Tracking and Detracking EWA Conference

Kentaro Iwasaki

https://www.concentricmath.com/

Tracking in math is a convenient justification to maintain segregation in our education system by those with social, political, and financial capital (70 years after Brown vs Board of Education). Tracking maintains separate and unequal.

The segregation in tracking is most often by race but can also be by gender, socio-economic status, language, etc.

Defining Tracking and How I Work in the Space

THE GREAT DIVIDE

Cambridge schools are divided over middle school algebra

The Boston Globe

By Christopher Huffaker Globe Staff, Updated July 14, 2023, 5:40 a.m.

Refusing to teach kids math will not improve equity

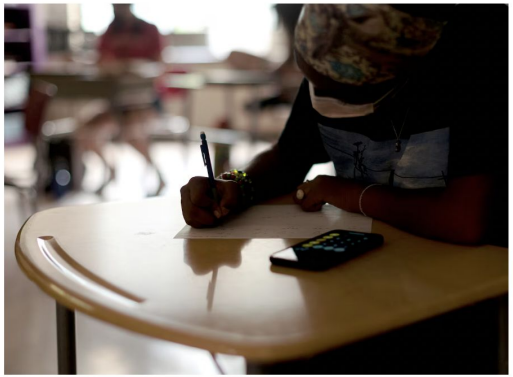
We have public schools for a reason.

NOAH SMITH
JUL 18, 2023

548 123 Share

As district leaders hesitate, Cambridge School Committee pushes on middle school algebra

By Christopher Huffaker Globe Staff, Updated June 28, 2024, 4:23 p.m.



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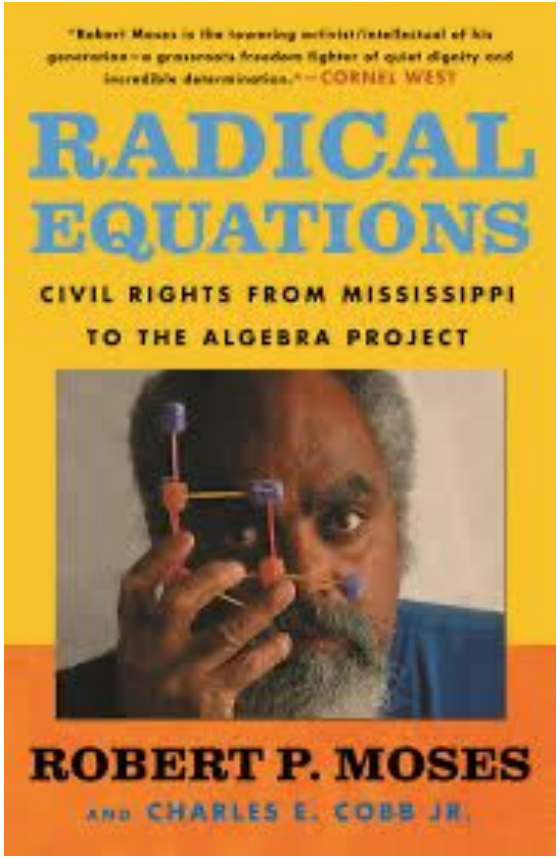
Math as a civil right

-Bob Moses, Founder of the Algebra Project

"...a change in the consciousness of Black people… towards mathematics...a culture of change... towards making it possible **to… really change classrooms**… we are talking about **systemic change**" (Moses, 2001, pp. 21-22)



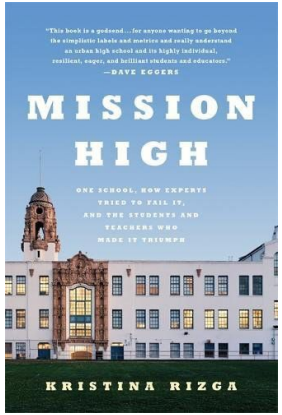
Professor Rochelle Gutierrez on Rehumanizing Mathematics

When I have asked students and teachers across the nation what kinds of practices can feel **dehumanizing** in mathematics education, they report—

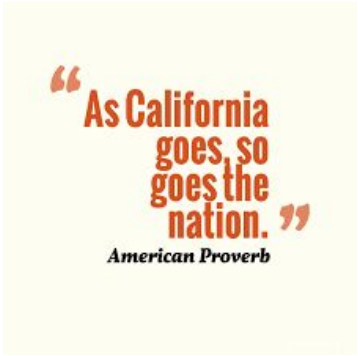
- **measuring, categorizing bodies** (e.g., tracking, mathematics as a filter);
- **evaluation that does not honor complexity, context, or individuals' own goals** (e.g., high-stakes and standardized testing);
- **being asked to leave one's identity at the door** (e.g., color-blind teaching, strict pacing guides, being unable to use one's native language);
- **speed valued over reflection** (e.g., get the answer quickly, cover the curriculum regardless of whether students understand); and
- **separation of mathematical practice from politics/values/ethics**

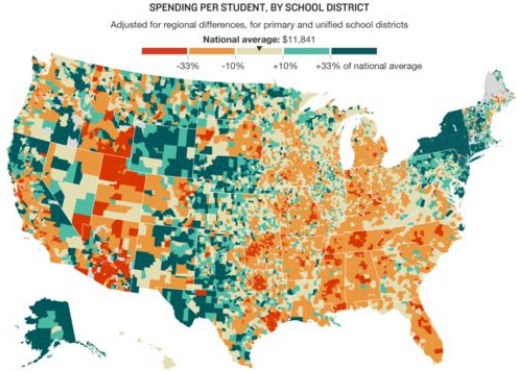
Goffney, I., Gutiérrez, R., & Boston, M. (2018). *Rehumanizing mathematics for Black, Indigenous, and Latinx students (Annual perspectives in mathematics education 2018)*. Reston, VA: National Council of Teachers of Mathematics.

How I've worked in the detracking space



SFUSD SAN FRANCISCO PUBLIC SCHOOLS





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Currently I work with districts in **Massachusetts, California, and Wisconsin** who are interested in examining detracking in math in some form and/or in developing deeper conceptual understanding through collaborative structures and in **examining power and status dynamics at all levels of systems** (classrooms, schools, districts, communities)

- **Begin with the context of the community–context matters!**
- **No prescriptive way to move forward**
- Some communities are examining 3 tracks in math and asking about going to 2 tracks while others asking to detrack in certain grades, etc.

Tracking: Tracked systems place and sort students into particular groups or classes based on grades, teacher recommendations, test scores or other criteria–often based on (biased) **perceived abilities** . Usually, once in a track, students do not move to another track.

"Streaming or tracking has been pervasive and created barriers for students historically underserved by public school systems—particularly low-income, Black, Latinx, multilingual students and students receiving special education services." *(A Guide to Detracking Math Courses, pg. 15)*

Leveling/De-leveling: This terminology has referred to honors vs regular sections within a course (some districts have three or more levels such as Accelerated, Honors, College Prep). Questions arise as to how the courses differ–by content of the course? By pace? By the difficulty of classwork, homework, and assessments? By the amount of assignments given?

Laning/Streaming/Tracking: The process and structure of placing students into groups that differ in course by year (if you start in Algebra, Geometry or Algebra 2 in 9th grade) and/or in Accelerated, Honors or College Prep in 9th grade

Problems Schools Trying to Solve with Tracking and Alternatives

- Schools responding to public pressure from community members who believe tracking is needed to meet the needs of their students
  - Community members with high levels of social, political, and financial capital
    - Lawsuits in San Francisco and Palo Alto by parent groups
- Open Honors
- Compression Courses to address acceleration (Algebra 2 and Precalculus as one course due to overlap in content)
- What is complex instruction? An instructional approach to mitigate status and power issues that get in the way of student learning in heterogeneous classrooms as they engage in tasks that demand conceptual understanding
- Complex Instruction - raising achievement through group worthy tasks | NRICH

What are all the ways I'm smart at math?

Sharing My Thinking

- Explaining what is confusing
- Explaining my thinking on paper
- Explaining my thinking out loud
- Justifying my ideas using mathematical arguments
- Putting ideas out for the group to work on

Working Collaboratively with a Group

- Checking others' work
- Listening to other people's ideas and explaining them to others
- Understanding others' ideas
- Using other people's examples to help me learn
- Asking questions

Making sure my process and answer makes sense

- Estimating
- Following a step-by-step process
- Making educated guesses
- Generalizing
- Making predictions
- Finding my mistakes

Using Math Practices

- Using math vocabulary
- Understanding common errors
- Building models
- Visualizing
- Measuring and labeling units correctly
- Solving problems in more than one way
- Finding patterns
- Finding similarities and differences between things
- Making connections between different representations

Using Student Practices

- Drawing diagrams to represent my thinking
- Organizing information
- Organizing my work
- Creating examples

CPS Math students will be able to....

- find joy in the process of problem solving
- feel like successful and confident learners

CPS Students, Thinking in terms of middle school math, should (I hope) feel comfortable participating in math class, speaking up, taking chances on being wrong, and feeling engaged & challenged, but not overwhelmed.

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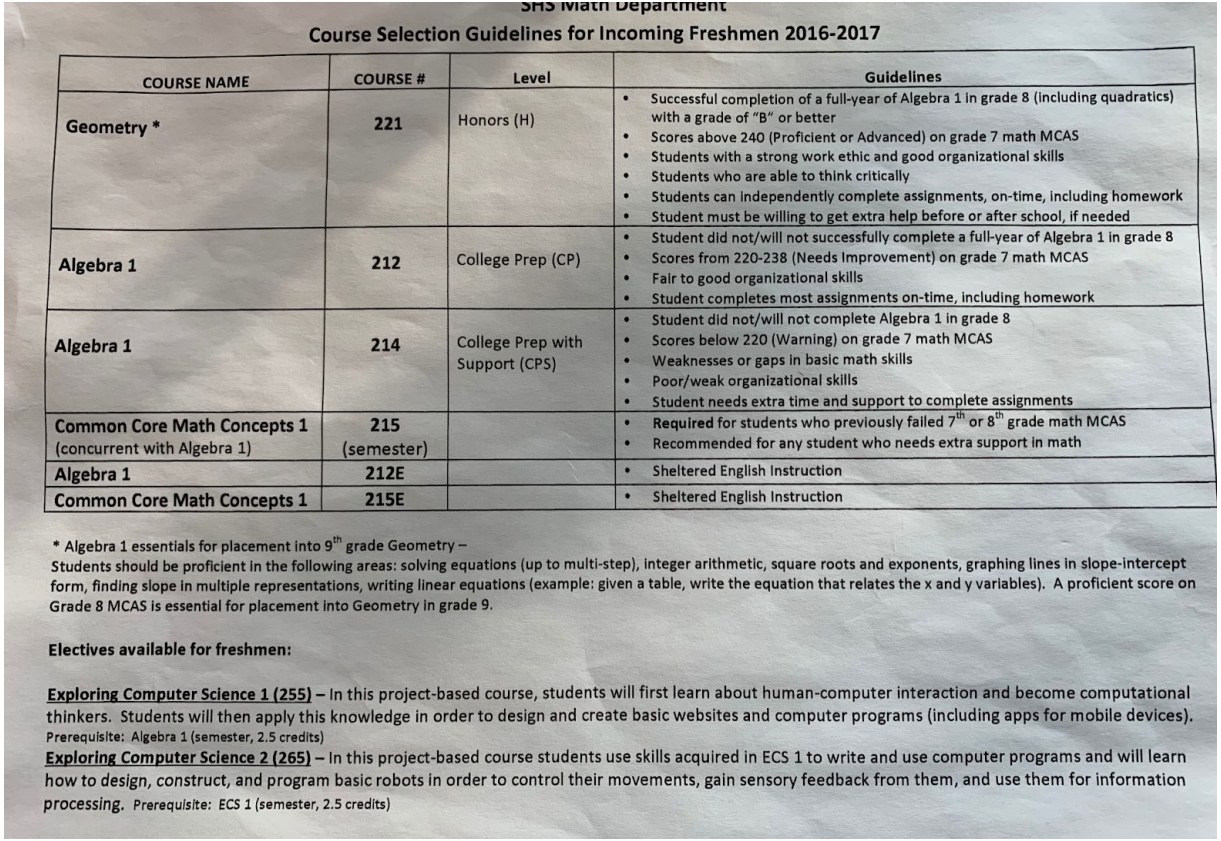
Different Factors Schools Use to Determine Tracking

A district's placement guidelines from 2016-17 still used in 2020-21



SHS Math Department

Course Selection Guidelines for Incoming Freshmen 2016-2017

COURSE NAME	COURSE #	Level	Guidelines
Geometry *	**221**	Honors (H)	• Successful completion of a full-year of Algebra 1 in grade 8 (including quadratics) with a grade of "B" or better • Scores above 240 (Proficient or Advanced) on grade 7 math MCAS • Students with a strong work ethic and good organizational skills • Students who are able to think critically • Students can independently complete assignments, on-time, including homework • Student must be willing to get extra help before or after school, if needed
Algebra 1	**212**	College Prep (CP)	• Student did not/will not successfully complete a full-year of Algebra 1 in grade 8 • Scores from 220-238 (Needs Improvement) on grade 7 math MCAS • Fair to good organizational skills • Student completes most assignments on-time, including homework
Algebra 1	**214**	College Prep with Support (CPS)	• Student did not/will not complete Algebra 1 in grade 8 • Scores below 220 (Warning) on grade 7 math MCAS • Weaknesses or gaps in basic math skills • Poor/weak organizational skills • Student needs extra time and support to complete assignments
Common Core Math Concepts 1 (concurrent with Algebra 1)	**215** (semester)		• **Required** for students who previously failed 7th or 8th grade math MCAS • Recommended for any student who needs extra support in math
Algebra 1	**212E**		• Sheltered English Instruction
Common Core Math Concepts 1	**215E**		• Sheltered English Instruction

* Algebra 1 essentials for placement into 9th grade Geometry –
Students should be proficient in the following areas: solving equations (up to multi-step), integer arithmetic, square roots and exponents, graphing lines in slope-intercept form, finding slope in multiple representations, writing linear equations (example: given a table, write the equation that relates the x and y variables). A proficient score on Grade 8 MCAS is essential for placement into Geometry in grade 9.

Electives available for freshmen:

Exploring Computer Science 1 (255) – In this project-based course, students will first learn about human-computer interaction and become computational thinkers. Students will then apply this knowledge in order to design and create basic websites and computer programs (including apps for mobile devices). Prerequisite: Algebra 1 (semester, 2.5 credits)

Exploring Computer Science 2 (265) – In this project-based course students use skills acquired in ECS 1 to write and use computer programs and will learn how to design, construct, and program basic robots in order to control their movements, gain sensory feedback from them, and use them for information processing. Prerequisite: ECS 1 (semester, 2.5 credits)

Criteria for Placement in 9th grade Geometry (Higher Track)

- A strong work ethic
- Good organizational skills
- Able to think critically
- Must be willing to get extra help before or after school

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One district's data in 2021

	Current 8th Grade Algebra Students with A's or B's Recommended for Geometry or Higher
Asian	71%
White	60%
Latinx	53%
Black	18%

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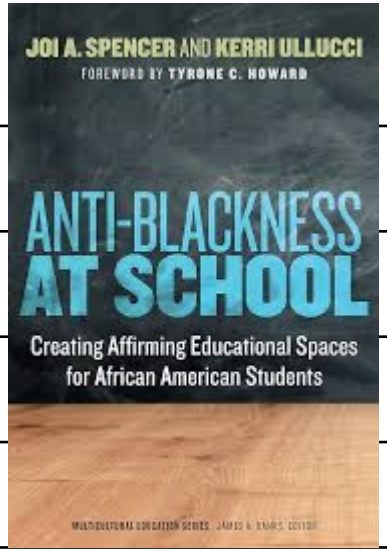


9th Grade Math Placement

Student Demographic	% in Geometry in 9th Grade
Asian	71
White	43
Latinx	26
Black	15

Convened a Math ***Student*** Leadership Team that facilitated discussions with school leaders and teachers around math (in partnership with the Young People's Project)

9th Grade Math Placement into Geometry (Higher Tracked Math Class)

Student Group	Taking Geometry in Ninth Grade
Asian	71%
White	43%
Latinx	26%
Black	15%

6th Grader Asks Math Teacher Working Group:

"Why are Black people less likely to take Geometry?"

CONCENTRIC MATH

Tracking that Disadvantages Students

A district between 2014-2021

1266 students in *lower* track 9th grade math who then comprise

- 11.5% of students taking Precalculus
- 6.1% taking AP Math
- 3.5% taking Calculus
- 591 Black students in lower track which is 46.6% of lower track students while Black students are 25% of students

vs

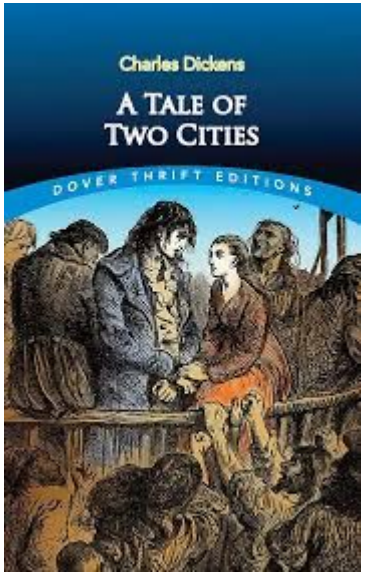
2361 students in *higher* track 9th grade math who then comprise

- 88.5% of students taking Precalculus
- 93.9% taking AP Math
- 96.5% taking Calculus
- 418 Black students in higher track which is 17.7% of higher track students while Black students are 25% of students

Two Geometry math classes, one Honors and one College Prep (“Regular”), occurring during the same period down the hall from each other.

Look in the window and you can see the difference in student demographics.

Go inside and experience the difference in pedagogy, math task given, structures in the class, amount of collaboration or collaboration opportunity, amount of direct instruction from the teacher, etc.



How and Why Tracking Causes Segregation Schools

Due to the nature of how school scheduling works (called master schedule), once a school has tracks, the whole school gets tracked in general.

The cohort of students of one track generally move together in all or most of their classes.

This is part of the segregation within schools that happens as a result of tracking.

What I've heard from students in math classrooms that are tracked or in classrooms that employ ability-grouping

"I'm in the dumb class…"

"I'm with the dumb group…"

What does this do to students and their sense of self, their relationship to math, and their identity as a learner (and what does this do to the other students in a class who hear this?)?

The question is frequently what are “honors” students missing out in detracking?

What are honors students missing out when they are tracked?

- Collaboration and working across lines of difference
- Communication
- Fortune 500 skills and competencies like ability to work in a cross-cultural context

…**students of color, recent immigrants, and those from low-income families have often been "tracked down"** into less challenging, rote-oriented coursework. Such coursework is also generally less well-taught, in large part because these classes are often **assigned to the least experienced and least expert teachers**, which further restricts later opportunities (Bacher-Hicks and Avery, 2018; Reardon, 2019; Oakes, 2005).

Tracking of this sort has been frequently critiqued not only because it **depresses the achievement of students in the lower track. It also often rations access to higher tracks for a set number of students on the basis of criteria that do not predict success in the more ambitious curriculum** (e.g., Callahan, Humphries, and Buontempo, 2020; Grissom and Redding, 2016); Guyon, Maurin, and McNally, 2011; Kalogrides and Loeb, 2013; Oakes, 2005).

Mathematics Framework

Conversations for reporters

- Conversations with Black and Brown community members in the detracking conversation
- District Math Leaders' views on why they are detracking
- Why A Focal Student Strategy - Reagan Riddle
- Targeted Universalism | Othering & Belonging Institute
- The UDL Guidelines

Why just Math?

Math (and possibly World Languages) is the only content area that allows acceleration.

If a 9th grade student told their English teacher that she had already read the novels on a the 9th grade English syllabus, she would still need to take 9th grade English. The English teacher would likely argue that this student will get something else from being in the class–that she will develop a deeper understanding, etc.

Detracking is complex

Our de facto structure in schools is one of tracking

To change and disrupt tracking requires concerted effort that goes against the existing pervasive structures in our schools, districts, and communities/society

Many conditions need to be attended to:

- Instructional shifts
- Bias
- Stereotype threat in students
- Classroom and school culture
- Students, teachers, and leaders trained to work across lines of difference

A Pathway to Calculus

High schools should provide a pathway to AP Calculus and every district I work with offers a pathway to AP Calculus

At times, arguments are made that tracking is necessary to provide opportunities for acceleration beyond AP Calculus

Yet–Why?

In one academic year at university (sometimes three semesters), a student can complete Multivariable Calculus, Differential Equations, and Linear Algebra (needed for engineering degrees) after having taken AP Calculus in high school. What's the rush in high school?

Raising Teacher Expectations and Practice By Telling Them They are Teaching “Honors”

Studies in which teachers are told they are teaching honors students when they are teaching a “regular” class of students in which teachers then raises their expectations for their “regular” students, provide them with more rigorous tasks and have student achievement rise which has been called the “Pygmalion Effect”

Attending to Teachers’ Beliefs and Practices Based in Student Assets

Students' Experiences of Ability Grouping—disaffection, polarisation and the construction of failure

JO BOALER, Stanford University, California DYLAN WILIAM & MARGARET BROWN, King's College London

…when students were taught in mixed-ability groups, their mathematics teachers gave them work that was at an appropriate level and pace. When the students were divided into ability groups, students in high sets (tracks) came to be regarded as 'mini-mathematicians' who could work through high-level work at a sustained fast pace, whereas students in low sets came to be regarded as failures who could cope only with low-level work—or worse—copying off the board. This suggests that **students are constructed as successes or failures by the set (track) in which they are placed as well as the extent to which they conform to the expectations the teachers have of their set.** In particular, within top sets, students are constructed as successes and failures according to the extent to which they can cope with the highly procedural approaches adopted by teachers of those sets.

San Francisco Unified School District Update

Ahead of the Game? Course-Taking Patterns under a Math Pathways Reform

Additional Information on SFUSD Mathematics Efforts

The data trend of Math Course-Taking Patterns of SFUSD shows that for advanced math courses (courses beyond Algebra 2), almost all cohorts increased their percentages of students enrolled in these courses from 2018 to 2021 (Stanford study, Table A2, 2023):

- Precalculus (including the SFUSD Algebra 2 + Precalculus compression course) from 53.21% to 54.31%,
- Probability and Statistics from 12.10% to 16.76%
- AP Statistics from 14.43% to 18.86%
- AP Calculus from 27.90% to 26.09%.
- AP Math courses from 37.41% to 37.34%.

The following slides contain some of the research and references on the foundations of tracking and detracking in math

Understanding Racial/Ethnic Gaps in AP® Exam Performance

The results clearly demonstrate that the initial raw gaps in AP Exam scores… become non-existent or are greatly diminished once prior academic achievement is considered

[Dallas ISD's Opt-Out Policy Dramatically Boosts Diversity in Its Honors Classes – The 74]

It places **far more students on track to take eighth-grade algebra**, a prerequisite for more advanced coursework in high school. Prior to the shift, only **20%** of Dallas ISD 8th graders were enrolled in Algebra I compared **to 60% today**.

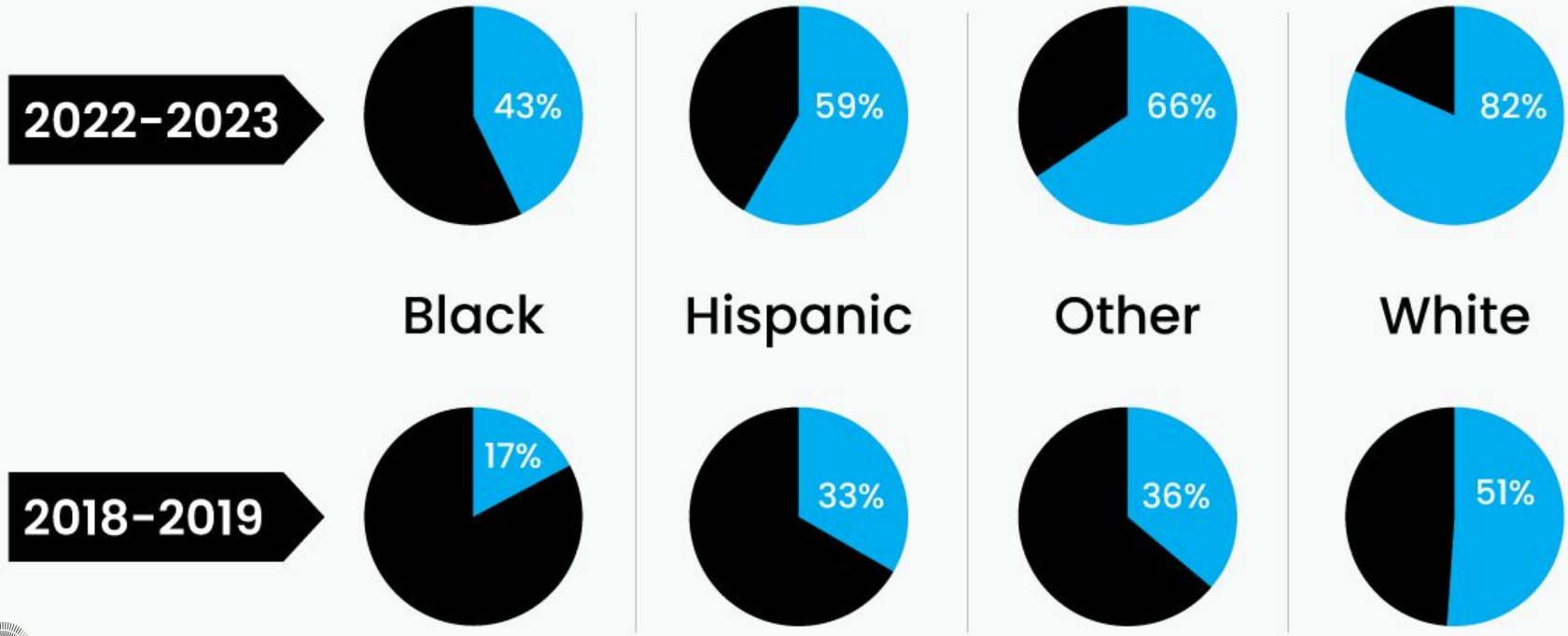
And the policy **has not led to a decrease in student scores** as some speculated: Last year's 8th-grade Algebra I students had similar pass rates as those in years prior, the district said, with 95% of Hispanic students passing the test and 76% meeting grade-level proficiency; 91% of Black students passing and 65% meeting grade level and 95% of English learner students passing the state exam and 74% meeting grade level.

Students of color had been dramatically underrepresented in the district's advanced programming. Just 33% of Hispanic sixth graders, 17% of Black sixth graders and 31% of English learners in that grade were enrolled in 6th-grade honors math classes in the 2018-19 school year. Conversely, 51% of white sixth graders took advanced math that year.

By the 2022-23 school year, 59% of Hispanic sixth graders, 43% of Black sixth graders and 59% of that grade's English learners were enrolled in 6th-grade honors math classes. The percentage of white sixth graders in advanced math also grew substantially, to 82%.

Dallas Independent School District

6th Grade Honors Math Enrollment



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source: Dallas Independent School District

When mathematics is organized differently and pathways are opened to all students, mathematics plays an important role in students' lives, propelling them to quantitative futures and rewarding careers (Burdman et al., 2018; Guha et al., 2018; Getz et al., 2016; Daro and Asturias, 2019).

Mathematics Framework

A meta-analysis of 15 studies on tracking, conducted in and outside the US, found that classes that offer a more ambitious curriculum to all students have tended to support improved outcomes for initially lower-achieving students, without negative effects for higher-achieving students (Rui, 2009). Another review of international evidence about tracking found that, while most Organisation for Economic Co-operation and Development (OECD) countries do not differentiate curriculum options for students in the early grades, those that track students into different schools or curriculum pathways in elementary school increase inequality in learning significantly (Hanushek and Woessmann, 2006; Woessmann, 2009). Woessmann (2009) concludes that “Early tracking leads to a systematic increase in inequality of student performance between the end of the primary and the end of lower-secondary school;” furthermore, while “later school tracking increases equality of opportunity, [it] is not associated with a lower performance level.”

Mathematics Framework

Many students blossom when they are offered higher level content, and they frequently choose to step up to challenges, especially when they have the support they need to succeed. Studies verify that such “tracking up” into more challenging classes can have benefits for students, and those benefits are particularly strong for students of color (see, for example, Card and Giuliano, 2016, who also found that high-achieving students of color are typically overlooked for these opportunities).

Mathematics Framework

At the higher education level, there are longstanding gaps among student groups in STEM enrollment and completion. While the number of female, Latino, and African American students enrolled in STEM fields in California's public higher education system has grown over the past decade, a 2019 report found that "both nationally and in California, female and underrepresented minority (URM) students are underrepresented in STEM overall and are highly underrepresented in particular STEM fields, including engineering and computer science" (California Education Learning Lab, 2019, 2). The report found that in the UC system in 2016-17, African American students and Latino students accounted for only 1.3 percent and 15 percent, respectively, of bachelor's degrees in STEM fields. In the CSU system, African Americans students accounted for only 2 percent and Latino students accounted for only 27 percent of bachelor's degrees in STEM fields. (California Education Learning Lab, 2019).

This evidence makes clear that, on average across the state, the opportunities being provided and the approaches being employed in TK–12 classrooms, schools, and districts are not resulting in equitable student mathematics success. Across their TK–12 years, students in California and across the country experience differences in opportunities to learn associated with the quality of curriculum and teaching they encounter. These differences begin early and are too often related to racial and economic inequalities in school resources (Carpenter et al., 2014; Clements and Sarama, 2014; Turner and Celedón-Pattichis, 2011). These opportunity gaps impact student outcomes differentially (Carter and Welner, 2013; Conger et al., 2009; OECD, 2014; Goodman, 2019; Hanushek et al., 2019; Long et al., 2012; Reardon et al., 2018).

Mathematics Framework

Uri Treisman, UC Berkeley Calculus

https://files.eric.ed.gov/fulltext/ED562582.pdf
https://merit.illinois.edu/for-educators/the-treismans-model/

- In the decade leading up to the study, more than **60 percent of the minority students** who had enrolled in freshman **calculus had failed**. And there was **not a single semester in which more than one African American or Latino student received a B or better in freshman calculus.**
- **Examined study habits** of Chinese American students (high passing rates) and African American students
  - Both groups **studied individually the same amount**
  - Chinese American students **studied together** and African American students **studied alone**
  - Chinese American students **share knowledge, check understanding** of what was required of them, ask each other **questions, critique each other's work**, assist with homework problems
- Developed **Emerging Scholars Program** (at many universities)
  - Collaboration around **academics: articulate own math ideas** and listen to math ideas of others
  - **Make their math work public** in workshop-style discussion sections focused on non-routine problems (non-remedial)
  - **"Someone knows who I am" "They know me by name" "Someone listens to me"**
- The results of the pilot, which were replicated in subsequent workshops, were dramatic: **two-thirds of the students who participated in the Mathematics Workshop at UC Berkeley earned grades of A or B.** And **virtually no Workshop students failed** (Fullilove and Treisman, 1990). Treisman recalls that "It was exhilarating!" Eliminating failure was a by-product of the focus on excellence, and it became a watchword of the Mathematics Workshop that it was **"easier to help a student get an A than a C."**

Alfie Kohn “Only For My Kid”

Kentaro Iwasaki's work with detracking in school districts–Harvard podcast

Math, the Great (Potential) Equalizer | Harvard Graduate School of Education