban school district, has taken similar steps to de-track math placement.[24]

Limited information exists regarding math placement throughout California in the years since the Common Core State Standards for Mathematics have been implemented, but it is known that some districts transitioned away from the traditional Algebra I-Geometry-Algebra II sequence in favor of integrated math courses.** Even for the dis-

* *There were not enough students in other underrepresented racial/ethnic groups for the study to report on the rate at which successful students from these groups advanced from eighth-grade Algebra I to ninth-grade Geometry.*

** *"Integrated math pathways" refers to a sequence of integrated math courses, where math content is not separated into Algebra I-Geometry-Algebra II courses.*

tricts that maintained the traditional sequence, the new standards mean that the content that used to be covered in Algebra I is now split between eighth-grade math and Common Core-aligned Algebra I.[25] Forthcoming research will study math placement in the state's largest school district, Los Angeles Unified.[26] More research is planned, too, as data become available that will permit certified transcript panels for high school seniors who were in school for four years of Common Core implementation. These data will likely shed light on the Common Core's impact on access and opportunity in California, including whether integrated math pathways have succeeded in closing access gaps.

Access to Advanced Math Courses

As school boards await data on math placement in the Common Core era, there are other data available on access to advanced math courses (Algebra II and beyond). The U.S. Department of Education's Office of Civil Rights shared the following national data from the 2013–14 school year that highlight access gaps in public schools with high percentages of underrepresented students of color:[27]

Access to Advanced Math and Science Courses by a School's Black and Latinx Enrollment[7]

	Course	
	Algebra II	Calculus
Percentage of Schools Offering the Course	78%	48%
Percentage of Schools with Low Black/Latinx Enrollment Offering the Course	84%	56%
Percentage of Schools with High Black/ Latinx Enrollment Offering the Course	71%	33%

These gaps in access to Algebra II and Calculus are undoubtedly linked to racial gaps in the pursuit of advanced math courses, as seen in these 2014–15 data on California students in public high schools collected by the California Department of Education and aggregated by the Public Policy Institute of California:[28]

Rates at Which Students in California Take Advanced Math Courses by Race

Race	Percentage Taking Advanced Math
Asian	29%
White	17%
Black	8%
Latinx	8%
All students	13%

How Do School Districts Create Equitable Placement Policies?

California districts have pursued a variety of strategies to minimize math misplacement. This section explores some of those strategies.

Varied Opportunities for Acceleration

Much of the math placement discussion centers around placement for eighth- and ninth-grade math because districts make critical placement decisions at the transition between middle and high school, a fact recognized in the CMPA. Statewide, though, districts have taken different approaches to placement that could produce more equitable results. The K–8 Cupertino Union School District starts placing qualified students into advanced math courses in sixth grade, and each year, students are given a new opportunity to join the accelerated math track.[29] These repeated opportunities to accelerate are important because they can help serve more students well, since acceleration carries benefits for prepared students. However, acceleration that occurs too early typically results in low course grades and a poor grasp of algebraic concepts.

Similarly, San Francisco and Oakland Unified School Districts' de-tracked math pathways offer multiple opportunities for transitioning to advanced coursework. All students take Algebra I in ninth grade and Geometry in 10th grade, but there are opportunities for acceleration starting in 11th grade. Students can take a combined Algebra II/Precalculus class if they are prepared to do so, and those students would

still be able to take Calculus before college.[30] Students who remain on the traditional track take Algebra II as a standalone course in 11th grade. This placement approach is designed to provide students access to rich, integrated math instruction prior to 11th grade; at that point, students would ideally be well supported if they pursue an accelerated course. This de-tracked system means that all students will have access to rigorous courses that build strong mathematical understanding, and more students should be prepared to pursue advanced math successfully than under the prior system. Both the Cupertino and the San Francisco/Oakland systems give students extended timelines to prove themselves capable of advanced math coursework. Their varied approaches demonstrate that there are multiple ways to create a math placement policy that offers increased opportunities for success.

Minimizing Bias

Many math placement policies use teacher recommendations as part of a multi-pronged system that includes test scores. Teacher recommendations have historically been a double-edged sword—they can reward students who have demonstrated exemplary academic or soft skills,[31] but personal relationships may result in some students receiving an unfair advantage. The Jefferson Union School District in the Bay Area, like many California districts, has a policy that teacher recommendations can boost a student into accelerated math if the student's best scores would not otherwise qualify, but teacher feedback cannot be used to retain a student whose scores place them into an accelerated course.[32]

The CMPA implies that teacher feedback should not contribute to math misplacement, since teacher feedback is generally considered subjective and the law requires that placement be based on objective measures. In the words of the act, a fair policy:

> *[s]ystematically takes multiple objective academic measures of pupil performance into consideration…such as statewide mathematics assessments, including interim and summative assessments authorized pursuant to Section 60640, placement tests that are aligned to state-adopted content standards in mathematics, classroom assignment and grades, and report cards.*[33]

Researchers at the Public Policy Institute of California (PPIC) interpreted this language in the law as only permitting teacher recommendations when they help accelerate students. However, the plain text of the law does not explicitly forbid districts from using teacher recommendations to decelerate students. A 2016 survey by the PPIC found that 87 percent of districts use teacher recommendations as part of their math placement policy.[34] The CMPA requires that districts look at student test scores to see whether underrepresented students of color were less likely to be promoted beyond Algebra I than their data would suggest. A recommendation for districts that may find differences in promotion by race and want a plan to address them—Plan-Do-Study-Act cycles—is presented below.

Plan-Do-Study-Act Cycles

Plan-Do-Study-Act Cycles, or PDSAs, are a way to test a plan for improvement. The Carnegie Foundation suggests thinking about PDSAs as miniature experiments. The first step (Plan) is to identify where change should happen, make a plan to effect change, and predict how that plan will work. Next, in the Do phase, organizations should test their plans and document what happened. The third step, Study, entails comparing predicted outcomes with actual outcomes. Finally, Act is an opportunity to decide on next steps.[35]

Balancing Variables

Districts use an assortment of tools to guide math placement. The 2016 PPIC survey found that the most common variables in math placement policies were test scores (used by 97 percent of respondents), math GPA (91 percent), and teacher recommendations (87 percent).[36] There are opportunities for equity within these variables if districts make sure schools use the right variables, give them the appropriate weight, and ensure those variables are equitable.

The PPIC survey determined how frequently certain variables were used, but not the weight they were given. Policies can give greater weight to objective measures (such as tests), relative to subjective measures (such as parental requests and teacher recommendations based on qualities like perceived motivation).

Tests can disadvantage underrepresented students in a few ways. One of these, stereotype threat, refers to the fear some groups may feel that tests will reinforce negative stereotypes about groups they belong to. This phenomenon has been proven to have a negative effect on the test-taking ability in mathematics for underrepresented students of color.[37] Underrepresented students of color may also have access to fewer opportunities to develop test-taking skills. To combat these issues, it is important that districts use tests that are aligned to student preparedness. WestEd researchers suggest the use of the Mathematics Diagnostic Testing Project (MDTP)

assessment in student placement as part of a district's math placement policy.[38] Districts that use tests to drive placement decisions often (80 percent) use two or more tests, as reported on the PPIC survey, but this may be unnecessary, as the MDTP test on its own has been effective in determining whether students are ready to succeed in Algebra I.[39] The MDTP assessment in student placement is also aligned to Integrated Math I-III, so it is appropriate for use in districts that have adopted integrated math pathways. It is worth noting that the MDTP test's validity for assessing math placement for EL students has not yet been studied.

For districts that want to factor student characteristics (such as interest in mathematics, study skills, and motivation) into placement decisions, there are ways to decrease the likelihood of advantaging certain students to the detriment of other underrepresented groups. Bias in the placement process can be minimized by offering guidance on teacher recommendations to emphasize skills that are integral to algebra achievement.

Leveraging Data

The CMPA calls for districts to:

> *[examine] aggregate pupil placement data annually to ensure that pupils who are qualified to progress in mathematics courses based on their performance on objective academic measures selected for inclusion in the policy pursuant to paragraph (1) are not held back in a disproportionate manner on the basis of their race, ethnicity, gender, or socioeconomic background. The local educational agency shall report the aggregate results of this examination to the governing board or body of the local educational agency.*

School districts must report these data, but they can also use the data to improve their practices. Districts could build Plan-Do-Study-Act cycles into their review of their math placement data based on student characteristics: identifying potential causes and possible solutions for disproportionate math misplacement in their districts, testing these ideas, evaluating the impact on math pathways, and adjusting their practices accordingly.

Conclusion: What Can School Boards Do?

Adopt Fair Math Placement Policies

There is evidence suggesting that school boards are currently more engaged in various aspects of Local Control and Accountability Plan (LCAP) development than they were at the inception of the Local Control Funding Formula (LCFF);[40] that engagement has several steps and requires authentic cooperation within and across the district and community to ensure that the math placement is clear. As mandated by law, school boards must adopt a math placement policy that is fair, objective, and transparent. It is recommended that this policy be developed in consultation with teachers, counselors, administrators, and, as applicable, feeder schools to develop a well-articulated sequence of mathematics courses and consistent protocols. In addition, as school boards must review and adopt their LCAP each year, there are opportunities to review data, engage constituents, and ensure that LCAP plans incorporate math placement policies that support all students and each numerically significant student subgroup, including ethnic subgroups, socioeconomically disadvantaged students, English learners, students with disabilities, foster youth, and homeless students. Findings from the data review should be used to evaluate the district's policy on math placement and its placement protocols and update them as necessary to address achievement gaps. Continued increased involvement in LCAP creation could be a key opportunity for school boards to review data, engage constituents, and ensure that LCAP plans incorporate math placement policies that support all students.

Help Families Navigate Math Placement

Math placement can be confusing to families, and there are several ways school boards can support family engagement with math placement policies. LCAP parent advisory committees, including EL parent advisory committees, should be encouraged to review math placement policies, as these policies are connected to LCAP goals. The key with forming these advisory groups is to ensure that diverse perspectives are heard. Superintendents note that it is challenging to engage parents of low-income students, EL students, and foster youth,[41] but it is worth the effort, since strong district engagement helps parents advocate for their students.

Districts have built best practices for engaging families into their LCAPs, including:

- Capacity-building activities to help families support student learning at home
- Communication in multiple languages through a variety of methods (e.g., email, text messages, newsletters)
- Formal family leadership training programs
- Cultural diversity training for staff who interact with families[42]

Parent advocacy has a fairly significant role in math placement in many districts (PPIC reports that 62 percent of districts factor parental requests into placement decisions), and the CMPA legislates that there must be "clear and timely recourse for each pupil and his or her parent or legal guardian who questions the pupil's placement."[43] WestEd has developed a series of resources to help parents and students advocate for themselves in the math placement process. These documents can be found by accessing the link within the resources provided at the end of this brief.

Parents must know and understand their students' math placement to be able to serve as advocates. School boards can ensure that policies are in place that will help empower parents to advocate for themselves and their children.

English Learner Students and Math Placement

English learner students comprised 20 percent of California public school students in the 2016–17 school year,[44] and math placement for these students requires some unique considerations, especially given the fact that they are less likely to take advanced math courses.[45] Research on EL students and Algebra placement indicates that while it is commonly assumed that math is accessible for non-native speakers, the Common Core requires that students explain and justify their work, which puts additional language demands on EL students and their teachers.[46] A review of literature on EL students and mathematics learning produces scant results on the math placement of EL students.[47] Additional research on EL students and Algebra access would be helpful for school boards and other educators.

However, more general findings about EL students and success in mathematics do exist, and they can be applied to math placement. Language barriers impede the ability of many EL students' parents to advocate for their children at school across the curriculum. School boards can respond to this challenge by advocating for best practices that include EL students' parents, such as offering additional information about the U.S. school system, providing opportunities to have more input in their children's schooling, and providing translated communications beyond what is legally required.[48] Doing so will help EL students' parents take advantage of the CMPA's provision that allows parents and students to question math placement decisions.

Connect with Other Districts

School boards may want to connect with districts whose placement policies support equitable math placement. Reviewing these districts' policies, and learning about how they developed them, may help districts develop policies that will advance their placement goals. Some California districts that have produced fair math placement plans are:

Long Beach Unified School District. The Long Beach policy requires that schools use multiple measures to evaluate math placement, mandates that students must not be asked to retake a class they have successfully completed, gives teachers an opportunity to recommend higher (but not lower) math placement, and offers opportunities for re-evaluation and parent appeal.[49]

Sacramento City Unified School District. Sacramento provides a detailed timeline of their middle school placement process, which includes translated documents to keep parents informed; the MDTP test paired with an open-ended task; opportunities for teachers, parents, and administrators to recommend students for advanced math classes; and a process to share students' results—and areas of strength and growth—with the students themselves.[50]

San Francisco Unified School District. As mentioned above, San Francisco's policy ensures that all students have access to the same rigorous math course, so students are not put into pathways. However, the district still ensures that students who want to pursue advanced mathematics have an opportunity to take Calculus in high school.[51]

Leverage County Office of Education Expertise

County offices of education (COEs) in California can play an important role in math placement by offering guidance on increasing equity, providing training to districts and schools, and connecting districts with peers. Recent WestEd work with a statewide community of COE staff has indicated that they are increasingly connected with one another, knowledgeable about equity issues, and deeply passionate about high-quality mathematics instruction.[52] School board members can connect with COE staff, or encourage district leaders to do so, in order to understand policies that have worked in similar districts.

Bring an Equity Lens

As school boards adopt placement policies and assist families in navigating math placement, it is imperative that they approach both tasks with equity in mind. Boards

can ensure that math placement policies are designed to support all children and families and then monitor their implementation, asking questions to ensure that plans are carried out with fidelity. By taking such actions as adopting CSBA's AR 6152.1 — Placement in Mathematics Courses, engaging in continuous improvement through PDSA cycles, and working closely with families, boards can be effective advocates for students who are currently underserved. Undertaking these steps with equity in mind will ultimately help create fairer education systems.

Questions for Board Members

When adopting or reviewing math placement policies and practices, board members may consider the following questions for district or COE staff:

1. What are our current policies for placing students in mathematics courses, particularly around transitions from elementary to middle school and from grade eight to nine? Do these policies meet the requirements of the California Mathematics Placement Act (Education Code 51224.7)?
2. Do we currently review placement data annually to identify any disproportionality in math course placements?
3. Are there patterns of placement for students based on race, ethnicity, gender, socioeconomic background, identified disabilities, or English language proficiency?
4. When and how do students have the opportunity to accelerate their math course sequence?
5. How can we promote effective communication between our schools—or, for non-unified districts and county offices of education, between districts—particularly during transitions between grade spans?
6. How are students and parents informed of our mathematics placement practices? What is the process for addressing disagreements over placement decisions?

Resources

» **CSBA Sample Board Policies and Administrative Regulations.** BP/AR 6152.1 — Placement in Mathematics Courses: CSBA has developed a sample policy and administrative regulation that is available to Policy Services subscribers. For a limited time, these materials are also available to nonsubscribers on the CSBA website at: http://bit.ly/SampleMathPlacement

» **Math Course Pathway Guides for Parents and Students.** WestEd has developed a series of resources to help parents and students advocate for themselves in the math placement process, with guidance for both traditional and integrated math pathways. These documents, available in four languages, can be found here: http://bit.ly/CoursePathwayGuides

» **Course Placement and Sequences.** This appendix from the *Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve* (2013) provides an overview of course sequence options and considerations for the California Common Core State Standards. http://bit.ly/FrameworkAppendixD

Endnotes

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