

Inequitable Opportunity to Learn

Access to Advanced Mathematics and Science Courses

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and Linda Darling-Hammond

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Acknowledgments

The authors thank Dion Burns, Ayana Campoli, Patrick Shields, and Man Yang for their contributions to the data analysis in this report. The authors also thank Erin Chase, Aaron Reeves, and Westchester Publishing Services for their editing and design contributions to this project and the entire Learning Policy Institute communications team for its invaluable support in developing and disseminating this report.

Core operating support for the Learning Policy Institute is provided by the S. D. Bechtel, Jr. Foundation, Heising-Simons Foundation, William and Flora Hewlett Foundation, Raikes Foundation, and Sandler Foundation. We are grateful for their generous support. The ideas voiced here are those of the authors and not those of our funders.

External Reviewers

This report benefited from the insights and expertise of two external reviewers: Amanda Lowe, Public Policy Analyst, National Disability Rights Network; and Scott Sargrad, Vice President, K–12 Education Policy, Center for American Progress. We thank them for the care, attention, and insightful feedback they provided to the report.

The appropriate citation for this report is: Leung, M., Cardichon, J., Scott, C., & Darling-Hammond, L. (2020). *Inequitable opportunity to learn: Access to advanced mathematics and science courses*. Learning Policy Institute.

This report can be found online at <https://learningpolicyinstitute.org/product/crdc-course-access>.

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Document last revised May 17, 2021

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Executive Summary

Research consistently demonstrates the benefits of student access to advanced curricular opportunities. College enrollment, retention, and degree completion rates are higher for students who have taken larger numbers of advanced high school mathematics and science courses, compared to students who have taken fewer, or less rigorous, courses. Students who have been exposed to rigorous college preparatory courses also receive higher earnings once they enter the labor market, regardless of their race. Evidence further suggests that a quality curriculum is a driver of student achievement. The need for high-level mathematics and science courses will likely only continue to increase because technological knowledge has become a key driver of employment and the economy. Its uses may expand further as the world continues to face threats—from health crises like pandemics to natural disasters like wildfires and hurricanes—that require specialized knowledge.

Yet equitable access to advanced courses remains out of reach for many students, particularly students of color and students from low-income families. These inequities in student access are especially concerning since this variation in course access helps to explain the disparity between the achievement of historically underserved students, such as students of color and students from low-income families, and their peers. Numerous studies reveal that students assigned to lower-level courses show reduced achievement outcomes and increased achievement gaps over time when compared with peers with similar initial achievement levels who are assigned to higher-level courses. Schools serving less advantaged students often offer fewer such courses, thus creating inequitable opportunities to learn challenging content. Understanding the extent of the inequities in student access to advanced courses and targeting resources to address those inequities are critical to closing achievement gaps.

Inequitable Opportunity to Learn: Access to Advanced Mathematics and Science Courses is the second in a series of Learning Policy Institute reports analyzing data primarily from the U.S. Department of Education’s Civil Rights Data Collection (CRDC). This report uses the most recent CRDC data from 2017–18. The CRDC includes data on a variety of information sources pertaining to school resources and student experiences, including student access to advanced courses in mathematics and science. These data are reported overall and disaggregated, including by race/ethnicity. They shed light on the extent to which inequities in opportunities to learn exist at the school level—and how these differentials produce disparities at the state and national levels.

To examine historically underserved students’ access to advanced courses, this report documents the extent to which high schools serving large percentages of students of color and students from low-income families offer Algebra II, Advanced Math, Calculus, Chemistry, and Physics courses. The report also compares these course offerings to those at schools with lower percentages of these students. This analysis, which includes national and state information, demonstrates that schools with high proportions of students of color and students from low-income families are less likely to offer the advanced mathematics and science courses needed to prepare for a college and career path.

Specifically, this report finds:

- High schools with a high proportion of students of color are less likely to offer advanced mathematics and science courses than schools with a low proportion of students of color. For example, only 52% of schools with high student of color enrollment offer Calculus, compared to 76% of schools with low student of color enrollment, and only 67% of schools with high student of color enrollment offer Physics, compared to 84% of schools with low student of color enrollment.
- High schools with a high proportion of students from low-income families are less likely to offer advanced mathematics and science courses than schools with a low proportion of students from low-income families. For example, only 45% of high schools enrolling a high proportion of students from low-income families offer Calculus, compared to 87% of high schools enrolling a low proportion of students from low-income families. Only 61% of high schools enrolling a high proportion of students from low-income families offer Physics, compared to 92% of high schools enrolling a low proportion of students from low-income families.

State-level data show large differences across states in access to advanced coursework. For example, in 18 states the disparity in access to Calculus is 20 percentage points or more for schools with low student of color enrollment, compared to those with high student of color enrollment. In New York, the difference is 54 percentage points: 81% of schools with low student of color enrollment offer Calculus, compared to only 27% of schools with high student of color enrollment. In New Jersey, the difference is 50 percentage points, and in Maryland, Ohio, and Pennsylvania, the disparity is 49 percentage points.

However, a policy established in Washington State appears to have dramatically reduced this gap. There, 59% of schools serving larger percentages of students of color offer Calculus, compared to 49% of schools serving smaller percentages of these students. This follows a state policy change through HB 1599 that emulates the Federal Way school district, which adopted an academic acceleration policy in which students meeting set academic standards are automatically enrolled in advanced courses, rather than requiring teachers, students, or parents to “opt in” these courses.

Similar trends are seen in science. For example, in 15 states, the difference in the percentage of schools with low student of color enrollment, compared to high student of color enrollment that offer Physics is 20 points or more. The difference is largest in New York State, at 57 percentage points, with 96% of schools with low student of color enrollment offering Physics, compared to only 39% of schools with high student of color enrollment. Once again, equity is greater in Washington State, where 66% of schools with high student of color enrollment offer Physics—a proportion exceeding that in schools with low student of color enrollment.

With respect to high- and low-poverty schools, Kentucky, Minnesota, and New York have the largest differentials: 66 percentage points. In Kentucky, 93% of low-poverty schools offer Calculus, compared to only 27% of high-poverty schools.

New York also has large differentials between low- and high-poverty schools when it comes to science. For example, 99% of low-poverty schools offer Physics, compared to only 39% of high-poverty schools. In Arizona, the disparity is only slightly less, with 92% of low-poverty schools offering Physics, compared to only 36% of high-poverty schools.

By contrast, in Florida 80% of schools serving large proportions of students from low-income families offer Calculus, as do 71% of schools serving small proportions of students from low-income families. Florida also provides more equitable access to advanced science classes: For example, among schools serving the largest and smallest proportions of students from low-income families, similar percentages offer Physics: 61% and 62%, respectively. Furthermore, 88% of schools serving the most students from low-income families offer Chemistry, as do 84% of schools with few students from low-income families. Florida's equity in course offerings is a result of past state efforts to offer more opportunity to students from low-income families.

Inequitable access to a quality curriculum can be a function of a lack of resources; an inadequate supply of sufficiently prepared teachers, which is particularly common in shortage fields in high-need districts; and biased assumptions about what curriculum would benefit different groups of students. Key policy strategies for increasing student access to advanced courses include:

1. At the state and local levels, annually review the extent to which a rigorous and engaging curriculum is provided across k–12 and to what degree all students have access to this kind of curriculum, including advanced mathematics and science courses.
2. Establish adequate and stable state and federal funding streams to support high schools' efforts to increase student access to advanced courses.
3. Support service scholarships, loan forgiveness programs, and teacher residency programs that cover the cost of tuition and living expenses for teacher candidates who prepare and commit to serving in high-need schools in high-need fields, such as advanced mathematics and science, and who gain full licensure in their assigned teaching area that permits the teaching of advanced courses.
4. Provide more competitive compensation to recruit teachers into high-need schools in high-need fields, such as advanced mathematics and science.

Introduction

To prepare for life after high school, students need access to challenging, relevant academic courses. Multiple studies show that college enrollment, retention, and degree completion rates are higher for students who have taken larger numbers of advanced high school mathematics and science courses, compared to students who have taken fewer, or less rigorous, courses.¹ The research literature also suggests that a quality curriculum is a driver of student achievement.²

For example, while achievement gaps in mathematics typically widen during high school for high-performing African American and Latino/a students, compared to their high-performing white peers, research shows that factors including advanced course placement can eliminate the gap for high-achieving Latino/a 11th-graders and some of the gap for high-achieving African American 11th-graders.³ This extends the findings of earlier studies demonstrating that students placed in lower tracks are often exposed to a limited, rote-oriented curriculum and ultimately achieve less than students of similar aptitude placed in academic programs or untracked classes.⁴ Additional studies show that after high school, students' participation in a rigorous college preparatory track is associated with higher earnings, regardless of race.⁵

Unfortunately, evidence continues to indicate that not all students have equitable access to the college preparatory curricula that can lead to skilled employment in the modern economy—schools predominantly serving students of color and students from low-income families offer fewer advanced courses and more remedial courses in academic subjects, compared to schools predominantly serving their white and wealthier peers.⁶ These schools also often experience shortages of highly qualified and experienced teachers.⁷ Evidence regarding limited course offerings in schools with fewer resources suggests that students of color and students from low-income families are often unnecessarily excluded from advanced courses.⁸

Our educational system's ability to offer high-level mathematics and science courses in all schools is especially important because technological knowledge has become a critical driver of employment and the economy. The importance of this expertise may expand in the future as communities across the country confront challenges—from health crises like pandemics to natural disasters like wildfires and hurricanes—that require specialized knowledge.

To shed light on the extent to which inequities in learning opportunities exist at the state and local levels and to inform the appropriate remedies, the Civil Rights Data Collection (CRDC) from the U.S. Department of Education's Office for Civil Rights measures a wide range of opportunities to learn, relative to educational equity, for students across schools. These measures include access to a variety of advanced mathematics and science courses. This data set has been collected every 2 years from all public schools and school districts in the United States since 1968. These data are reported at the overall school level, along with school-level demographic information.

This report examines the 2017–18 CRDC, the most recent data collected, supplemented by data from the 2017–18 National Center for Education Statistics' Common Core of Data. The analyses assess the degree to which students of color (including African American, Asian, Latino/a, Native American, Pacific Islander, and students of two or more races) and students from low-income families, compared to their white and wealthier peers, have access to advanced mathematics and science courses—elements of a curriculum that prepares students for a college and career path.

Because CRDC data are collected at the school level, they can illuminate important disparities across schools. These data cannot, however, identify disparities at the student level within each school. More information about methodology is included in Appendix A. The report addresses the following questions:

- Do high schools enrolling a high proportion of students of color offer the same access to advanced mathematics and science courses as schools with a low proportion of students of color?
- Do high schools enrolling a high proportion of students from low-income families offer the same access to advanced mathematics and science courses as schools with a low proportion of students from low-income families?

The report concludes with policy recommendations for closing achievement gaps in advanced mathematics and science course offerings. This report is the second in a series of reports that have used CRDC data to understand the extent to which historically underserved students experience inequities in their opportunities to learn—from who teaches them, to what they are taught, to how they are treated. The first report examined CRDC data on teacher qualifications and found that students in schools with a high enrollment of students of color have less access to certified and experienced teachers than students in schools with low student of color enrollment.⁹

Definitions for This Report

High school—Schools with all four grade levels from 9 through 12 are considered high schools for the purposes of this study. The study excludes schools that also offer lower grades—for example, k–12 schools.¹⁰

Students of color—For this analysis we define students of color as those who are African American, Asian, Latino/a, Native American, Pacific Islander, or of two or more races. These students are referred to as students of color in the analysis.¹¹

High or low enrollment of students of color—This classification is based on the percentage of students of color enrolled for each school. This percentage is then used to divide schools into quintiles. Schools in the top quintile are classified as having high enrollment of students of color, and schools in the bottom quintile are classified as having low enrollment of students of color.¹²

High or low enrollment of students from low-income families—This classification is based on the percentage of students receiving free or reduced-price lunch in each school.¹³ This percentage is then used to divide schools into quintiles. Schools in the top quintile are classified as having high enrollment of students from low-income families, and schools in the bottom quintile are classified as having low enrollment of students from low-income families.¹⁴ This paper also uses the terms low-poverty school and high-poverty school to refer to schools with low and high enrollment of students from low-income families.

Advanced mathematics courses—For the purposes of this analysis, we examined Algebra II, Advanced Math, and Calculus.

Advanced science courses—For the purposes of this analysis, we examined Chemistry and Physics.

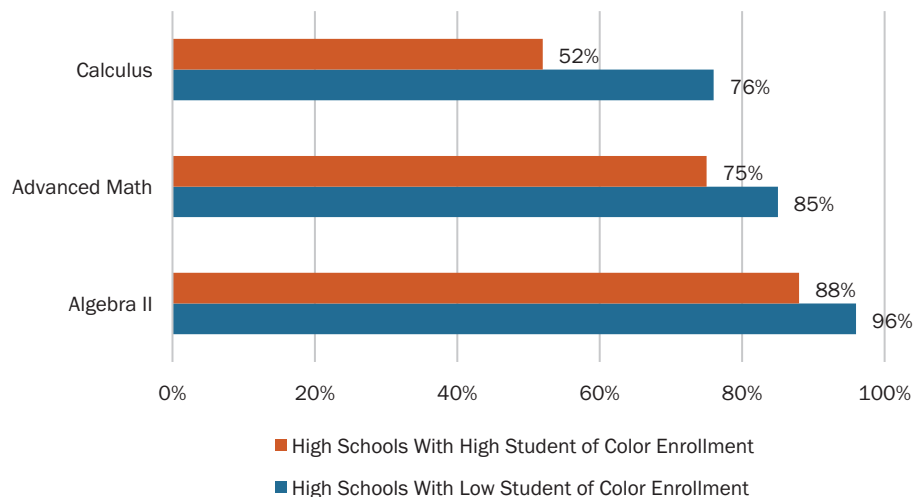
Which Schools Offer Advanced Mathematics and Science Courses?

Despite the critical importance of student access to advanced academic courses, our analysis of the 2017–18 CRDC data finds that schools with high student of color enrollment are less likely to offer advanced mathematics and science courses than schools with low student of color enrollment. Similarly, we find that schools with larger percentages of students from low-income families are less likely to offer advanced mathematics and science courses than schools serving larger percentages of students from high-income families. State-level data are provided in Appendix B.

Access to Advanced Mathematics Courses for Students of Color

Our analysis of the CRDC data shows that, nationwide, schools with high student of color enrollment are less likely to offer advanced mathematics courses than schools with low student of color enrollment (Figure 1). For example, only 52% of schools with high student of color enrollment offer Calculus, compared to 76% of schools with low student of color enrollment.

Figure 1
Percentage of High Schools Offering Advanced Mathematics Courses by Student of Color Enrollment, 2018



Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between data reported for the CRDC and data from other sources.

Data source: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>.

The extent to which schools with high student of color enrollment offer advanced mathematics courses, compared to schools with low student of color enrollment varies by state (Appendix B, Table B1). In 12 states, the disparity in access to Advanced Math is 20 percentage points or more for schools with low student of color enrollment, compared to those with high student of color enrollment.¹⁵ Mississippi and New York have some of the most substantial differences (38 percentage points in Mississippi and 34 percentage points in New York) between schools with low student of color enrollment and schools with high student of color enrollment.

In 18 states, the disparity in access to Calculus is 20 percentage points or more for schools with low student of color enrollment, compared to high student of color enrollment.¹⁶ In New York, the difference is 54 percentage points, with 81% of schools with low student of color enrollment offering Calculus, compared to only 27% of schools with high student of color enrollment. In New Jersey the difference is 50 percentage points, and in Maryland, Ohio, and Pennsylvania, the disparity in access to Calculus is 49 percentage points.

In at least one state, however, policy changes appear to have increased equity in course offerings. In Washington State, we found that, across all advanced mathematics courses, somewhat larger percentages of schools serving high proportions of students of color offered these advanced courses. For example, we found that 59% of schools serving larger percentages of students of color offered Calculus, compared to only 49% of schools serving smaller percentages

In Washington State, we found that, across all advanced mathematics courses, somewhat larger percentages of schools serving high proportions of students of color offered these advanced courses.

of these students. This state policy change began as the result of a single district's efforts: Beginning in 2010, the Federal Way school district adopted an "academic acceleration policy" in which students meeting set academic standards are automatically enrolled in advanced courses. Previously, teachers, students, or parents were required to "opt in" to these courses voluntarily by actively registering students.¹⁷ The policy saw success, was championed by the nonprofit Stand for Children Washington, and in 2019 became law as part of HB 1599.¹⁸ While the percentages of schools offering courses could still be increased, the pattern of course offerings illustrates states' efforts to ensure greater equity.

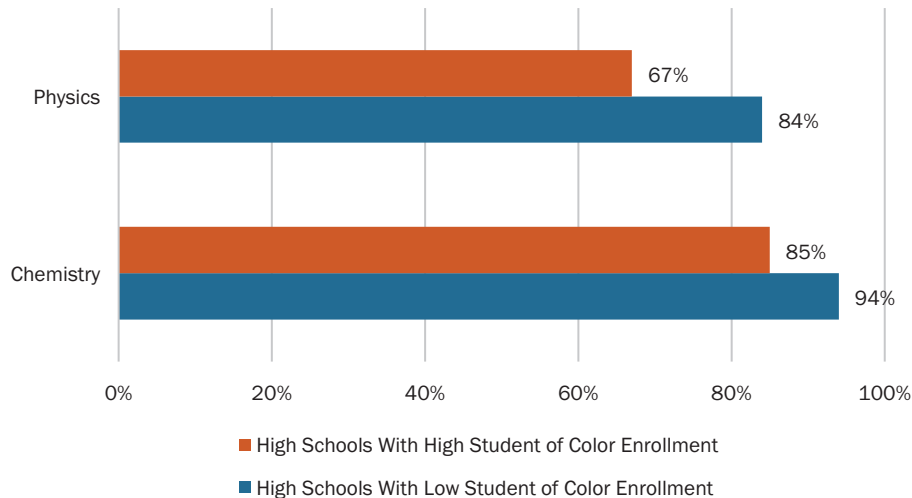
Access to Advanced Science Courses for Students of Color

The patterns of course offerings in mathematics are present in science as well. Schools with high student of color enrollment are less likely to offer advanced science courses, compared to schools with low student of color enrollment (Figure 2).

Schools with large numbers of students of color provide less access to advanced science courses. For example, 67% of schools with high student of color enrollment offer Physics, compared to 84% of schools with low student of color enrollment.

The extent to which schools with high student of color enrollment offer advanced science courses, compared to schools with low student of color enrollment varies by state (Appendix B, Table B2).

Figure 2
Percentage of High Schools Offering Advanced Science Courses by Student of Color Enrollment, 2018



Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

Data source: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>.

In 15 states, the difference between the percentage of schools with low student of color enrollment that offer Physics, compared to schools with high student of color enrollment that offer Physics is 20 points or more.¹⁹ For example, in New York the difference is 57 percentage points, with 96% of schools with low student of color enrollment offering Physics, compared to only 39% of schools with high student of color enrollment. In Mississippi, the difference is 47 percentage points, with 85% of schools with low student of color enrollment offering Physics, compared to only 38% of schools with high student of color enrollment.

In eight states, the difference between the percentage of schools with low student of color enrollment that offer Chemistry, compared to schools with high student of color enrollment that offer Chemistry is 20 points or more.²⁰ Ohio has one of the largest differences (23 percentage points) between schools with low student of color enrollment that offer Chemistry (97%) and schools with high student of color enrollment that offer Chemistry (74%).

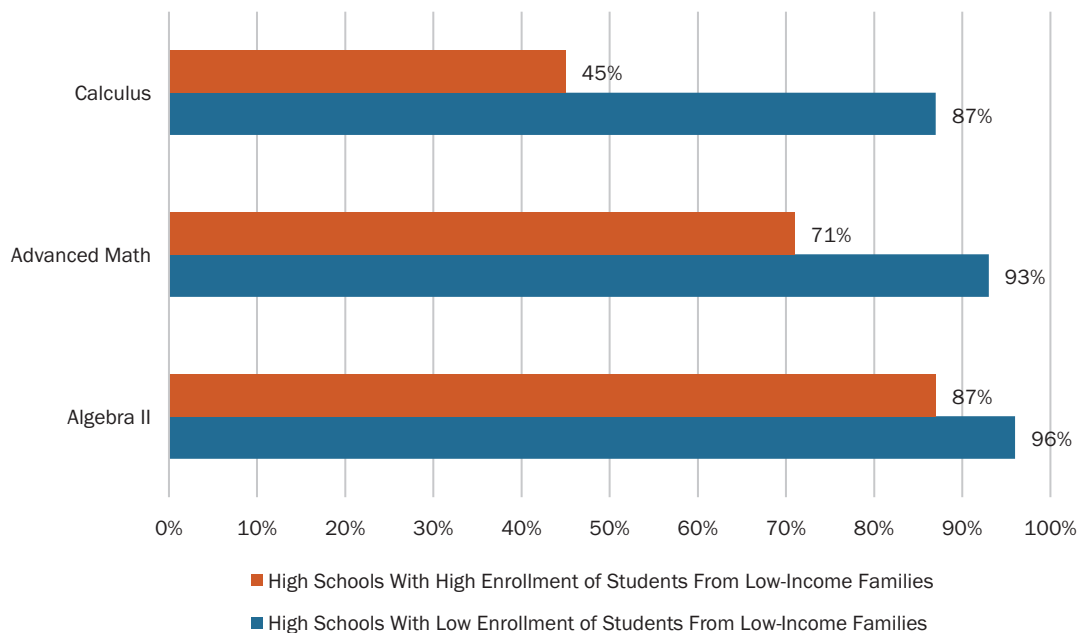
As with mathematics courses, Washington State stands out as offering more equitable access to advanced science courses. In fact, 77% of Washington schools that serve high proportions of students of color offer Chemistry, compared to 61% of schools that serve lower proportions of students of color. The same is true for Physics: 66% of schools serving high proportions of students of color offer Physics, compared to 46% of those serving low proportions of students of color.

Access to Advanced Mathematics Courses for Students From Low-Income Families

Similar to schools with high student of color enrollment, schools with high enrollment of students from low-income families are less likely to offer advanced mathematics courses, compared to schools with low enrollment of students from low-income families (Figure 3). For example, only 45% of high schools with high percentages of students from low-income families offer Calculus, compared to 87% of high schools with low percentages of students from low-income families.

The extent to which high-poverty schools offer advanced mathematics courses, compared to low-poverty schools also varies by state (Appendix B, Table B3). In 41 states, the disparity in access to Calculus is 20 percentage points or more for low-poverty schools, compared to high-poverty schools.²¹ For example, in Kentucky, Minnesota, and New York, the difference is 66 percentage points. In Kentucky, 93% of low-poverty schools offer Calculus, compared to only 27% of high-poverty schools.

Figure 3
Percentage of High Schools Offering Advanced Mathematics Courses by Enrollment of Students From Low-Income Families, 2018



Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

Data sources: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>; National Center for Education Statistics. (2018). Common Core of Data. <https://nces.ed.gov/ccd/ccddata.asp> (accessed 11/20/20).

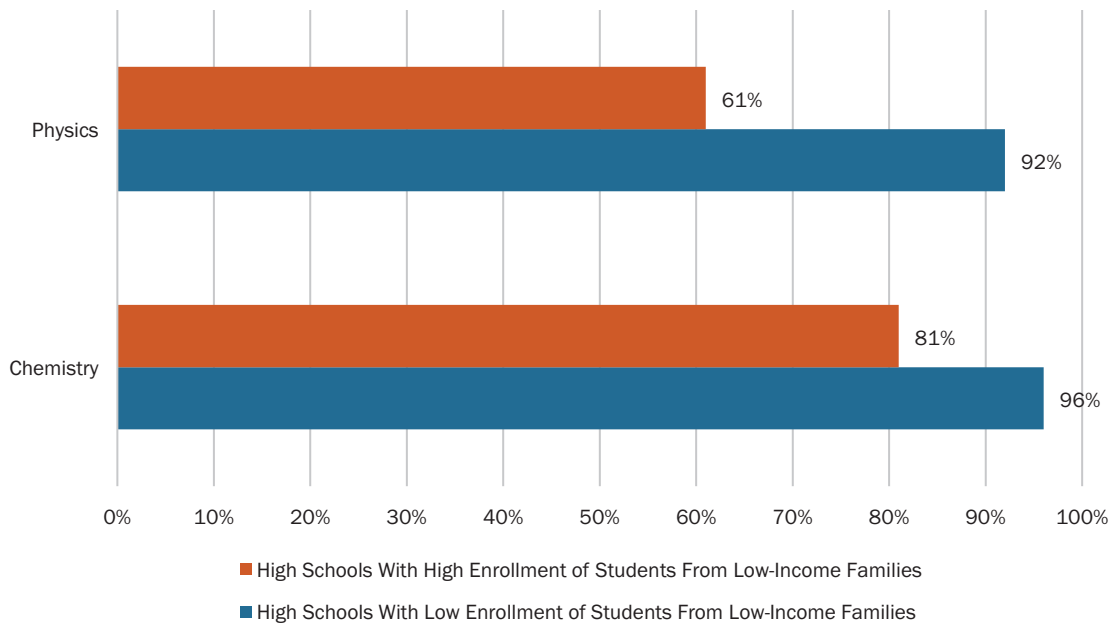
In 19 states, the disparity in access to Advanced Math is 20 percentage points or more for low-poverty schools, compared to high-poverty schools.²² Again, New York has one of the largest differences (52 percentage points) between low-poverty schools that offer Advanced Math (97%) and high-poverty schools that offer it (45%).

In a few states, the trends look different. For example, in Florida 80% of schools serving large proportions of students from low-income families offer Calculus, while 71% of schools serving small proportions of students from low-income families offer Calculus. Others examining Florida’s educational data have attributed this pattern of course offerings to the statewide efforts to increase educational opportunities that began in the early 2000s.²³

Access to Advanced Science Courses for Students From Low-Income Families

This pattern persists with the most advanced science courses as well (Figure 4). For example, only 61% of high schools enrolling high percentages of students from low-income families offer Physics, compared to 92% of high schools enrolling low percentages of students from low-income families.

Figure 4
Percentage of High Schools Offering Advanced Science Courses by Enrollment of Students From Low-Income Families, 2018

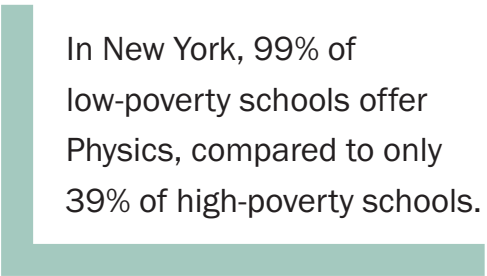


Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

Data sources: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>; National Center for Education Statistics. (2018). Common Core of Data. <https://nces.ed.gov/ccd/ccddata.asp> (accessed 11/20/20).

The extent to which schools with high enrollment of students from low-income families offer advanced science courses, compared to schools with low enrollment of students from low-income families also varies by state (Appendix B, Table B4).

In 28 states, the disparity in access to Physics is 20 percentage points or more in low-poverty schools, compared to high-poverty schools.²⁴ In New York, the difference is 60 percentage points, with 99% of low-poverty schools offering Physics, compared to only 39% of high-poverty schools. In Arizona, the disparity is 56 percentage points, with 92% of low-poverty schools offering Physics, compared to only 36% of high-poverty schools that offer it.



In New York, 99% of low-poverty schools offer Physics, compared to only 39% of high-poverty schools.

In 13 states, the disparity in access to Chemistry is 20 percentage points or more in low-poverty schools, compared to high-poverty schools.²⁵ Arizona has one of the largest differences (50 percentage points) between low-poverty schools that offer Chemistry (96%) and high-poverty schools that offer it (46%).

As with mathematics courses, a few states manage to buck the trends in science courses. Again, Florida is a leader: 88% of schools predominantly serving students from low-income families offer Chemistry, while 84% of schools with low enrollment of students from low-income families offer the course. Florida's pattern of course offerings speaks to past state efforts to offer more opportunities to students from low-income families.²⁶

Policy Implications

Analysis of the CRDC reveals inequities in student access to advanced courses in schools serving larger percentages of students of color and students from low-income families. Universal access, particularly to high-level mathematics and science courses, is essential and will only grow in importance as technological knowledge continues to drive employment and the economy. The need for mathematical and scientific knowledge may also expand as our society encounters increasingly complex threats requiring responses based on such expertise in mathematics and science—from pandemics to natural disasters. Policymakers and other education leaders should be alert to the root causes of these disparities in course offerings for students of color and students from low-income families and develop sound strategies for improving access for all students.

Inequitable access to high-quality curriculum at the school level occurs for several underlying reasons. First, it can be a function of inequitable school finance systems that determine the number, type, and qualifications of staff that districts can afford to employ. These inequities occur at both the state and local levels.²⁷ They allow some districts to offer a plethora of high-level courses, while others can offer only the basics.

In addition, it takes targeted investment of funds to recruit and retain high-quality teachers prepared to teach advanced courses.²⁸ Unfortunately, experienced and certified teachers are in short supply in mathematics and science, especially in schools serving students of color and lower-income communities.²⁹ For example, research shows that, on average, schools with high student of color enrollment had four times as many uncertified teachers as schools with low student of color enrollment in 2016.³⁰ Investments in high-quality teachers must also be paired with funding for course supplies, equipment, and technology to support effective teaching and learning.³¹ These types of resources are less likely to be available in schools serving low-income communities and communities of color.³²

And where funding is available, it may not be used to provide advanced coursework in all schools or to all students. States and districts instead may decide where to allocate resources based on an inadequate appreciation of the importance of a rigorous curriculum. Implementation of these decisions by districts and schools may also be based on biased assumptions about which students warrant, or can succeed in, different curriculum pathways.³³

Efforts to increase student access to advanced courses must be part of a comprehensive approach to address inequities in educational opportunity. The federal government, states, districts, and schools can use these CRDC data to identify which resources to target to ensure high-quality instruction and education for all students.

Key policy strategies for increasing student access to advanced courses include the following:

1. **At the state and local levels, annually review the extent to which a rigorous and engaging curriculum is provided across k–12 schools and to what degree all students have access to this kind of curriculum, including advanced mathematics and science courses.** The most recent CRDC data suggest that students of color and students from low-income families experience inequitable access to advanced mathematics and science courses, and it will be important to track such access over time. This information can reveal where gaps exist and where additional resources and supports are needed. The collection

of data on student access should evolve to capture the types and formats of courses offered, which may change in response to understanding the new knowledge and skills that may become necessary for a successful college experience and career. (For example, many high schools are now moving to offer courses in statistics and data science in lieu of Algebra II or Calculus in response to changing college and career expectations.)³⁴

2. **Establish adequate and stable state and federal funding streams to support high schools in increasing student access to advanced courses.** Analysis of CRDC data suggests that more students of color and students from low-income families could be participating in advanced mathematics and science courses. Adequate and stable state and federal funds could help ensure that students and teachers have access to high-quality materials and technology, align curricula across grade levels, and provide high-quality professional development for teachers in the efforts to support advanced courses of study. At the federal level, Title IV, Part A of the Every Student Succeeds Act (ESSA) provides funding to support state and local efforts to expand student access to advanced courses, among other things. If these funds were increased, states and localities could purposefully use them to increase access to such courses. State funding could also improve student participation in advanced courses, advanced placement courses, international baccalaureate programs, and dual credit college courses by paying for textbooks and testing fees.³⁵
3. **Support service scholarships, loan forgiveness programs, and teacher residency programs that cover the cost of tuition and living expenses to teacher candidates who prepare and commit to teach in high-need schools in high-need fields, such as advanced mathematics and science, and who gain full licensure in their assigned teaching area that permits the teaching of advanced courses.** Past research has shown that schools serving more students of color or students from low-income families have fewer certified and experienced teachers than schools serving fewer, especially in shortage fields like mathematics and science.³⁶ Service scholarships, loan forgiveness programs, and teacher residencies have proven effective at attracting teachers into high-need schools and hard-to-staff positions.³⁷ Research shows that student debt has a powerful influence on whether college students choose to pursue a career in education.³⁸ Well-designed, high-quality teacher preparation programs that offer financial aid can draw prospective teachers into the profession by lowering their debt burden, especially given teachers' modest salaries compared to other professionals—particularly in mathematics and science fields. In addition, combining solid, comprehensive preparation with a service requirement keeps candidates in teaching longer.³⁹
4. **Provide more competitive compensation to recruit teachers into high-need schools in high-need fields, such as advanced mathematics and science.** Research shows that teachers' salaries affect the supply of teachers, including the distribution of teachers across districts and the quality of people training to be teachers.⁴⁰ Competitive compensation can be a critical strategy to recruit and retain effective educators in high-need fields and schools.⁴¹ Although different approaches may be necessary depending on the particular state, regional, and district context, a variety of strategies have proven effective, including overall salary increases, stipends, and other forms of compensation targeted to teachers in high-need subjects and high-need schools. Research suggests that enhanced compensation is most effective in improving teacher retention when accompanied by investments in supportive leadership and working conditions in targeted schools.⁴²

Conclusion

Research shows that meaningful and relevant curricula alongside knowledgeable, competent, and dedicated teachers support student achievement, especially for students who are historically underserved and in need of high-quality education.⁴⁵ Despite this need, advanced mathematics and science courses are often unavailable to students of color and students from low-income families, as shown by this analysis of CRDC data. Policymakers should look to the CRDC and other data to identify where inequities exist and respond by targeting necessary resources, such as increasing the number of advanced courses and investing in teacher preparation, development, and support. Policymakers should continue to work toward ensuring that statewide accountability and improvement systems are designed to reveal gaps in access to high-quality curricula, and they should incentivize and support district and school efforts to close these gaps. Without increased support for and investment in providing all students with a relevant and challenging curriculum, gaps in student achievement may never be fully addressed.

Appendix A: Methodology

This report is based primarily on the 2017–18 Civil Rights Data Collection (CRDC). The data set includes information about 17,604 school districts, 97,632 schools, and 50.9 million students. Within the data set, 14,823 schools met our definition of a high school—that is, a school that offers all four grade levels from grade 9 through 12, does not offer grades 8 or below, has 10 or more students, and is not a juvenile justice facility. Such schools are located in 8,668 school districts and serve over 12.7 million students.

In this report, we examine students’ opportunities to learn in a number of ways. First, we compare course offerings in high schools with low and high student of color enrollment. To identify the schools for comparison, we calculated the percentage of students of color enrolled for each school and used these percentages to group schools across the nation into quintiles. In the top quintile across the nation, 87% to 100% of students enrolled are students of color, and in the bottom quintile, 0% to 12% of students enrolled are students of color (i.e., African American, Asian, Latino/a, Native American, Pacific Islander, or of two or more races). It is important to note that among students of color, Asian students tend to be overrepresented in advanced mathematics and science courses.⁴⁴ The percentage of Asian students in our overall sample was 6%; therefore, the disparity in access we report here may be slightly smaller than the disparities for African American, Latino/a, and Native American students in general. However, we decided to include Asian students in our analyses because within this group students can experience inequitable treatment in school. To calculate the percentage of schools that offer advanced courses in the top and bottom quintiles, we divided the number of schools in the quintile that offer each course by the total number of schools in that quintile.

Second, the report compares course offerings in high schools with low and high enrollments of students from low-income families. For this analysis, we combined the 2017–18 CRDC with the 2017–18 Common Core of Data (CCD) from the National Center for Education Statistics, a national database of all public elementary and secondary schools and school districts.

Combining these data sets allowed us to retrieve information on the number of students in each school receiving free or reduced-price lunch, which we used as an indicator of students’ income levels. We obtained school-level data on enrollment and the number of students receiving free and reduced-price lunch from the Elementary/Secondary Information System (ELSi) web application, using the table generator feature. Of the 14,823 high schools analyzed, 1,264 (9%) did not have a count for the number of students receiving free or reduced-price lunch. For 766 of these schools, we used the number of students identified through direct certification with a multiplier of 1.6, as suggested by the U.S. Department of Agriculture.⁴⁵ After applying the multiplier, we found that in 159 schools the number was greater than the school’s total enrollment. In these instances, we assumed that all students at the school are receiving free or reduced-price lunch.

We calculated the percentage of students from low-income families in each school by dividing the total number of students eligible for free or reduced-price lunch based on the CCD data by the total number of students in that school, also based on the CCD data. We removed 30 schools with percentages over 100%, likely due to errors in data reporting. This provided a total of 14,289 schools located in 8,467 school districts and serving over 12.6 million students for our analysis sample. We grouped these schools into quintiles based on the percentage of students receiving free or

reduced-price lunch in each school. In the top quintile across the nation, 77% to 100% of students are receiving free or reduced-price lunch, and in the bottom quintile, 0% to 26% of students are receiving free or reduced-price lunch.

Lastly, we repeated these two analyses by state. To examine state-level percentages of high schools with low and high student of color enrollment offering advanced courses, we calculated the percentage of students of color enrolled for each school in the state and used these percentages to group schools into quintiles. Similarly, to examine state-level course offerings in high schools with low and high enrollments of students from low-income families, we calculated the percentage of students receiving free or reduced-price lunch for each school in each state by dividing the total number of students eligible for the National School Lunch Program by the total number of students in that state.

It is important to note the limitations of the CRDC data set. First, most of the data are self-reported by local education agencies (LEAs). While most LEAs attest that the data they submit are correct to the best of their knowledge, there may be discrepancies between the data reported for the CRDC and data from other sources. Second, in conducting the analyses by state, sorting schools into quintiles resulted in low sample sizes (10 or below for one or more quintiles) for several states, including Alaska, Delaware, Hawaii, North Dakota, Rhode Island, and Vermont. Results for these states should be interpreted with caution. In addition, due to the low sample size in Washington, DC, and the uneven distribution of students of color and students from low-income families, we removed DC from Appendix B, which reports results by state.

Appendix B: State-by-State Analysis

In addition to analyzing advanced course offerings at the national level, the study also examined the data at the state level. We compared course offerings (1) in schools with high and low percentages of students of color and (2) in schools with high and low enrollment of students from low-income families. To do so, we sorted schools into quintiles based on their percentage of students of color and percentage of students eligible for free and reduced-price lunch, respectively. We then calculated the proportion of schools that offered advanced courses in the highest and lowest quintiles.

Table B1 shows the percentage of schools offering Algebra II, Advanced Math, and Calculus at schools with high student of color enrollment (highest quintile) and schools with low student of color enrollment (lowest quintile). Table B2 shows the percentage of schools offering Chemistry and Physics at schools with high and low student of color enrollment.

Table B3 shows the percentage of schools offering Algebra II, Advanced Math, and Calculus at schools with high proportions of students from low-income families (highest quintile of percentage of students eligible for free and reduced-price lunch) and schools with low proportions of students from low-income families (lowest quintile of percentage of students eligible for free and reduced-price lunch). Table B4 shows the percentage of schools offering Chemistry and Physics at schools with high and low proportions of students from low-income families.

Table B1
Percentages of Schools With High and Low Student of Color Enrollment Offering Advance Mathematics Courses

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
ALABAMA Highest quintile = 86% to 100% students of color; lowest quintile = 2% to 18% students of color	90% (42)	98% (41)	79% (42)	90% (41)	50% (42)	76% (41)
ALASKA Highest quintile = 71% to 97% students of color; lowest quintile = 6% to 29% students of color	89% (9)	88% (8)	56% (9)	75% (8)	33% (9)	38% (8)
ARIZONA Highest quintile = 94% to 100% students of color; lowest quintile = 8% to 36% students of color	89% (70)	93% (69)	53% (70)	62% (69)	41% (70)	51% (69)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
ARKANSAS Highest quintile = 61% to 98% students of color; lowest quintile = 2% to 9% students of color	96% (24)	100% (22)	71% (24)	91% (22)	33% (24)	36% (22)
CALIFORNIA Highest quintile = 97% to 100% students of color; lowest quintile = 6% to 52% students of color	86% (279)	87% (278)	76% (279)	81% (278)	65% (279)	73% (278)
COLORADO Highest quintile = 78% to 100% students of color; lowest quintile = 5% to 22% students of color	79% (58)	93% (57)	81% (58)	86% (57)	47% (58)	72% (57)
CONNECTICUT Highest quintile = 76% to 99% students of color; lowest quintile = 0% to 16% students of color	88% (43)	95% (42)	79% (43)	95% (42)	56% (43)	88% (42)
DELAWARE^c Highest quintile = 70% to 89% students of color; lowest quintile = 19% to 36% students of color	86% (7)	100% (6)	71% (7)	83% (6)	57% (7)	100% (6)
FLORIDA Highest quintile = 91% to 100% students of color; lowest quintile = 12% to 40% students of color	97% (93)	98% (92)	76% (93)	90% (92)	81% (93)	89% (92)
GEORGIA Highest quintile = 94% to 100% students of color; lowest quintile = 3% to 32% students of color	99% (80)	99% (78)	95% (80)	96% (78)	66% (80)	69% (78)
HAWAII^c Highest quintile = 95% to 99% students of color; lowest quintile = 60% to 80% students of color	100% (7)	100% (6)	100% (7)	100% (6)	100% (7)	83% (6)
IDAHO Highest quintile = 38% to 82% students of color; lowest quintile = 0% to 12% students of color	84% (25)	83% (24)	64% (25)	46% (24)	52% (25)	50% (24)
ILLINOIS Highest quintile = 92% to 100% students of color; lowest quintile = 0% to 6% students of color	45% (130)	95% (129)	88% (130)	83% (129)	37% (130)	78% (129)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
INDIANA Highest quintile = 45% to 100% students of color; lowest quintile = 2% to 6% students of color	100% (53)	96% (52)	77% (53)	85% (52)	77% (53)	90% (52)
IOWA Highest quintile = 23% to 77% students of color; lowest quintile = 1% to 5% students of color	93% (43)	98% (42)	79% (43)	98% (42)	74% (43)	93% (42)
KANSAS Highest quintile = 39% to 96% students of color; lowest quintile = 0% to 9% students of color	87% (45)	93% (44)	78% (45)	86% (44)	71% (45)	64% (44)
KENTUCKY Highest quintile = 36% to 95% students of color; lowest quintile = 0% to 5% students of color	93% (46)	96% (45)	83% (46)	91% (45)	67% (46)	73% (45)
LOUISIANA Highest quintile = 96% to 100% students of color; lowest quintile = 5% to 29% students of color	89% (35)	91% (33)	83% (35)	91% (33)	29% (35)	61% (33)
MAINE Highest quintile = 10% to 46% students of color; lowest quintile = 0% to 4% students of color	95% (20)	89% (19)	90% (20)	84% (19)	95% (20)	63% (19)
MARYLAND Highest quintile = 96% to 100% students of color; lowest quintile = 3% to 24% students of color	100% (41)	100% (40)	95% (41)	93% (40)	46% (41)	95% (40)
MASSACHUSETTS Highest quintile = 69% to 100% students of color; lowest quintile = 3% to 10% students of color	57% (53)	98% (52)	70% (53)	90% (52)	57% (53)	87% (52)
MICHIGAN Highest quintile = 59% to 100% students of color; lowest quintile = 0% to 8% students of color	91% (127)	97% (126)	53% (127)	59% (126)	38% (127)	57% (126)
MINNESOTA Highest quintile = 63% to 100% students of color; lowest quintile = 0% to 9% students of color	86% (58)	93% (57)	55% (58)	77% (57)	36% (58)	74% (57)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
MISSISSIPPI Highest quintile = 97% to 100% students of color; lowest quintile = 2% to 31% students of color	88% (34)	100% (33)	62% (34)	100% (33)	32% (34)	61% (33)
MISSOURI Highest quintile = 39% to 100% students of color; lowest quintile = 0% to 5% students of color	79% (67)	97% (66)	79% (67)	82% (66)	60% (67)	56% (66)
MONTANA Highest quintile = 21% to 100% students of color; lowest quintile = 0% to 6% students of color	94% (33)	94% (32)	79% (33)	84% (32)	52% (33)	47% (32)
NEBRASKA Highest quintile = 47% to 100% students of color; lowest quintile = 0% to 8% students of color	88% (25)	100% (23)	60% (25)	87% (23)	60% (25)	70% (23)
NEVADA Highest quintile = 85% to 100% students of color; lowest quintile = 9% to 35% students of color	100% (20)	100% (18)	90% (20)	67% (18)	85% (20)	50% (18)
NEW HAMPSHIRE Highest quintile = 13% to 44% students of color; lowest quintile = 0% to 5% students of color	100% (19)	89% (18)	95% (19)	72% (18)	89% (19)	72% (18)
NEW JERSEY Highest quintile = 91% to 100% students of color; lowest quintile = 7% to 22% students of color	99% (79)	100% (78)	72% (79)	99% (78)	49% (79)	99% (78)
NEW MEXICO Highest quintile = 96% to 100% students of color; lowest quintile = 18% to 62% students of color	100% (30)	100% (28)	63% (30)	86% (28)	50% (30)	46% (28)
NEW YORK Highest quintile = 97% to 100% students of color; lowest quintile = 0% to 15% students of color	89% (171)	95% (170)	54% (171)	88% (170)	27% (171)	81% (170)
NORTH CAROLINA Highest quintile = 74% to 99% students of color; lowest quintile = 5% to 25% students of color	97% (97)	100% (96)	91% (97)	92% (96)	42% (97)	71% (96)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
NORTH DAKOTA Highest quintile = 33% to 100% students of color; lowest quintile = 0% to 6% students of color	75% (12)	100% (11)	50% (12)	82% (11)	33% (12)	36% (11)
OHIO Highest quintile = 55% to 100% students of color; lowest quintile = 0% to 5% students of color	92% (125)	98% (124)	78% (125)	93% (124)	32% (125)	81% (124)
OKLAHOMA Highest quintile = 60% to 99% students of color; lowest quintile = 4% to 29% students of color	97% (89)	97% (88)	73% (89)	70% (88)	37% (89)	24% (88)
OREGON Highest quintile = 51% to 98% students of color; lowest quintile = 3% to 19% students of color	90% (39)	84% (38)	77% (39)	82% (38)	56% (39)	61% (38)
PENNSYLVANIA Highest quintile = 50% to 100% students of color; lowest quintile = 1% to 6% students of color	86% (88)	100% (87)	74% (88)	95% (87)	45% (88)	94% (87)
RHODE ISLAND^c Highest quintile = 88% to 99% students of color; lowest quintile = 4% to 11% students of color	100% (12)	100% (10)	92% (12)	100% (10)	67% (12)	100% (10)
SOUTH CAROLINA Highest quintile = 77% to 100% students of color; lowest quintile = 8% to 24% students of color	100% (41)	95% (40)	98% (41)	90% (40)	44% (41)	80% (40)
SOUTH DAKOTA Highest quintile = 27% to 100% students of color; lowest quintile = 0% to 4% students of color	100% (33)	94% (31)	76% (33)	71% (31)	33% (33)	32% (31)
TENNESSEE Highest quintile = 60% to 100% students of color; lowest quintile = 0% to 7% students of color	98% (54)	94% (53)	54% (54)	77% (53)	59% (54)	64% (53)
TEXAS Highest quintile = 97% to 100% students of color; lowest quintile = 4% to 36% students of color	94% (266)	97% (264)	85% (266)	93% (264)	72% (266)	58% (264)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
UTAH Highest quintile = 43% to 97% students of color; lowest quintile = 5% to 12% students of color	88% (16)	93% (14)	56% (16)	86% (14)	50% (16)	57% (14)
VERMONT^c Highest quintile = 14% to 62% students of color; lowest quintile = 2% to 4% students of color	67% (6)	100% (5)	83% (6)	80% (5)	50% (6)	60% (5)
VIRGINIA Highest quintile = 72% to 98% students of color; lowest quintile = 0% to 19% students of color	90% (61)	92% (60)	75% (61)	93% (60)	70% (61)	85% (60)
WASHINGTON Highest quintile = 62% to 100% students of color; lowest quintile = 1% to 20% students of color	83% (70)	78% (69)	73% (70)	58% (69)	59% (70)	49% (69)
WEST VIRGINIA Highest quintile = 11% to 40% students of color; lowest quintile = 0% to 2% students of color	100% (19)	94% (18)	100% (19)	94% (18)	100% (19)	78% (18)
WISCONSIN Highest quintile = 31% to 100% students of color; lowest quintile = 0% to 7% students of color	88% (81)	99% (80)	75% (81)	88% (80)	63% (81)	89% (80)
WYOMING Highest quintile = 32% to 100% students of color; lowest quintile = 3% to 8% students of color	86% (14)	92% (13)	50% (14)	62% (13)	64% (14)	46% (13)

Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

^a Quintiles were generated based on the state population.

^b In Washington, DC, due to the small number of high schools (29) as well as the large and unevenly distributed percentage of students of color, schools cannot be divided evenly into quintiles; therefore, we excluded DC in this table. Among high schools in DC, 100% offer Algebra II, 93% offer Advanced Math, and 59% offer Calculus.

^c The number of schools in one or more of the quintiles is 10 or fewer; results should be interpreted cautiously.

Data source: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>.

Table B2
Percentages of Schools With High and Low Student of Color Enrollment
Offering Advance Science Courses

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
ALABAMA Highest quintile = 86% to 100% students of color; lowest quintile = 2% to 18% students of color	88% (42)	100% (41)	50% (42)	73% (41)
ALASKA Highest quintile = 71% to 97% students of color; lowest quintile = 6% to 29% students of color	44% (9)	75% (8)	67% (9)	63% (8)
ARIZONA Highest quintile = 94% to 100% students of color; lowest quintile = 8% to 36% students of color	57% (70)	78% (69)	37% (70)	68% (69)
ARKANSAS Highest quintile = 61% to 98% students of color; lowest quintile = 2% to 9% students of color	96% (24)	100% (22)	63% (24)	100% (22)
CALIFORNIA Highest quintile = 97% to 100% students of color; lowest quintile = 6% to 52% students of color	86% (279)	83% (278)	70% (279)	76% (278)
COLORADO Highest quintile = 78% to 100% students of color; lowest quintile = 5% to 22% students of color	76% (58)	91% (57)	78% (58)	79% (57)
CONNECTICUT Highest quintile = 76% to 99% students of color; lowest quintile = 0% to 16% students of color	91% (43)	95% (42)	65% (43)	95% (42)
DELAWARE^c Highest quintile = 70% to 89% students of color; lowest quintile = 19% to 36% students of color	71% (7)	100% (6)	71% (7)	100% (6)
FLORIDA Highest quintile = 91% to 100% students of color; lowest quintile = 12% to 40% students of color	94% (93)	95% (92)	62% (93)	73% (92)
GEORGIA Highest quintile = 94% to 100% students of color; lowest quintile = 3% to 32% students of color	96% (80)	99% (78)	83% (80)	83% (78)
HAWAII^c Highest quintile = 95% to 99% students of color; lowest quintile = 60% to 80% students of color	100% (7)	100% (6)	100% (7)	100% (6)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
IDAHO Highest quintile = 38% to 82% students of color; lowest quintile = 0% to 12% students of color	60% (25)	58% (24)	60% (25)	50% (24)
ILLINOIS Highest quintile = 92% to 100% students of color; lowest quintile = 0% to 6% students of color	89% (130)	94% (129)	76% (130)	78% (129)
INDIANA Highest quintile = 45% to 100% students of color; lowest quintile = 2% to 6% students of color	100% (53)	96% (52)	83% (53)	88% (52)
IOWA Highest quintile = 23% to 77% students of color; lowest quintile = 1% to 5% students of color	91% (43)	100% (42)	86% (43)	98% (42)
KANSAS Highest quintile = 39% to 96% students of color; lowest quintile = 0% to 9% students of color	84% (45)	95% (44)	76% (45)	80% (44)
KENTUCKY Highest quintile = 36% to 95% students of color; lowest quintile = 0% to 5% students of color	83% (46)	96% (45)	72% (46)	93% (45)
LOUISIANA Highest quintile = 96% to 100% students of color; lowest quintile = 5% to 29% students of color	86% (35)	91% (33)	51% (35)	52% (33)
MAINE Highest quintile = 10% to 46% students of color; lowest quintile = 0% to 4% students of color	100% (20)	84% (19)	95% (20)	79% (19)
MARYLAND Highest quintile = 96% to 100% students of color; lowest quintile = 3% to 24% students of color	98% (41)	98% (40)	83% (41)	98% (40)
MASSACHUSETTS Highest quintile = 69% to 100% students of color; lowest quintile = 3% to 10% students of color	77% (53)	98% (52)	72% (53)	96% (52)
MICHIGAN Highest quintile = 59% to 100% students of color; lowest quintile = 0% to 8% students of color	83% (127)	94% (126)	60% (127)	74% (126)
MINNESOTA Highest quintile = 63% to 100% students of color; lowest quintile = 0% to 9% students of color	71% (58)	93% (57)	64% (58)	74% (57)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
MISSISSIPPI Highest quintile = 97% to 100% students of color; lowest quintile = 2% to 31% students of color	85% (34)	100% (33)	38% (34)	85% (33)
MISSOURI Highest quintile = 39% to 100% students of color; lowest quintile = 0% to 5% students of color	88% (67)	88% (66)	78% (67)	55% (66)
MONTANA Highest quintile = 21% to 100% students of color; lowest quintile = 0% to 6% students of color	73% (33)	84% (32)	58% (33)	69% (32)
NEBRASKA Highest quintile = 47% to 100% students of color; lowest quintile = 0% to 8% students of color	80% (25)	96% (23)	64% (25)	91% (23)
NEVADA Highest quintile = 85% to 100% students of color; lowest quintile = 9% to 35% students of color	90% (20)	89% (18)	85% (20)	56% (18)
NEW HAMPSHIRE Highest quintile = 13% to 44% students of color; lowest quintile = 0% to 5% students of color	95% (19)	89% (18)	89% (19)	89% (18)
NEW JERSEY Highest quintile = 91% to 100% students of color; lowest quintile = 7% to 22% students of color	91% (79)	99% (78)	65% (79)	97% (78)
NEW MEXICO Highest quintile = 96% to 100% students of color; lowest quintile = 18% to 62% students of color	87% (30)	89% (28)	67% (30)	57% (28)
NEW YORK Highest quintile = 97% to 100% students of color; lowest quintile = 0% to 15% students of color	76% (171)	96% (170)	39% (171)	96% (170)
NORTH CAROLINA Highest quintile = 74% to 99% students of color; lowest quintile = 5% to 25% students of color	85% (97)	93% (96)	39% (97)	60% (96)
NORTH DAKOTA Highest quintile = 33% to 100% students of color; lowest quintile = 0% to 6% students of color	83% (12)	91% (11)	25% (12)	64% (11)
OHIO Highest quintile = 55% to 100% students of color; lowest quintile = 0% to 5% students of color	74% (125)	97% (124)	70% (125)	94% (124)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
OKLAHOMA Highest quintile = 60% to 99% students of color; lowest quintile = 4% to 29% students of color	72% (89)	74% (88)	26% (89)	27% (88)
OREGON Highest quintile = 51% to 98% students of color; lowest quintile = 3% to 19% students of color	77% (39)	71% (38)	64% (39)	63% (38)
PENNSYLVANIA Highest quintile = 50% to 100% students of color; lowest quintile = 1% to 6% students of color	82% (88)	99% (87)	73% (88)	97% (87)
RHODE ISLAND^c Highest quintile = 88% to 99% students of color; lowest quintile = 4% to 11% students of color	100% (12)	100% (10)	92% (12)	100% (10)
SOUTH CAROLINA Highest quintile = 77% to 100% students of color; lowest quintile = 8% to 24% students of color	95% (41)	93% (40)	66% (41)	80% (40)
SOUTH DAKOTA Highest quintile = 27% to 100% students of color; lowest quintile = 0% to 4% students of color	91% (33)	81% (31)	55% (33)	68% (31)
TENNESSEE Highest quintile = 60% to 100% students of color; lowest quintile = 0% to 7% students of color	98% (54)	96% (53)	63% (54)	72% (53)
TEXAS Highest quintile = 97% to 100% students of color; lowest quintile = 4% to 36% students of color	94% (266)	97% (264)	94% (266)	96% (264)
UTAH Highest quintile = 43% to 97% students of color; lowest quintile = 5% to 12% students of color	69% (16)	100% (14)	63% (16)	71% (14)
VERMONT^c Highest quintile = 14% to 62% students of color; lowest quintile = 2% to 4% students of color	67% (6)	80% (5)	67% (6)	80% (5)
VIRGINIA Highest quintile = 72% to 98% students of color; lowest quintile = 0% to 19% students of color	85% (61)	90% (60)	85% (61)	73% (60)
WASHINGTON Highest quintile = 62% to 100% students of color; lowest quintile = 1% to 20% students of color	77% (70)	61% (69)	66% (70)	46% (69)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)	Schools With High Student of Color Enrollment (n = number of schools)	Schools With Low Student of Color Enrollment (n = number of schools)
WEST VIRGINIA Highest quintile = 11% to 40% students of color; lowest quintile = 0% to 2% students of color	100% (19)	94% (18)	100% (19)	67% (18)
WISCONSIN Highest quintile = 31% to 100% students of color; lowest quintile = 0% to 7% students of color	88% (81)	98% (80)	83% (81)	80% (80)
WYOMING Highest quintile = 32% to 100% students of color; lowest quintile = 3% to 8% students of color	64% (14)	69% (13)	57% (14)	54% (13)

Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

^a Quintiles were generated based on the state population.

^b In Washington, DC, due to the small number of high schools (29) as well as the large and unevenly distributed percentage of students of color, schools cannot be divided evenly into quintiles; therefore, we excluded DC in this table. Among high schools in DC, 100% offer Chemistry and 86% offer Physics.

^c The number of schools in one or more of the quintiles is 10 or fewer; results should be interpreted cautiously.

Data source: U.S. Department of Education, Office for Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018).

<https://ocrdata.ed.gov/>.

Table B3
Percentages of Schools With High and Low Enrollment of Students From Low-Income Families Offering Advanced Mathematics Courses

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
ALABAMA Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 34% students receiving free or reduced-price lunch	88% (41)	93% (40)	83% (41)	100% (40)	54% (41)	95% (40)
ALASKA^c Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 3% to 20% students receiving free or reduced-price lunch	78% (9)	75% (8)	67% (9)	75% (8)	44% (9)	75% (8)
ARIZONA Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 37% students receiving free or reduced-price lunch	96% (50)	100% (49)	52% (50)	94% (49)	32% (50)	90% (49)
ARKANSAS Highest quintile = 50% to 86% students receiving free or reduced-price lunch; lowest quintile = 1% to 24% students receiving free or reduced-price lunch	96% (23)	100% (22)	78% (23)	100% (22)	26% (23)	59% (22)
CALIFORNIA Highest quintile = 85% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 37% students receiving free or reduced-price lunch	81% (271)	94% (270)	69% (271)	94% (270)	57% (271)	89% (270)
COLORADO Highest quintile = 66% to 97% students receiving free or reduced-price lunch; lowest quintile = 1% to 20% students receiving free or reduced-price lunch	81% (58)	95% (56)	79% (58)	96% (56)	50% (58)	91% (56)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
CONNECTICUT Highest quintile = 58% to 93% students receiving free or reduced-price lunch; lowest quintile = 0% to 11% students receiving free or reduced-price lunch	95% (37)	100% (36)	86% (37)	100% (36)	62% (37)	97% (36)
DELAWARE^c Highest quintile = 65% to 77% students receiving free or reduced-price lunch; lowest quintile = 7% to 24% students receiving free or reduced-price lunch	100% (7)	100% (6)	86% (7)	100% (6)	86% (7)	100% (6)
FLORIDA Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 34% students receiving free or reduced-price lunch	97% (93)	91% (92)	90% (93)	74% (92)	80% (93)	71% (92)
GEORGIA Highest quintile = 94% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 35% students receiving free or reduced-price lunch	100% (77)	99% (75)	96% (77)	100% (75)	56% (77)	88% (75)
HAWAII^c Highest quintile = 56% to 76% students receiving free or reduced-price lunch; lowest quintile = 14% to 26% students receiving free or reduced-price lunch	100% (7)	100% (6)	100% (7)	100% (6)	86% (7)	100% (6)
IDAHO Highest quintile = 58% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 27% students receiving free or reduced-price lunch	58% (24)	83% (23)	29% (24)	70% (23)	25% (24)	70% (23)
ILLINOIS Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 25% students receiving free or reduced-price lunch	41% (129)	96% (128)	84% (129)	95% (128)	31% (129)	91% (128)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
INDIANA Highest quintile = 58% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 28% students receiving free or reduced-price lunch	100% (52)	98% (51)	75% (52)	90% (51)	75% (52)	90% (51)
IOWA Highest quintile = 47% to 92% students receiving free or reduced-price lunch; lowest quintile = 5% to 22% students receiving free or reduced-price lunch	93% (43)	95% (41)	84% (43)	98% (41)	72% (43)	98% (41)
KANSAS Highest quintile = 55% to 93% students receiving free or reduced-price lunch; lowest quintile = 0% to 28% students receiving free or reduced-price lunch	95% (44)	91% (43)	82% (44)	86% (43)	61% (44)	84% (43)
KENTUCKY Highest quintile = 72% to 100% students receiving free or reduced-price lunch; lowest quintile = 7% to 43% students receiving free or reduced-price lunch	89% (44)	95% (43)	57% (44)	93% (43)	27% (44)	93% (43)
LOUISIANA Highest quintile = 71% to 100% students receiving free or reduced-price lunch; lowest quintile = 9% to 33% students receiving free or reduced-price lunch	91% (35)	97% (33)	91% (35)	97% (33)	20% (35)	67% (33)
MAINE Highest quintile = 56% to 71% students receiving free or reduced-price lunch; lowest quintile = 4% to 25% students receiving free or reduced-price lunch	100% (19)	94% (18)	89% (19)	100% (18)	68% (19)	94% (18)
MARYLAND Highest quintile = 66% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 16% students receiving free or reduced-price lunch	95% (41)	98% (40)	95% (41)	90% (40)	37% (41)	95% (40)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
MASSACHUSETTS Highest quintile = 87% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 16% students receiving free or reduced-price lunch	57% (53)	96% (51)	58% (53)	92% (51)	45% (53)	96% (51)
MICHIGAN Highest quintile = 77% to 100% students receiving free or reduced-price lunch; lowest quintile = 4% to 29% students receiving free or reduced-price lunch	91% (126)	96% (125)	37% (126)	85% (125)	25% (126)	82% (125)
MINNESOTA Highest quintile = 67% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 19% students receiving free or reduced-price lunch	88% (56)	93% (55)	46% (56)	87% (55)	23% (56)	89% (55)
MISSISSIPPI Highest quintile = 100% to 100% students receiving free or reduced-price lunch; lowest quintile = 21% to 51% students receiving free or reduced-price lunch	97% (31)	97% (30)	71% (31)	97% (30)	45% (31)	70% (30)
MISSOURI Highest quintile = 65% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 28% students receiving free or reduced-price lunch	81% (63)	98% (62)	81% (63)	97% (62)	54% (63)	92% (62)
MONTANA Highest quintile = 59% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 25% students receiving free or reduced-price lunch	94% (32)	97% (31)	66% (32)	84% (31)	41% (32)	77% (31)
NEBRASKA Highest quintile = 54% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 25% students receiving free or reduced-price lunch	100% (22)	100% (21)	86% (22)	95% (21)	86% (22)	90% (21)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
NEVADA Highest quintile = 70% to 100% students receiving free or reduced-price lunch; lowest quintile = 9% to 23% students receiving free or reduced-price lunch	100% (19)	100% (18)	79% (19)	83% (18)	58% (19)	78% (18)
NEW HAMPSHIRE Highest quintile = 37% to 82% students receiving free or reduced-price lunch; lowest quintile = 1% to 10% students receiving free or reduced-price lunch	95% (19)	100% (18)	89% (19)	94% (18)	79% (19)	94% (18)
NEW JERSEY Highest quintile = 65% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 8% students receiving free or reduced-price lunch	97% (76)	99% (75)	82% (76)	97% (75)	67% (76)	97% (75)
NEW MEXICO Highest quintile = 100% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 46% students receiving free or reduced-price lunch	97% (29)	100% (27)	41% (29)	93% (27)	34% (29)	59% (27)
NEW YORK Highest quintile = 85% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 26% students receiving free or reduced-price lunch	85% (155)	99% (154)	45% (155)	97% (154)	25% (155)	91% (154)
NORTH CAROLINA Highest quintile = 95% to 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 31% students receiving free or reduced-price lunch	96% (97)	98% (96)	89% (97)	96% (96)	37% (97)	84% (96)
NORTH DAKOTA^c Highest quintile = 38% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 18% students receiving free or reduced-price lunch	83% (12)	80% (10)	67% (12)	80% (10)	25% (12)	50% (10)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
OHIO Highest quintile = 99% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 16% students receiving free or reduced-price lunch	94% (124)	92% (123)	78% (124)	87% (123)	48% (124)	73% (123)
OKLAHOMA Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 41% students receiving free or reduced-price lunch	98% (87)	98% (86)	66% (87)	86% (86)	21% (87)	52% (86)
OREGON Highest quintile = 65% to 83% students receiving free or reduced-price lunch; lowest quintile = 7% to 35% students receiving free or reduced-price lunch	81% (36)	100% (35)	72% (36)	94% (35)	39% (36)	86% (35)
PENNSYLVANIA Highest quintile = 78% to 100% students receiving free or reduced-price lunch; lowest quintile = 4% to 22% students receiving free or reduced-price lunch	85% (81)	99% (79)	75% (81)	95% (79)	46% (81)	99% (79)
RHODE ISLAND^c Highest quintile = 84% to 93% students receiving free or reduced-price lunch; lowest quintile = 3% to 16% students receiving free or reduced-price lunch	100% (11)	100% (10)	100% (11)	90% (10)	55% (11)	100% (10)
SOUTH CAROLINA Highest quintile = 100% to 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 35% students receiving free or reduced-price lunch	100% (39)	95% (38)	97% (39)	95% (38)	54% (39)	87% (38)
SOUTH DAKOTA Highest quintile = 42% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 18% students receiving free or reduced-price lunch	97% (33)	100% (31)	64% (33)	81% (31)	24% (33)	65% (31)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
TENNESSEE Highest quintile = 62% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 29% students receiving free or reduced-price lunch	94% (54)	98% (52)	57% (54)	87% (52)	57% (54)	81% (52)
TEXAS Highest quintile = 79% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 36% students receiving free or reduced-price lunch	92% (265)	98% (264)	81% (265)	97% (264)	62% (265)	85% (264)
UTAH Highest quintile = 57% to 100% students receiving free or reduced-price lunch; lowest quintile = 7% to 22% students receiving free or reduced-price lunch	87% (15)	93% (14)	40% (15)	64% (14)	47% (15)	71% (14)
VERMONT^c Highest quintile = 43% to 57% students receiving free or reduced-price lunch; lowest quintile = 11% to 21% students receiving free or reduced-price lunch	100% (6)	80% (5)	100% (6)	100% (5)	83% (6)	100% (5)
VIRGINIA Highest quintile = 57% to 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 22% students receiving free or reduced-price lunch	100% (56)	98% (54)	95% (56)	100% (54)	88% (56)	100% (54)
WASHINGTON Highest quintile = 66% to 98% students receiving free or reduced-price lunch; lowest quintile = 0% to 27% students receiving free or reduced-price lunch	70% (69)	88% (68)	52% (69)	82% (68)	39% (69)	75% (68)
WEST VIRGINIA Highest quintile = 57% to 77% students receiving free or reduced-price lunch; lowest quintile = 20% to 43% students receiving free or reduced-price lunch	95% (19)	100% (18)	95% (19)	100% (18)	84% (19)	100% (18)

State ^{a,b}	Percentage of Schools Offering Algebra II		Percentage of Schools Offering Advanced Math		Percentage of Schools Offering Calculus	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
WISCONSIN Highest quintile = 45% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 16% students receiving free or reduced-price lunch	90% (80)	96% (79)	68% (80)	96% (79)	55% (80)	89% (79)
WYOMING Highest quintile = 46% to 97% students receiving free or reduced-price lunch; lowest quintile = 4% to 21% students receiving free or reduced-price lunch	79% (14)	92% (13)	29% (14)	85% (13)	36% (14)	62% (13)

Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

^a Quintiles were generated based on the state population.

^b In Washington, DC, due to the small number of high schools (29) as well as the large and unevenly distributed percentage of students of color, schools cannot be divided evenly into quintiles; therefore, we excluded DC in this table. Among high schools in DC, 100% offer Algebra II, 93% offer Advanced Math, and 59% offer Calculus.

^c The number of schools in one or more of the quintiles is 10 or fewer; results should be interpreted cautiously.

Data sources: U.S. Department of Education, Office of Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>; National Center for Education Statistics. (2018). Common Core of Data. <https://nces.ed.gov/ccd/ccddata.asp> (accessed 11/20/20).

Table B4
Percentages of Schools With High and Low Enrollment of Students From Low-Income Families Offering Advanced Science Courses

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (<i>n</i> = number of schools)	Schools With Low Percentage of Students From Low-Income Families (<i>n</i> = number of schools)	Schools With High Percentage of Students From Low-Income Families (<i>n</i> = number of schools)	Schools With Low Percentage of Students From Low-Income Families (<i>n</i> = number of schools)
ALABAMA Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 34% students receiving free or reduced-price lunch	93% (41)	100% (40)	56% (41)	90% (40)
ALASKA^c Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 3% to 20% students receiving free or reduced-price lunch	44% (9)	63% (8)	67% (9)	75% (8)
ARIZONA Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 37% students receiving free or reduced-price lunch	46% (50)	96% (49)	36% (50)	92% (49)
ARKANSAS Highest quintile = 50% to 86% students receiving free or reduced-price lunch; lowest quintile = 1% to 24% students receiving free or reduced-price lunch	96% (23)	100% (22)	78% (23)	91% (22)
CALIFORNIA Highest quintile = 85% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 37% students receiving free or reduced-price lunch	77% (271)	94% (270)	64% (271)	91% (270)
COLORADO Highest quintile = 66% to 97% students receiving free or reduced-price lunch; lowest quintile = 1% to 20% students receiving free or reduced-price lunch	76% (58)	96% (56)	76% (58)	93% (56)
CONNECTICUT Highest quintile = 58% to 93% students receiving free or reduced-price lunch; lowest quintile = 0% to 11% students receiving free or reduced-price lunch	97% (37)	100% (36)	73% (37)	100% (36)
DELAWARE^c Highest quintile = 65% to 77% students receiving free or reduced-price lunch; lowest quintile = 7% to 24% students receiving free or reduced-price lunch	100% (7)	100% (6)	100% (7)	100% (6)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
FLORIDA Highest quintile = 73% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 34% students receiving free or reduced-price lunch	88% (93)	84% (92)	61% (93)	62% (92)
GEORGIA Highest quintile = 94% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 35% students receiving free or reduced-price lunch	97% (77)	100% (75)	77% (77)	100% (75)
HAWAII^c Highest quintile = 56% to 76% students receiving free or reduced-price lunch; lowest quintile = 14% to 26% students receiving free or reduced-price lunch	100% (7)	100% (6)	86% (7)	100% (6)
IDAHO Highest quintile = 58% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 27% students receiving free or reduced-price lunch	42% (24)	78% (23)	33% (24)	65% (23)
ILLINOIS Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 25% students receiving free or reduced-price lunch	86% (129)	98% (128)	74% (129)	96% (128)
INDIANA Highest quintile = 58% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 28% students receiving free or reduced-price lunch	96% (52)	96% (51)	81% (52)	94% (51)
IOWA Highest quintile = 47% to 92% students receiving free or reduced-price lunch; lowest quintile = 5% to 22% students receiving free or reduced-price lunch	93% (43)	100% (41)	91% (43)	98% (41)
KANSAS Highest quintile = 55% to 93% students receiving free or reduced-price lunch; lowest quintile = 0% to 28% students receiving free or reduced-price lunch	93% (44)	88% (43)	77% (44)	91% (43)
KENTUCKY Highest quintile = 72% to 100% students receiving free or reduced-price lunch; lowest quintile = 7% to 43% students receiving free or reduced-price lunch	77% (44)	98% (43)	64% (44)	95% (43)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
LOUISIANA Highest quintile = 71% to 100% students receiving free or reduced-price lunch; lowest quintile = 9% to 33% students receiving free or reduced-price lunch	86% (35)	97% (33)	54% (35)	70% (33)
MAINE Highest quintile = 56% to 71% students receiving free or reduced-price lunch; lowest quintile = 4% to 25% students receiving free or reduced-price lunch	95% (19)	100% (18)	95% (19)	94% (18)
MARYLAND Highest quintile = 66% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 16% students receiving free or reduced-price lunch	90% (41)	95% (40)	83% (41)	95% (40)
MASSACHUSETTS Highest quintile = 87% to 100% students receiving free or reduced-price lunch; lowest quintile = 6% to 16% students receiving free or reduced-price lunch	70% (53)	98% (51)	62% (53)	98% (51)
MICHIGAN Highest quintile = 77% to 100% students receiving free or reduced-price lunch; lowest quintile = 4% to 29% students receiving free or reduced-price lunch	83% (126)	96% (125)	50% (126)	91% (125)
MINNESOTA Highest quintile = 67% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 19% students receiving free or reduced-price lunch	71% (56)	96% (55)	64% (56)	93% (55)
MISSISSIPPI Highest quintile = 100% students receiving free or reduced-price lunch; lowest quintile = 21% to 51% students receiving free or reduced-price lunch	94% (31)	100% (30)	35% (31)	90% (30)
MISSOURI Highest quintile = 65% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 28% students receiving free or reduced-price lunch	87% (63)	97% (62)	73% (63)	92% (62)
MONTANA Highest quintile = 59% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 25% students receiving free or reduced-price lunch	75% (32)	84% (31)	59% (32)	68% (31)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
NEBRASKA Highest quintile = 54% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 25% students receiving free or reduced-price lunch	91% (22)	100% (21)	91% (22)	90% (21)
NEVADA Highest quintile = 70% to 100% students receiving free or reduced-price lunch; lowest quintile = 9% to 23% students receiving free or reduced-price lunch	84% (19)	94% (18)	58% (19)	78% (18)
NEW HAMPSHIRE Highest quintile = 37% to 82% students receiving free or reduced-price lunch; lowest quintile = 1% to 10% students receiving free or reduced-price lunch	95% (19)	100% (18)	84% (19)	100% (18)
NEW JERSEY Highest quintile = 65% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 8% students receiving free or reduced-price lunch	95% (76)	100% (75)	70% (76)	99% (75)
NEW MEXICO Highest quintile = 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 46% students receiving free or reduced-price lunch	69% (29)	89% (27)	41% (29)	78% (27)
NEW YORK Highest quintile = 85% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 26% students receiving free or reduced-price lunch	72% (155)	99% (154)	39% (155)	99% (154)
NORTH CAROLINA Highest quintile = 95% to 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 31% students receiving free or reduced-price lunch	87% (97)	95% (96)	28% (97)	81% (96)
NORTH DAKOTA^c Highest quintile = 38% to 99% students receiving free or reduced-price lunch; lowest quintile = 0% to 18% students receiving free or reduced-price lunch	83% (12)	80% (10)	25% (12)	80% (10)
OHIO Highest quintile = 99% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 16% students receiving free or reduced-price lunch	81% (124)	88% (123)	78% (124)	85% (123)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
OKLAHOMA Highest quintile = 83% to 100% students receiving free or reduced-price lunch; lowest quintile = 8% to 41% students receiving free or reduced-price lunch	63% (87)	88% (86)	11% (87)	48% (86)
OREGON Highest quintile = 65% to 83% students receiving free or reduced-price lunch; lowest quintile = 7% to 35% students receiving free or reduced-price lunch	58% (36)	97% (35)	53% (36)	94% (35)
PENNSYLVANIA Highest quintile = 78% to 100% students receiving free or reduced-price lunch; lowest quintile = 4% to 22% students receiving free or reduced-price lunch	81% (81)	99% (79)	75% (81)	99% (79)
RHODE ISLAND^c Highest quintile = 84% to 93% students receiving free or reduced-price lunch; lowest quintile = 3% to 16% students receiving free or reduced-price lunch	91% (11)	100% (10)	91% (11)	100% (10)
SOUTH CAROLINA Highest quintile = 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 35% students receiving free or reduced-price lunch	97% (39)	95% (38)	77% (39)	87% (38)
SOUTH DAKOTA Highest quintile = 42% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 18% students receiving free or reduced-price lunch	82% (33)	97% (31)	45% (33)	81% (31)
TENNESSEE Highest quintile = 62% to 100% students receiving free or reduced-price lunch; lowest quintile = 1% to 29% students receiving free or reduced-price lunch	94% (54)	96% (52)	57% (54)	81% (52)
TEXAS Highest quintile = 79% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 36% students receiving free or reduced-price lunch	92% (265)	98% (264)	93% (265)	98% (264)
UTAH Highest quintile = 57% to 100% students receiving free or reduced-price lunch; lowest quintile = 7% to 22% students receiving free or reduced-price lunch	60% (15)	86% (14)	47% (15)	71% (14)

State ^{a,b}	Percentage of Schools Offering Chemistry		Percentage of Schools Offering Physics	
	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)	Schools With High Percentage of Students From Low-Income Families (n = number of schools)	Schools With Low Percentage of Students From Low-Income Families (n = number of schools)
VERMONT^c Highest quintile = 43% to 57% students receiving free or reduced-price lunch; lowest quintile = 11% to 21% students receiving free or reduced-price lunch	100% (6)	100% (5)	100% (6)	100% (5)
VIRGINIA Highest quintile = 57% to 100% students receiving free or reduced-price lunch; lowest quintile = 2% to 22% students receiving free or reduced-price lunch	98% (56)	100% (54)	88% (56)	100% (54)
WASHINGTON Highest quintile = 66% to 98% students receiving free or reduced-price lunch; lowest quintile = 0% to 27% students receiving free or reduced-price lunch	55% (69)	87% (68)	41% (69)	82% (68)
WEST VIRGINIA Highest quintile = 57% to 77% students receiving free or reduced-price lunch; lowest quintile = 20% to 43% students receiving free or reduced-price lunch	100% (19)	100% (18)	63% (19)	94% (18)
WISCONSIN Highest quintile = 45% to 100% students receiving free or reduced-price lunch; lowest quintile = 0% to 16% students receiving free or reduced-price lunch	84% (80)	96% (79)	70% (80)	91% (79)
WYOMING Highest quintile = 46% to 97% students receiving free or reduced-price lunch; lowest quintile = 4% to 21% students receiving free or reduced-price lunch	36% (14)	85% (13)	43% (14)	69% (13)

Note: Because the CRDC data are self-reported by local education agencies (i.e., school districts), there may be discrepancies between the data reported for the CRDC and data from other sources.

^a Quintiles were generated based on the state population.

^b In Washington, DC, due to the small number of high schools (29) as well as the large and unevenly distributed percentage of students of color, schools cannot be divided evenly into quintiles; therefore, we excluded DC in this table. Among high schools in DC, 100% offer Chemistry and 86% offer Physics.

^c The number of schools in one or more of the quintiles is 10 or fewer; results should be interpreted cautiously.

Data sources: U.S. Department of Education, Office of Civil Rights. (n.d.). Civil Rights Data Collection (public-use data files for 2018). <https://ocrdata.ed.gov/>; National Center for Education Statistics. (2018). Common Core of Data. <https://nces.ed.gov/ccd/ccddata.asp> (accessed 11/20/20).

Endnotes

1. Long, M. C., Conger, D., & Latarola, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal*, 49(2), 285–322; Morgan, T. L., Zakhem, D., & Cooper, W. L. (2018). From high school access to postsecondary success: An exploratory study of the impact of high-rigor coursework. *Education Sciences*, 8(4), 191; Radunzel, J., & Noble, J. (2012). *Tracking 2003 ACT[R]-tested high school graduates: College readiness, enrollment, and long-term success* [ACT Research Report No. 2012-2]. ACT, Inc.
2. Kane, T. J., Owens, A. M., Marinell, W. H., Thal, D. R., & Staiger, D. O. (2016). *Teaching higher: Educators' perspectives on Common Core implementation*. Center for Education Policy Research, Harvard University; Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *High School Journal*, 100(3), 183–202; Steiner, D. (2017). Curriculum research: What we know and where we need to go. *Standards Work*, 1–13; Steiner, D., Magee, J., & Jensen, B. (2019). *High-quality curriculum and system improvement*. Learning First and the Johns Hopkins Institute for Education Policy. <https://learningfirst.com/wp-content/uploads/2019/01/Quality-curriculum-and-system-improvement.pdf> (accessed 06/30/2020).
3. Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *High School Journal*, 100(3), 183–202. For studies examining similar issues, see also: Jones, L. V. (1984). White-Black achievement differences: The narrowing gap. *American Psychologist*, 39, 1207–1213; Darling-Hammond, L. (1985). *Equality and Excellence: The Educational Status of Black Americans*. College Entrance Examination Board; Moore, E. G., & Smith, A. W. (1985). Mathematics aptitude: Effects of coursework, household language, and ethnic differences. *Urban Education*, 20, 273–294; Jones, L. V., Burton, N. W., & Davenport, E. C. (1984). Monitoring the achievement of black students. *Journal for Research in Mathematics Education*, 15, 154–164.
4. Gamoran, A., & Mare, R. (1989). Secondary school tracking and educational inequality: Compensation, reinforcement or neutrality? *American Journal of Sociology*, 94, 1146–1183; Oakes, J. (1985). *Keeping Track*. Yale University Press; Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science*. RAND Corporation; Gamoran, A. (1990). *The consequences of track-related instructional differences for student achievement*. Paper presented at the Annual Meeting of the American Educational Research Association.
5. Moller, S., & Stearns, E. (2012). Tracking success: High school curricula and labor market outcomes by race and gender. *Urban Education*, 47(6), 1025–1054. <https://doi.org/10.1177/0042085912454440> (accessed 06/30/2020).
6. Nowicki, J. M. (2018). *K–12 education: Public high schools with more students in poverty and smaller schools provide fewer academic offerings to prepare for college* [Report to the Ranking Member, Committee on Education and the Workforce, House of Representatives. GAO-19-8]. U.S. Government Accountability Office; U.S. Department of Education Office for Civil Rights. (2018). *2015–16 Civil Rights Data Collection STEM course taking*. <https://www2.ed.gov/about/offices/list/ocr/docs/stem-course-taking.pdf> (accessed 02/11/20); Oakes, J. (2005). *Keeping Track: How Schools Structure Inequality* (2nd ed.). Yale University Press; Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press.
7. Cardichon, J., Darling-Hammond, L., Yang, M., Scott, C., Shields, P. M., & Burns, D. (2020). *Inequitable opportunity to learn: Student access to certified and experienced teachers*. Learning Policy Institute; Sutchter, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.* Learning Policy Institute. <https://learningpolicyinstitute.org/product/coming-crisis-teaching>.
8. Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *High School Journal*, 100(3), 183–202; Moller, S., & Stearns, E. (2012). Tracking success: High school curricula and labor market outcomes by race and gender. *Urban Education*, 47(6), 1025–1054; Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press.
9. Cardichon, J., Darling-Hammond, L., Yang, M., Scott, C., Shields, P. M., & Burns, D. (2020). *Inequitable opportunity to learn: Student access to certified and experienced teachers*. Learning Policy Institute.

10. This definition includes public and charter schools, alternative schools, and special education schools but excludes juvenile justice facilities and schools with fewer than 10 students.
11. It is important to note that among students of color, Asian students tend to be overrepresented in advanced mathematics and science courses. The percentage of Asian students in our overall sample was 6%; therefore, the disparity in access we report here may be slightly smaller than the disparities for Black, Latino/a, and Native American students in general. However, we decided to include Asian students in our analyses because they can experience inequitable treatment in school.
12. The bottom quintile includes a total of 2,964 schools in which students of color (African American, Hispanic, Asian, Pacific Islander, American Indian, and students of two or more races) account for an average of 7% (with a range of 0–12% students of color) of total student enrollment; the top quintile includes a total of 2,965 schools in which students of color account for an average of 96% (with a range of 87–100% students of color) of total student enrollment.
13. While the percentage of students receiving free or reduced-price lunch is not always fully representative of the poverty rate of the school, these data are readily available at the school level and are frequently used by researchers as proxies for school poverty.
14. The bottom quintile includes a total of 2,857 schools in which students from low-income families account for an average of 16% (with a range of 0–26% eligible for free or reduced-price lunch) of total student enrollment; the top quintile includes a total of 2,858 schools in which students from low-income families account for an average of 91% (with a range of 77–100% receiving free or reduced-price lunch) of total student enrollment.
15. These states include Arkansas, Massachusetts, Minnesota, Mississippi, Nebraska, New Jersey, New Mexico, New York, North Dakota, Pennsylvania, Tennessee, and Utah.
16. These states include Alabama, Colorado, Connecticut, Delaware, Illinois, Louisiana, Maryland, Massachusetts, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, and Wisconsin.
17. Blad, E. (2020). The simple policy change that’s getting more students of color in advanced courses: Washington state moves to erase entrenched form of inequity—access to high-level classes. *Education Week*, 39(24), 10–11.
18. Stand for Children. (2019). First-in-nation law to reduce barriers to advanced classes for all students adopted in Washington state [Press release]. <https://www.globenewswire.com/news-release/2019/05/07/1818737/0/en/FIRST-IN-NATION-LAW-TO-REDUCE-BARRIERS-TO-ADVANCED-CLASSES-FOR-ALL-STUDENTS-ADOPTED-IN-WASHINGTON-STATE.html>.
19. These states include Alabama, Arizona, Arkansas, Connecticut, Delaware, Kentucky, Massachusetts, Mississippi, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, and Pennsylvania.
20. These states include Alaska, Arizona, Delaware, Massachusetts, Minnesota, New York, Ohio, and Utah.
21. These states include Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, and Wyoming.
22. These states include Arizona, Arkansas, California, Idaho, Kentucky, Massachusetts, Michigan, Minnesota, Mississippi, New Mexico, New York, Oklahoma, Oregon, Pennsylvania, Tennessee, Utah, Washington, Wisconsin, and Wyoming.
23. Coutts, S., & LaFleur, J. (2011). Some states still leave low-income students behind; others make surprising gains. *ProPublica*. <https://www.propublica.org/article/opportunity-gap-schools-data>.
24. These states include Alabama, Arizona, California, Connecticut, Georgia, Idaho, Illinois, Kentucky, Massachusetts, Michigan, Minnesota, Mississippi, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Utah, Washington, West Virginia, Wisconsin, and Wyoming.
25. These states include Arizona, Colorado, Idaho, Kentucky, Massachusetts, Minnesota, New Mexico, New York, Oklahoma, Oregon, Utah, Washington, and Wyoming.

26. Coutts, S., & LaFleur, J. (2011). Some states still leave low-income students behind; others make surprising gains. *ProPublica*. <https://www.propublica.org/article/opportunity-gap-schools-data>.
27. Farrie, D., & Sciarra, D. G. (2020). *Making the grade 2020: How fair is funding in your state?* Education Law Center. <https://edlawcenter.org/research/making-the-grade-2020.html>.
28. Espinoza, D., Saunders, R., Kini, T., & Darling-Hammond, L. (2018). *Taking the long view: State efforts to solve teacher shortages by strengthening the profession*. Learning Policy Institute.
29. Cardichon, J., Darling-Hammond, L., Yang, M., Scott, C., Shields, P. M., & Burns, D. (2020). *Inequitable opportunity to learn: Student access to certified and experienced teachers*. Learning Policy Institute; Sutchter, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.* Learning Policy Institute. <https://learningpolicyinstitute.org/product/coming-crisis-teaching>.
30. Cardichon, J., Darling-Hammond, L., Yang, M., Scott, C., Shields, P. M., & Burns, D. (2020). *Inequitable opportunity to learn: Student access to certified and experienced teachers*. Learning Policy Institute.
31. Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press.
32. KewalRamani, A., Zhang, J., Wang, X., Rathbun, A., Corcoran, L., Diliberti, M., & Zhang, J. (2018). *Student access to digital learning resources outside of the classroom* [NCES 2017-098]. National Center for Education Statistics; Oakes, J. (2005). *Keeping Track: How Schools Structure Inequality* (2nd ed.). Yale University Press; Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press.
33. Copur-Gencturk, Y., Cimpian, J. R., Lubienski, S. T., & Thacker, I. (2020). Teachers' bias against the mathematical ability of female, Black, and Hispanic students. *Educational Researcher*, 49(1), 30–43; Oakes, J. (2005). *Keeping Track: How Schools Structure Inequality* (2nd ed.). Yale University Press; Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press.
34. Boser, U. (2021). Data science for all. Math for modern times. *The Learning Curve*. <https://www.the-learning-agency-lab.com/the-learning-curve/data-science-for-all-why-math-needs-data-science-reform> (accessed 02/08/21).
35. Kostyo, S., Cardichon, J., & Darling-Hammond, L. (2018). *Making ESSA's equity promise real: State strategies to close the opportunity gap: Expanding access to a college- and career-ready curriculum*. Learning Policy Institute.
36. Cardichon, J., Darling-Hammond, L., Yang, M., Scott, C., Shields, P. M., & Burns, D. (2020). *Inequitable opportunity to learn: Student access to certified and experienced teachers*. Learning Policy Institute.
37. Podolsky, A., & Kini, T. (2016). *How effective are loan forgiveness and service scholarships for recruiting teachers?* Learning Policy Institute; Guha, R., Hyler, M. E., & Darling-Hammond, L. (2016). *The teacher residency: An innovative model for preparing teachers*. Learning Policy Institute.
38. Podolsky, A., & Kini, T. (2016). *How effective are loan forgiveness and service scholarships for recruiting teachers?* Learning Policy Institute.
39. Podolsky, A., Kini, T., Bishop, J., & Darling-Hammond, L. (2016). *Solving the teacher shortage: How to attract and retain excellent educators*. Learning Policy Institute.
40. Adamson, F., & Darling-Hammond, L. (2012). Funding disparities and the inequitable distribution of teachers: Evaluating sources and solutions. *Education Policy Analysis*, 20(7), 1–46; Podolsky, A., Kini, T., Bishop, J., & Darling-Hammond, L. (2016). *Solving the teacher shortage: How to attract and retain excellent educators*. Learning Policy Institute.
41. Espinoza, D., Saunders, R., Kini, T., & Darling-Hammond, L. (2018). *Taking the long view: State efforts to solve teacher shortages by strengthening the profession*. Learning Policy Institute.
42. Podolsky, A., Kini, T., Bishop, J., & Darling-Hammond, L. (2016). *Solving the teacher shortage: How to attract and retain excellent educators*. Learning Policy Institute.

43. Darling-Hammond, L. (2010). *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. Teachers College Press; Sutchter, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.* Learning Policy Institute.
44. U.S. Department of Education Office for Civil Rights. (2018). *2015–16 Civil Rights Data Collection STEM course taking*. <https://www2.ed.gov/about/offices/list/ocr/docs/stem-course-taking.pdf> (accessed 06/30/20).
45. Cookson, P. W., Jr. (2020). *Measuring student socioeconomic status: Toward a comprehensive approach*. Learning Policy Institute.

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The Learning Policy Institute conducts and communicates independent, high-quality research to improve education policy and practice. Working with policymakers, researchers, educators, community groups, and others, the Institute seeks to advance evidence-based policies that support empowering and equitable learning for each and every child. Nonprofit and nonpartisan, the Institute connects policymakers and stakeholders at the local, state, and federal levels with the evidence, ideas, and actions needed to strengthen the education system from preschool through college and career readiness.