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Achievement in California's Public Schools

What Do Test Scores Tell Us?

SUMMARY

CONTENTS

Technical appendices to this report are available on the PPIC website.

Two major reforms have transformed California's K–12 education system over the past decade. To revamp English and mathematics instruction, the Common Core standards were adopted in 2010, with district implementation beginning several years later. In 2013, the Local Control Funding Formula (LCFF) was enacted to increase funding for disadvantaged students, reshape the state's K–12 accountability system, and expand local control over school spending. There is now concern that these reforms are failing to improve student outcomes fast enough. To evaluate these concerns, this report examines California's performance on two tests of English and mathematics—the Smarter Balanced Assessment Consortium (SBAC) tests and National Assessment of Educational Progress (NAEP).

Overall, we find that California's performance is mostly headed in the right direction. Specifically, we find:

- **Significant progress in English.** Both tests indicate that California made large gains in English scores between 2015 and 2018. On the SBAC, the percent of third-graders scoring at proficient levels increased 10 percentage points. Proficiency also increased 10 points as students progressed from third to sixth grade. NAEP data also reflects major gains: reading scores (adjusted for the share of low-income students) are now near the national average.
- **Stalled gains in mathematics.** Both tests suggest that Common Core math standards are not yet generating improved student performance. Third-grade SBAC scores have improved 9 percentage points, but growth in later grades is inconsistent. However, California's gains are larger than in Oregon and Washington, which also use the SBAC. NAEP math scores improved fairly consistently from 2003 to 2011 (before Common Core) and then flattened. California's relative performance among states is mostly unchanged.
- **Persistent income achievement gaps.** District-level SBAC analysis shows no relationship between growth and district income in English. In math, growth is slower in lower-income districts: gaps increase as students move through the grades. NAEP data reveal a similar pattern.
- **Slow change is to be expected.** The NAEP data also show that average achievement at the state level does not change quickly. Improvement usually comes in small sustained increments, which, over time, can make a significant difference for students.

The conflict between our goals for students and the pace of change is important to recognize. Large leaps in performance are unlikely from year to year. Our findings suggest, though, areas for state action that could hasten the improvement process. There are almost no state funds for improving math instruction in grades 4 to 8, for instance, and the lack of progress in this subject

argues for providing additional help to districts. In addition, the success of both reforms depends upon state support for low-performing districts, as the process of improving instruction is intensely local. Ensuring that the state's system of support for struggling districts is adequately funded and operating effectively is crucial to the success of our K–12 system.

The state also needs to ensure and expand the availability of accurate and meaningful performance data. Currently, the California Department of Education does not publish data on the growth of student scores from year to year. Yet understanding K–12 performance—the progress of schools, districts, and student subgroups—requires accurate growth data. Parents, community members, and educators need good data to provide feedback on the effect of local improvement efforts. Policymakers and the public also need this information to assess the impact of recent K–12 reform efforts. Without it, conclusions will be based on anecdotes and impressions rather than evidence.

Introduction

California has adopted significant reforms in K–12 education over the past decade with the expectation that student performance would improve. The state adopted the Common Core State Standards in English and mathematics in 2010. Implementation at the district level began several years later. These standards were considered to be better than most state standards, focusing on conceptual understanding and problem-solving skills needed in today's economy. In 2013, the financial and governance reforms of the Local Control Funding Formula (LCFF) were enacted, emphasizing local control and significantly increased funding for low-income, English Learner, and foster care students.

Taking advantage of these reforms is a long, slow process. California's K–12 system is enormous and decentralized, with 1,000 school districts, over 10,000 schools, and over 300,000 teachers. In order to meet the reforms' goals, each district must be able to help teachers and administrators change practices in ways that boost achievement. Yet research has shown that changing the daily practice of K–12 professionals takes time (Greene and McShane 2018). Moreover, the state has only recently completed implementing LCFF by fully funding district revenue targets and creating a new support system to assist struggling districts.

Despite these challenges, many argue that California is not making sufficient progress—especially with lower-performing students. For example, the Education Trust-West, an advocacy group for low-income and minority students, labeled the state's test results in 2017 and 2018 a "marginal improvement" over the prior year (Education Trust-West 2018). The Los Angeles Times, in an editorial, stated that achievement test data in 2018 show that "[c]learly, California isn't doing well" (Los Angeles Times 2018). These views were buttressed by claims that the number of students meeting grade level standards should be increasing faster.

The desire to improve the academic success of California's children is shared by all. The question remains, though, whether it is reasonable to expect that the state's K–12 sector can change as quickly as we would like. This report examines available data from two tests of academic achievement in mathematics and English—the Smarter Balanced Assessment Consortium (SBAC) test, administered to California students each year, and the National Assessment of Educational Progress (NAEP), given to a sample of California students every two years—to develop a picture of how well the state's K–12 system is faring. First, we look at how well California's K–12 system is helping students achieve at proficient levels. Then we determine whether California's progress is slower or faster than in other states, and what these data suggest about state-level performance expectations.

The report is divided into four main sections. First we provide an overview of the two tests, and how we use their data. Next we look at how well California students are achieving relative to the SBAC standards from 2015 to 2018. Third, we examine whether student test scores in low-income districts are growing at similar rates to those in other districts. Finally, we compare California's outcomes on both the SBAC and NAEP tests with the results for students in other states.

How We Use SBAC and NAEP Results

Assessments are not the only outcome of importance for K-12 education—California's accountability system for K–12 education measures academic achievement, attendance, student behavior, high school graduation, and preparation for career or college. Academic testing with SBAC and NAEP provides important information about how much students learn each year and the system's progress helping all students find success in school. Test results also enable us to compare California's performance to outcomes in other states.

The two tests have many similarities, but are different in fundamental ways. California and 10 other states use the SBAC, which was designed for the annual federal requirement to assess all students in grades 3 through 8 plus one grade in high school. [1] Its questions align with the Common Core State Standards in mathematics and English language arts. Its "proficient" performance level (called "met standard" in California) reflects whether students are on track to be college-ready. The test is designed to allow for assessment of grade-to-grade growth for grades 4–8. However, annual growth cannot be calculated for grades 3 and 11.[2]

The NAEP is a federally designed test in mathematics and reading based on standards developed in the 1980s. The state NAEP, which assesses representative samples of students in each state, has been administered every two years since 1990 to a sample of fourth and eighth grade students in all 50 states and the District of Columbia.[3] Because it only happens every two years, to different samples of students each time, and in two widely separated grades, it does not track growth in student proficiency.

Both tests report scale scores and the share of students in each of four proficiency categories.[4] Those in the top two categories are at or above proficient levels. Those in the lowest level are well below the proficient performance standard. In this report, we use two outcomes to illuminate the extent to which educators are succeeding at the main challenges facing California at this time: increasing the number achieving at or above the state's performance target (proficiency) and reducing the number who score at the lowest proficiency level. Table 1 details the different testing measures used in this report.[5] (For more information about performance SBAC performance levels, see Technical Appendix A.)

Growth and trends: two measures of change over time. SBAC and NAEP results permit specific measures of change over time. With SBAC data in grades 3–8, we can calculate *growth,* which is the change in scores as students move from one grade to the next. NAEP data allow only an analysis of *trends,* which compares achievement of different groups of students in the same grade over time.

Growth. The growth of student achievement is key to assessing whether the state is meeting its goals of increasing proficiency and of shrinking achievement gaps among student subgroups. Since virtually all California students in the tested grades participate in SBAC, we can measure the gains made by specific groups of students—or cohorts—

[1] California tests 11th graders. However we do not discuss these results for several reasons. First, some SBAC states do not test 11th graders, preferring to assess other high school grades instead. Second, the lack of testing in grades 9 and 10 makes 11th grade scores more difficult to put into context, and year-to-year growth cannot be estimated. Finally, many California students did not take the test—6.2 percent of enrolled 11th grade students did not take the 2018 test, for instance, compared to 2.5 percent of students in grades 3–8. This high rate of non-testing introduces the possibility that the reported scores for 11th graders may not accurately represent the score that would result if all students were tested (federal and state policy require districts to test at least 95 percent of their eligible students).

[2] Annual growth cannot be calculated for these grades, as grade 3 is the first testing grade, and there are no SBAC exams for grades 9 and 10.

[3] The State NAEP was administered in two consecutive years in 2002 and 2003. From 2003 onward, grades 4 and 8 reading and math has been tested in every administration. Prior to 2002, not all states, grades, nor subjects were tested in a given year.

[4] Scale scores are commonly generated by converting the number and difficulty of questions a student answered correctly on a given exam form to a comparable scale that can be mapped into achievement categories. For a (relatively) non-technical overview of scoring and measurement in the NAEP and other student assessment systems, see Jacob and Rothstein 2016.

[5] This simplifies the data (reducing four data points to two). This simplification is not intended to minimize the importance of students who fall into the other categories; but displaying data on proficient students and the lowest-performing students most succinctly illuminates the extent to which educators are succeeding at the main challenges facing California at this time.

over time. Importantly, growth data are less affected than trend data by changes in the underlying group of students being tested. Even so, current publicly available data does not track changes in subgroup membership from one year to the next, so we can only reliably estimate growth for the entire population in a grade (Warren 2018).

Trends. NAEP data are available starting in the 1990s and reflect nationwide achievement trends, so it allows for a longer-term and broader perspective. As a widely reported test score metric for states, its additional context complements growth analysis. We use it to evaluate third-grade SBAC scores and long-term trends in fourth- and eighth-grade achievement. But it also sheds light on trends in California's performance relative to the rest of the country, which can supplement SBAC data. However, NAEP scores are a less reliable indicator of changes in the quality of the state's K–12 system because of changes in the underlying student demographics.

TABLE 1

Test score metrics used in this report

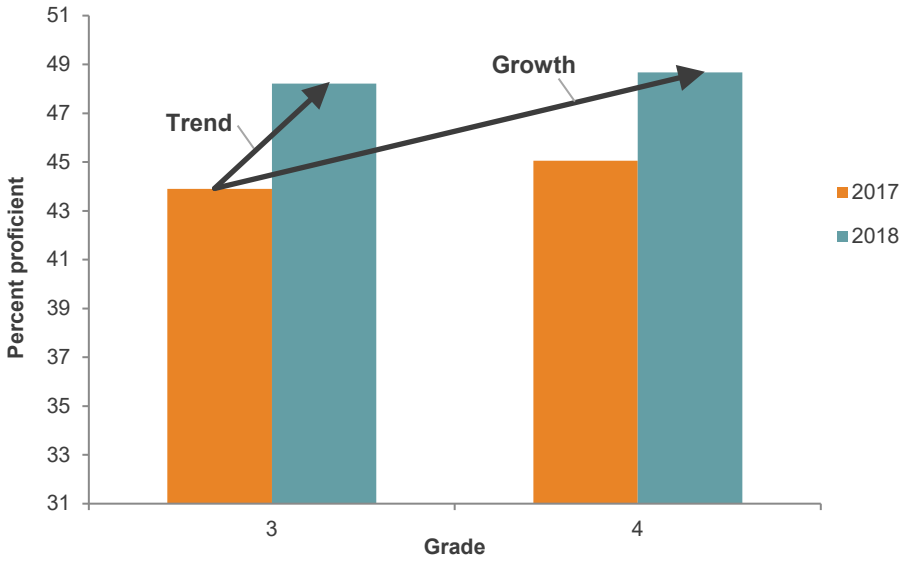
Test	Measure type	Test Performance Metric	Description	Years used	Comparison states
SBAC	Trend	Proficiency thresholds	• Percent of third graders at or above standards • Percent of third graders in the lowest performance level	2015–18	Oregon, Washington
SBAC	Growth	Scale scores	• Average growth of all students in grades 3–7 relative to the change in the "met standard" performance level in grades 4–8; "1" indicates keeping pace with standards	2015–18	n/a
SBAC	Growth	Proficiency thresholds	• Percent of third-grade cohort at or above standards as students move through grades 4–6 • Percent of third-grade cohort in the lowest performance level as students move through grades 4–6	2015–18	Oregon, Washington
NAEP	Trend	Proficiency thresholds	• Percent of fourth graders at or above standards • Percent of fourth graders in the lowest performance level	2003–17	Entire nation, Oregon, Washington, Florida, Texas

Figure 1 illustrates an example of the difference between trend and growth data. Trend data shows the change in third-grade scores from one group of students to the next. This indicator changed from 44 percent of students in 2017 to 47 percent in 2018. Since the data reflect two completely different groups of students, it is more difficult to interpret whether the change represents better system performance or differences in underlying student makeup.

Our growth measure shows the change in scores from third to fourth grade for the same group of students. In this case, the percent of proficient students increases from 44 percent in third grade to 49 percent in fourth grade. Assuming there were no significant changes in the cohort from one year to the next, this increase suggests students achieved at higher levels in grade 4 than in grade 3.

Finally, our analysis focuses on the early elementary grades. Readers interested in grade spans not discussed in the body of the report can refer to Figures B1 and B2 in technical appendix B.

FIGURE 1
Growth and trend data illustrated



California's SBAC Performance

In this section, we examine California's SBAC test performance from 2015 to 2018 to show student progress and create a foundation for our comparison of state outcomes. In 2015, third-grade scores started fairly low for both English and mathematics. However, from then through 2018, the share of third graders scoring at or above standards increased each year, approaching 50 percent in both subjects by 2018.

After third grade, students also made sustained growth in English as they moved up the grades. Scores improved each year, and by sixth grade the share of students achieving at or above standards in English rose by 10 percentage points. Mathematics is another story. Although third-grade scores improved, growth after third grade was inconsistent, and the share of students meeting SBAC standards in sixth grade was very similar to the cohort's third-grade outcomes.

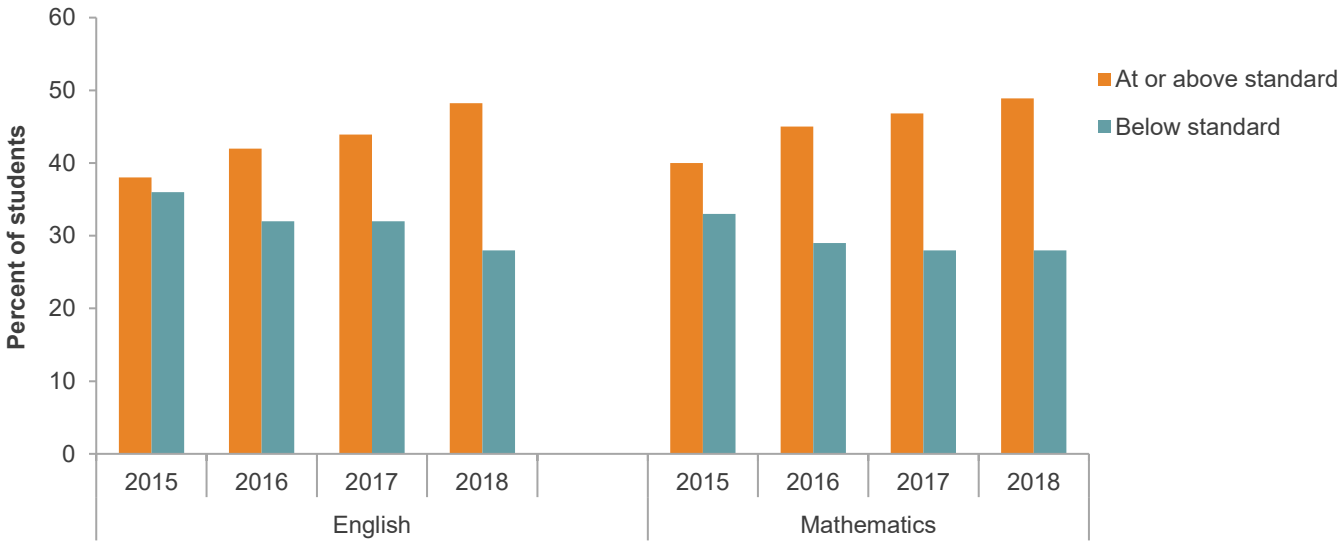
Third-Grade Scores Are Improving over Time

The first piece of evidence on California's performance looks at the trends in third-grade scores in English and math. These third-grade scores can be understood as measuring how well students are being prepared in pre–K and in the K–3 elementary grades. Figure 2 displays the proportion of students scoring proficient or below standard in third grade over the four years from 2015-2018. Each year, third-grade scores improved.[6] In both subjects, the proportion of students performing at or above standards increased about 10 percentage points, with about half of third-grade students reaching that level in 2018. At the same time, the share of students scoring in the lowest performance level shrank in both areas: 5 points in math and 8 points in English by 2018. This left 27 percent of students scoring below standard.

It is possible that changes in the different student cohorts' underlying demographics may be coloring this trend. For example, the proportion of third-grade students identified with a disability increased from 10.5 percent in 2014–15 to 11.7 percent in 2017–18. This may mean that the state's K–12 sector made even larger SBAC gains than the data reveals. On the other hand, if fewer immigrant children have been arriving in California since 2014–15, actual gains may be overstated.[7]

FIGURE 2

Third-grade SBAC scores are improving each year



SOURCE: California Department of Education and authors' calculations.

NOTES: Data represents the scores for students who were in third grade in 2015–2018. At or above standard includes students scoring in the met-standard and above-standard performance levels. Not shown is the proportion of students scoring in the near-standard performance level.

[6] Test score increases can result from a number of sources. Better teaching methods and better alignment of classroom content can both result in gains. Increases can also stem from "teaching to the test"—when teachers design their instructional program around the knowledge and skills they expect to be on the test. Both the SBAC and NAEP are designed to minimize teacher knowledge of what will be tested. The SBAC's "adaptive" assessment process means that every student's test is unique, limiting a teacher's ability to identify what questions students face on the test. The NAEP is also less susceptible to teaching to the test. The test is given to a relatively small sample of California students every two years, and teachers have no way to predict whether their students will participate. In addition, NAEP results are not generally available at the school or district level. See Koretz, 2002, for more discussion on the topic of test score inflation.

[7] Our discussion of NAEP data below is similarly vulnerable to changing demographics. For instance, the proportion of low-income students, measured by the percent of students eligible for free- or reduced-price lunches under the federal nutrition programs, increased from 46.6 percent in 2000 to 61.5 percent in 2018.

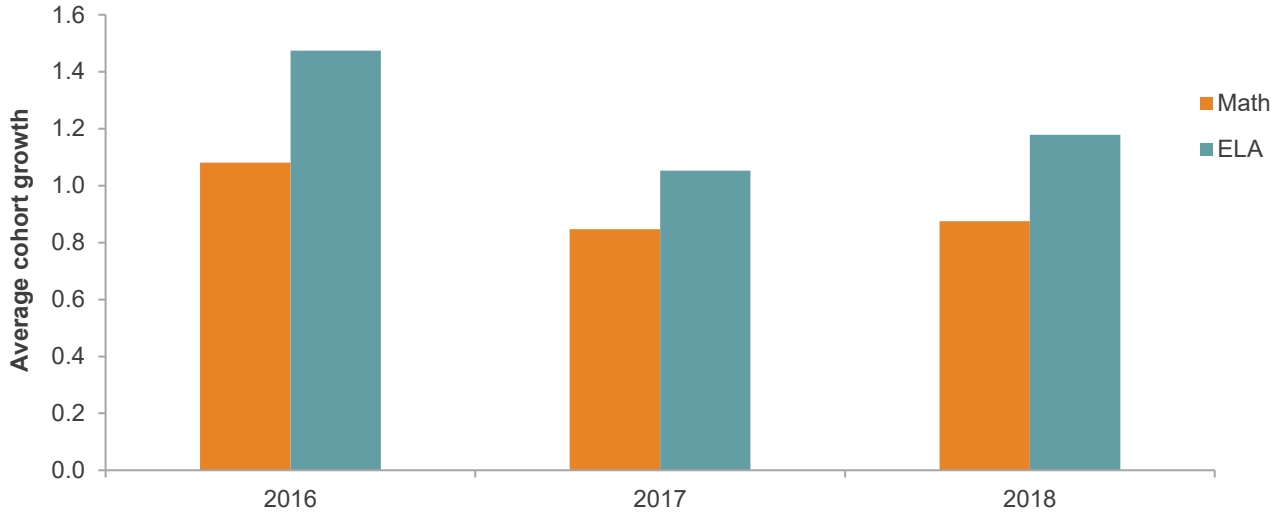
Average Cohort Growth through the Grades

California appears to be making progress in boosting third-grade outcomes. But fewer than half of tested students are meeting the SBAC standards. Continued improvement is needed as students move up through the grades. Figure 3 displays the average cohort growth for students in grades 4 through 8 from 2016 to 2018. To arrive at the results, we take all students in grades 3 through 7 in one year and measure their average growth in proficiency as they move to the next year's grade. Growth measuring "1" here indicates that from one grade to the next the average student grew at the same rate as the met standard performance level. If it is above 1, the average student grew faster, and if it falls below, growth was less than the increase in the standard.

As the figure shows, after very healthy growth in both English and math from 2015 to 2016, growth in 2017 and 2018 is more modest. Growth in 2016 may overstate actual growth in student achievement, as a number of factors unrelated to what students actually know likely boosted scores (Warren 2018).[8] In both 2017 and 2018, growth in English was greater than 1, indicating students' mastery of the standards is improving each year. The English growth score increased from 1.05 in 2017 to 1.18 in 2018. To put this difference into perspective, if students grew at the higher 2018 rate in each grade from 4 to 8, they would have learned about half a year more English content by eighth grade than if they had grown at the 2017 rate.[9] That is a pretty big difference.

FIGURE 3

Average cohort growth improved in 2018 compared to the previous year



SOURCE: California Department of Education and authors' calculations.

NOTE: Growth is defined as adjacent-grade growth in grades 4–8 (i.e., grade 3 in 2015–16 to grade 4 in 2016–17, grade 4 in 2015–16 to grade 5 in 2016–17) as a proportion of the change in lowest score in met standards level for that grade.

In contrast to English test score results, math presents a different picture. Growth in 2016 exceeded 1, meaning that student scores grew more than what was needed to keep pace with the standards. However, in both 2017 and 2018 growth was below 1: students learned less each year than was needed. Growth in 2018 improved a little, increasing from 0.85 in 2017 to 0.88 in 2018. This difference, if applied from grade 4 through 8, would yield a very small learning gain.

[8] Factors include a better understanding of the academic content tested on the SBAC assessments and more experience administering and taking the tests on computers.
[9] On average, from grade 4 to grade 8, the met standard level increases 30 points each year. The higher growth rate would result in a gain of 17 additional scale score points, yielding our rough calculation of about one half of a year's worth of additional learning.

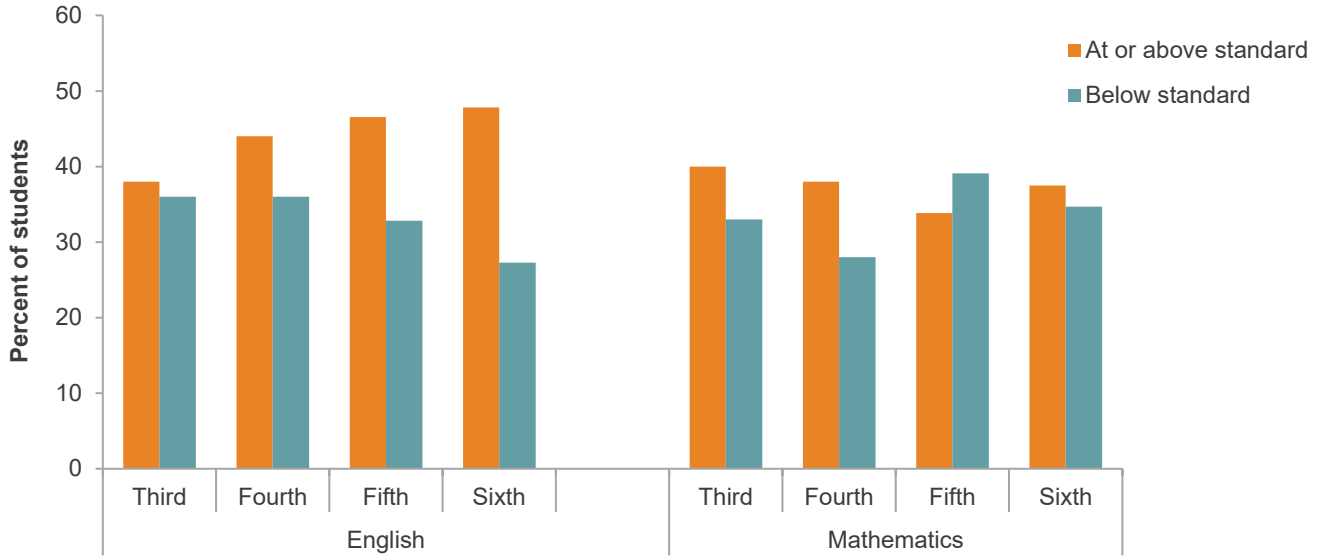
Third-Grade Cohorts Do Better in English than in Math

Another way to understand a student cohort's progress is to track changes in the proportion of proficient students (that is, those at the "met standard" and "above standard" levels) and those scoring in the lowest performance level. Figure 4 follows the 2015 third grade cohort as they progress through grades 4 to 6.[10]

As the figure shows, the proportion of students proficient in English rose in each grade, going from 40 percent in 2015 to 48 percent in 2018. The share of students scoring below standard also fell during these grades—an important development signaling that students at all levels are making gains towards proficiency. After holding steady at 36 percent in 2015 and 2016, the proportion scoring at the lowest level fell to 27 percent by 2018, when students were in sixth grade.

FIGURE 4

SBAC data show very different growth patterns in English and mathematics



SOURCES: California Department of Education and authors' calculations.

NOTES: Data represent the 2015–2018 scores for the cohort of students who were in third grade in 2015. At or above standard includes students scoring in the met standard and above standard performance levels. Not shown is the proportion of students scoring in the near standard performance level.

The progress in math is less positive. Over two years, from 2015 to 2017, the share of students scoring at or above proficiency fell by six percentage points—from 40 to 34 percent. By sixth grade in 2018, it jumped back to 37 percent. Meanwhile, the percentage of low-scoring students increased during the first two years, from 33 percent in 2015 to 39 percent in 2017, then fell to 35 percent in 2018. Since third grade this cohort has made little progress towards proficiency.

Clearly, teachers are not as successful improving mathematics scores as they are with English. In part, progress may be hindered by the significant changes to California's previous standards with the adoption of Common Core. The new standards place greater emphasis on conceptual understanding and the ability to use mathematical concepts to solve problems (Warren and Murphy 2014). One educator described the Common Core math

[10] The 2015 third grade cohort has an average growth score of 1.16 in English and 0.85 in mathematics, somewhat lower than the average for all grade cohorts over this time (1.24 in English and .93 in mathematics).

standards as "well beyond what's been asked before" (Fensterwald 2017). Although this cohort's sixth-grade improvement may indicate standards are being implemented more effectively, more data will be needed to reach that conclusion.

Income Achievement Gaps and District-Level Performance

Disparities in academic outcomes between students with different socioeconomic backgrounds have been widely documented in California and throughout the rest of the nation.[11] Lower-income students generally score lower than higher-income students, and the stubborn persistence of these income achievement gaps has been an issue of continuing focus for policymakers, advocates, and parents.[12] In California, these gaps occur in districts across all regions (Warren 2018) [13]. Indeed, where a district falls on the income-level spectrum is highly correlated with SBAC test scores. Moreover, even in more well-off districts, low-income students fare only slightly better than those in less well-off districts.

In this section, we use cohort growth through the grades to look at how achievement gaps between richer and poorer districts evolve over time. As we have seen statewide, most districts show robust growth—beyond what is needed to keep pace with standards—in English but not in math. Lower-income students and districts score lower at the beginning than do higher-income students, so they need faster growth to catch up, but this does not occur. In fact, in math, more well-off districts start from a higher base, and see slightly higher growth. Income/achievement gaps appear to be growing as students advance grade-to-grade through school.

District Achievement Gaps Reflect Family Income

Figure 5 shows the correlation between achievement and income in SBAC English test scores for 2018: it varies considerably with the level of economic disadvantage in a district. Each dot represents the share of students in a district that scores at or above proficiency, or below basic. Higher-income districts—districts with less than 20 percent of students who are economically disadvantaged—perform quite well on SBAC: Nearly all such districts have proficiency rates over 70 percent, with only a small share of students at the lowest proficiency level, below basic.

Lower-income districts with more concentrated levels of economic disadvantage fare considerably worse: those with greater than 80 percent of economically disadvantaged students see proficiency rates around 40 percent. Many of these districts have more students below basic in their grade level than at or above proficient. For math, rates of proficiency are slightly lower than for English, but the relationship between economic disadvantage and student achievement is similar. When looking only at economically disadvantaged students, gaps between districts shrink, but still exist. Student socioeconomic status appears to affect academic performance, and these differences suggest that more concentrated district poverty may also be an additional important factor affecting achievement.[14]

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[11] For example, Reardon et al. (2018) document large achievement gaps by race and student poverty. Hanushek et al. (2019) take a long-term look at racial and socioeconomic gaps in student test scores, and find we have made little progress closing these over the past several decades.

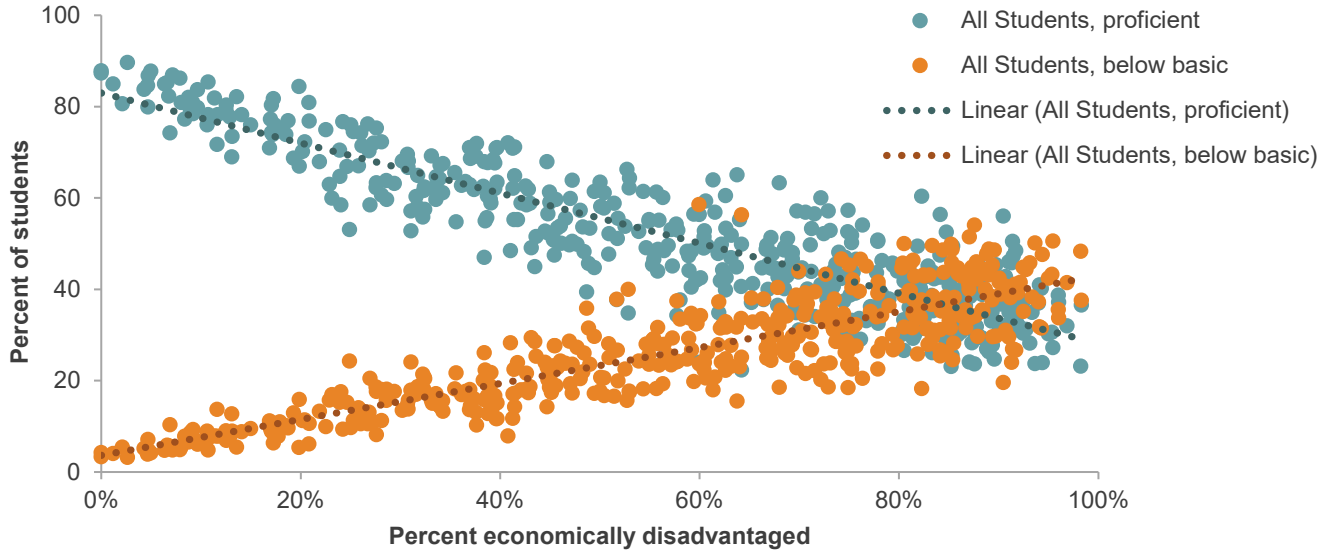
[12] Racial achievement gaps have also been widely documented and studied. Although these gaps are also of primary policy importance, in this report we limit our attention to gaps in student achievement by income.

[13] In this report we use the more widely used term "district" to refer to Local Education Agencies (LEAs), which includes both districts and independent charter schools in California.

[14] Whether or not a student is economically disadvantaged is an imperfect proxy for student socioeconomic status. Lower performance among disadvantaged students in districts with higher shares may also reflect differences in the true socioeconomic situation of these student, and not just the greater concentration of poverty.

FIGURE 5

District third-grade English performance is highly correlated with family income



SOURCES: California Department of Education and authors' calculations.

NOTES: The dotted lines represent the average percent of students in the two performance levels. Includes only districts with at least 250 tested students.

These are not novel findings; recent work examining student achievement gaps has shown that district affluence is a strong predictor of student achievement in California and across the nation (Brighouse et al. 2018). Indeed, this motivated the recent shift to a weighted funding formula (LCFF). Under LCFF, the state now provides additional supplemental funding for each high-need student. Districts with greater than 55 percent of students so classified receive additional concentration grant funding. Whether this will be sufficient to improve student achievement and reduce gaps remains to be seen.

How Does Growth Vary by District?

Given the substantial achievement gaps between districts of different income levels, it is important to understand how these gaps evolve as students advance through school. Income achievement gaps have been shown to exist before a child's entry into the K–12 system; many districts serve student populations that begin school academically further behind than others.[15] Are these districts able to make progress reducing achievement gaps? Do they catch up through faster rates of growth?

In this section we take a closer look at how growth varies by district, focusing on the cohort starting grade 3 in 2015 and reaching grade 6 in 2018. We find considerable variation, with many districts far above and below the average. In addition, we do not see faster growth in either subject for students in lower-income districts. Moreover, growth rates in math are slower for more disadvantaged districts, indicating that income achievement gaps in math increase as students advance upward in school. (Results for the two other cohorts, reported in Technical Appendix C, are generally similar (see Figures C3 and C4).)

[15] See, for example, Heckman (2011) and Reardon (2013).

Estimating district-level growth

As highlighted in last year's report on SBAC progress and growth (Warren 2018), our ability to accurately measure test score growth is limited to using aggregated SBAC results that are publicly available through the California Department of Education (CDE). The group of students that comprise each grade-year cohort may change from year to year. Student movement between districts is common, and growth estimates may be affected by changes in district demographic composition, not just the students' academic progression.

To deal with these potential problems we do two things. First, we limit our focus to only those districts that have relatively stable demographics and enrollment over the four-year period from 2015 to 2018. This leaves us with 552 districts in English and 546 in math, which represent just under 60 percent of districts but over 88 percent of tested students statewide. Importantly, roughly half of excluded districts are small districts of fewer than 11 students with non-publicly reported SBAC scores in a given grade.

Second, we adjust growth estimates for changes in the demographic composition of each district's student population. Importantly, we do not net out differences in the overall demographic composition of districts; the adjustments only account for any observable changes in a district's demographics. For the exact details on these adjustments, see Technical Appendix C.

Moreover, equally scaling growth across all districts (as we also did at the statewide level) assumes that districts with different baseline levels of achievement should grow at similar rates. But we may expect that districts where students score higher have less room to grow, or should be judged relative to the grade-to-grade increase in a standard higher than the met standard threshold. In practice, the grade-to-grade increase in the number of points required to meet each standard is similar, meaning that using different thresholds will have only a small impact on the distribution of growth we measure. Nonetheless, this is an important caveat to any analysis comparing growth rates of students or districts starting at different levels of achievement: any interpretations of differences in growth depend on our expectations for whether and how much we think students ought to improve.

Most Districts Had Robust Growth in English but not in Math

The large majority of districts experienced robust growth in excess of standards in English. In the median district the growth rate was about 1.14, meaning that growth is 14 percent above what the standards expect. Put differently, over the past four years students progressed the equivalent of more than four and one-half grade levels. Nearly 80 percent of districts had growth equal to or greater than 1, and over 25 percent in excess of 1.25—25 percent above what the standards expect. Moreover, even among districts with growth below 1, most are not far off from proficiency: less than 5 percent are lower than 0.75. (Interested readers can refer to Figures C1 and C2 in technical appendix C for the full distributions of district growth rates.)

Unlike English, in math the median district had growth of only 0.85, and only 23 percent of districts were at or above 1. Students in most districts fell behind in math with each grade progression, and many districts were far below 1. Extrapolating this trend forward suggests that by grade 11 students in the median district will be roughly one grade level (on average) behind the expectations set by the growth in the SBAC performance standards. Fortunately, growth shows signs of improvement in later grades: older cohorts fared slightly better than the third-

to sixth-grade cohort shown here.[16] Right now we can only examine growth over the four-year window in which California has used the SBAC exam. Future years of testing data will enable a more complete picture of longer-term student growth trajectories.

It is important to highlight that this lackluster growth occurs on top of relatively low rates of proficiency when students are first tested in mathematics in third grade. Not only do a majority fall short of proficient levels then, in following years even more fall behind. Clearly, considerable work remains to be done to improve math instruction in the large majority of California's school districts.

Economically Disadvantaged Districts Do Not Experience Faster Growth

Figure 6 plots our measure of adjusted district growth against the district share of economically disadvantaged students. Similar to Figure 5, each dot represents a single district, and the dotted line (known as a "trend line") plots the average relationship between growth and student disadvantage. A flat line indicates that there is no relationship between district growth and student disadvantage, whereas a downward sloping line indicates that district growth is lower in more disadvantaged districts, on average. As shown in the top panel, the trend line is flat, and thus growth in English in low-income districts is the same as in higher-income districts, on average. Thus, because students are improving at the same rate across districts of all income levels, English achievement gaps between districts are not shrinking as they progress from third to sixth grade.

The bottom panel shows the relationship between growth and district disadvantage for math. Here, the pattern is notably different: lower-income districts had lower rates of growth. The magnitude of this difference is modest, but meaningful: growth rates are roughly 12 percent lower in a district with 80 percent disadvantaged students than in a district with only 20 percent. This implies that achievement gaps in math are growing as students go from grade to grade.[17]

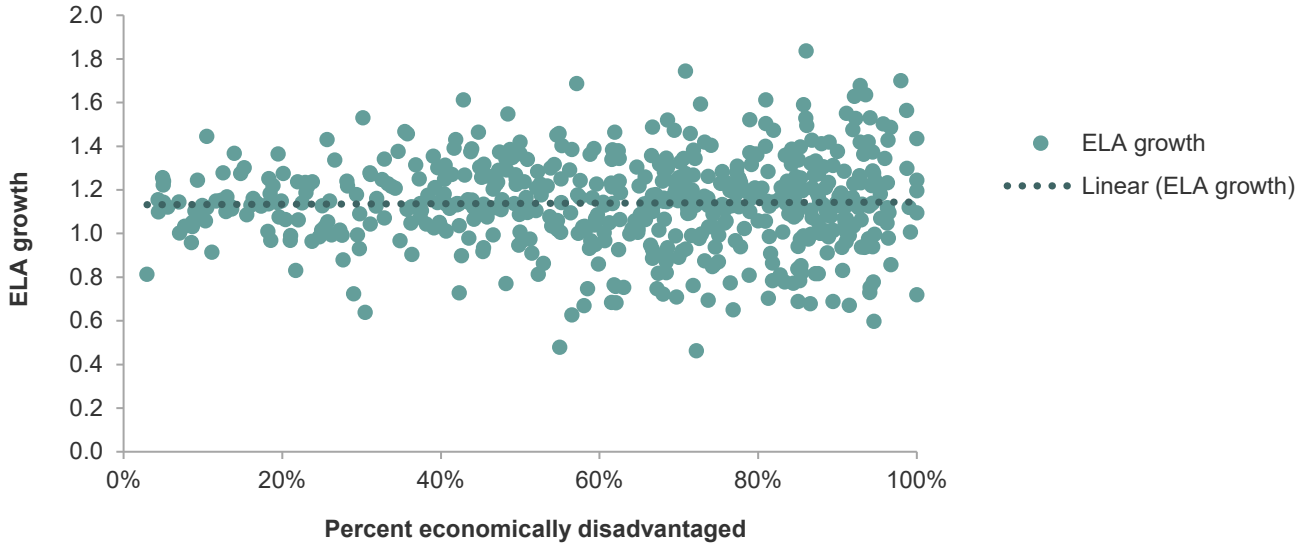
Student performance varies more among lower-income districts than higher-income districts. In English, there are many low-income districts with growth far above or far below 1. In math, there are also more outliers with very low growth rates, although relatively few districts at any income level have growth rates above 1. This variation suggests that many districts serving lower-income students are achieving notable improvement in student test scores, but students in many others are falling further behind in each grade. Identifying what is working in these low-income but high-performing districts (and what is not in the low-performing ones) could provide important insights about what can be done to reduce income achievement gaps.

[16] For the fourth- to seventh-grade cohort, the median district's growth rate in math was 0.94; for the fifth- to eighth-grade cohort it was 1.04.
[17] For older cohorts, income-achievement gradients in growth are similar, meaning that achievement gaps in math continue to grow as students advance through middle school.

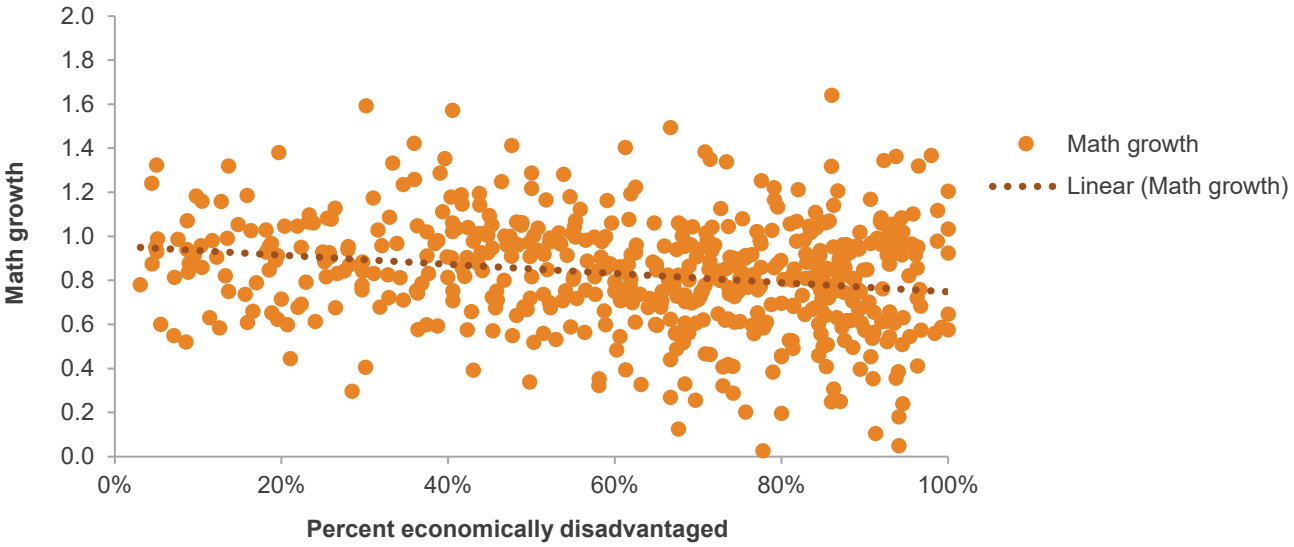
FIGURE 6

Growth in English is similar across districts, but in Math high-income districts have faster growth

English Language Arts



Mathematics



SOURCE: California Department of Education; authors' calculations.

NOTES: Each dot plots cohort growth estimates adjusted for changes in student demographics. Each dot represents one district. The top panel reports English and the bottom panel reports mathematics. The x-axis shows the percent of students in a district who were economically disadvantaged in 2015. Only the growth for the grade 3 to grade 6 cohort is shown. Growth is not reported for districts with large changes in enrollment, large changes in the student disadvantage, or for small districts with non-reported test scores. See text and Technical Appendix C for details on sample restrictions and the computation of growth measures.

California's Performance Compared to Other States

The past four years of testing data paint a mixed picture of California's performance in the K–12 system. Broad gains in English across the large majority of districts in the state, while students struggle to keep up in math, especially in lower-income districts. District-level income achievement gaps are notable, and growth in low-income districts is not sufficient to close these gaps as students advance through school. Lower-income districts have slower growth on average in math, meaning that the gaps in SBAC performance between higher- and lower-income school districts increase from grade to grade. But how do California's results compare to those of other states and the rest of the nation? Do we see similar patterns on other exams?

In this section, we place California's test score performance in a broader context. Here we focus on statewide trends in growth and performance in California, and compare these to other states and the rest of nation. We do not compare income achievement gaps in California to other states, which is beyond this report's scope.[18] We first compare performance on SBAC over the past four years with Oregon and Washington, who are also part of the Smarter Balanced Assessment Consortium. We then examine California's performance on NAEP over the past decade and a half, and compare it to other states and the national average. Compared to other states, California is making mostly positive consistent strides in boosting student achievement.

California's SBAC Growth Compared to Oregon and Washington

In 2017, ten states used the SBAC to assess students in grades 3–8 (Porter 2017). For these states, test score performance is directly comparable to California for the same subjects, grades, and years. Here, we compare California's SBAC results over the past four years to those of Oregon and Washington. None of the states in the Smarter Balanced consortium are demographically or economically matched to California.[19] However, Oregon and Washington offer the best comparison, as both are large western states with a mix of urban and rural districts. Both use the SBAC test score data for the grades and years we studied.

Overall, when compared to Oregon and Washington, California has been making significant progress in both English and math. Trends in third-grade performance are more positive, and grade-to-grade growth in both subjects is also higher. Student growth in math has been lackluster in California as more students fall below standards with each grade progression, but in the two nearby states it has been worse. These findings suggest that difficulties in math may have more to do with challenges arising from new policies affecting these states, such as the recent rollout of Common Core standards.

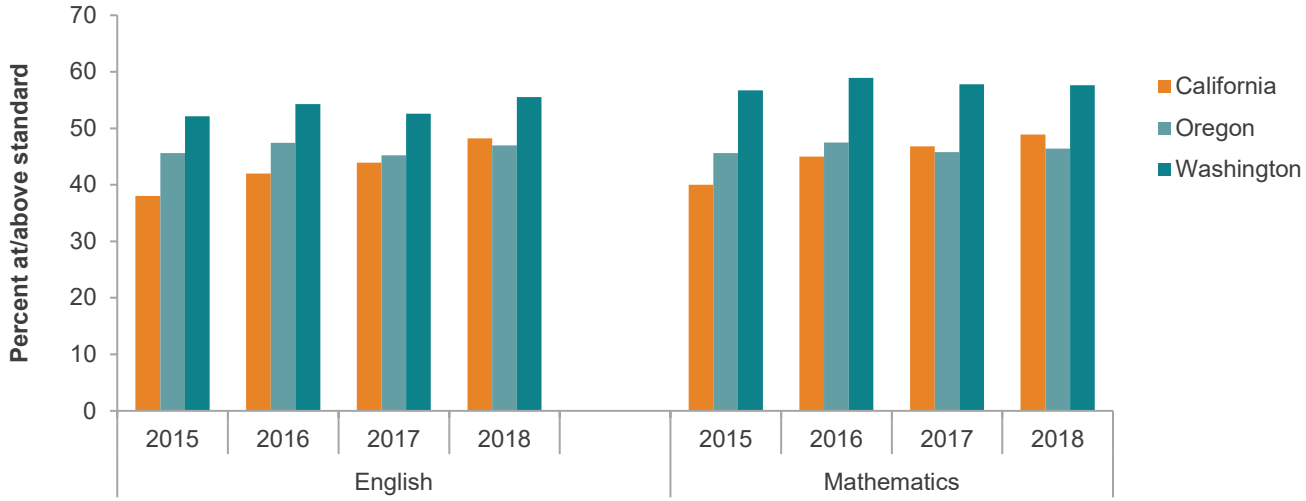
Trend data show California is closing gaps in both subjects. Figure 7 shows trends in third-grade SBAC performance for the three states. In English, the percent of California third graders at or above standards has increased consistently each year, going from 38 in 2015 to just over 48 in 2018. Trends in Oregon and Washington were also positive, but more modest. Over this period California surpassed Oregon and reduced the gap with Washington by roughly one half, from 14 percentage points in 2015 to just over 7 in 2018. Results for math paint a similar picture: trends have been mostly flat in Oregon and Washington, but California's third graders have improved by over 2 percentage points per year. The gap in mathematics proficiency with Oregon was eliminated over this period, and the gap with Washington was reduced by over one half.

[18] There is a long literature on this topic. For example, interested readers can refer to Reardon, Kalogrides, and Shores (2019), who examine racial/ethnic test score gaps by school district across the U.S.

[19] The 10 other states that used SBAC in 2017 are generally much smaller and are typically less ethnically and socioeconomically diverse than California. These states are: Connecticut, Delaware, Hawaii, Idaho, Montana, Nevada, Oregon, South Dakota, Vermont, and Washington.

FIGURE 7

Third-grade SBAC trends show California improving faster than Oregon and Washington



SOURCES: California Department of Education; Oregon Department of Education; Washington State Office of Superintendent of Public Instruction.

NOTES: Only third-grade scores are shown in this figure. At or above standard includes students scoring in the met standard and above standard performance levels.

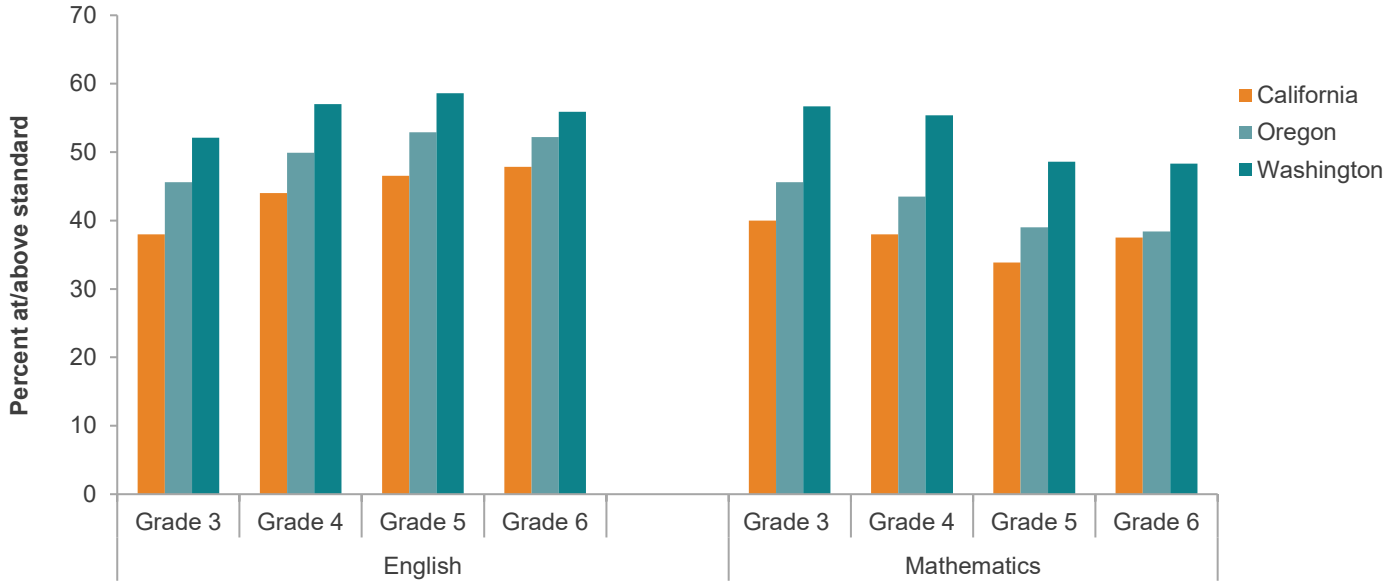
Faster growth in English. Figure 8 shows English scores for the cohort of students that began in grade 3 in 2015 and had reached grade 6 by 2018. The share of California students meeting or exceeding proficiency standards is below that of Oregon and Washington in each grade. In grade 3 in 2015, California was behind Washington by 12 percentage points and Oregon by 6. But California's growth rates over the subsequent three grades exceeded those of Oregon and Washington. By grade 6 the English proficiency gap had decreased to 6 points (Washington) and 3 points (Oregon). Thus, while overall rates of proficiency in California still lag, the state closed this gap by half in four years with higher grade-to-grade growth.

Slower declines in mathematics. Figure 8 shows math proficiency rates for the same cohort of students. As was the case in English, California students lagged far behind Oregon and Washington in overall rates of third-grade proficiency, but were able to reduce this gap significantly by sixth grade. This reduction was not the result of strong grade-to-grade growth in California. Quite the contrary: only 38 percent of students were proficient in math in grade 6, compared to 40 percent in grade 3. The gap decreased because performance slid much more in Oregon and Washington. In 2015, California third graders at or above grade level were behind Oregon and Washington by 5 and 16 percentage points, respectively. However, by the time this cohort reached grade 6 in 2018, the gap declined to 1 percentage point (Oregon) and 11 percentage points (Washington). As was also the case in California, the drop in proficiency between grades 4 and 5 is particularly noteworthy.[20]

[20] This drop from grade 4 to 5 in math is also apparent for other cohorts in other years of SBAC testing; see Figures B1 and B2 in technical appendix B for supplemental results for other cohorts.

FIGURE 8

California saw faster growth in English from grades 3 to 6 than Oregon and Washington



SOURCES: California Department of Education; Oregon Department of Education; Washington State Office of Superintendent of Public Instruction.

NOTES: Data represents the 2015–2018 scores for the cohort of students who were in third grade in 2015. At or above standard includes students scoring in the met standard and above standard performance levels.

California's Performance on NAEP

The federal NAEP provides longer-term data on the trends in the academic performance of California's public education system. NAEP exams have been administered every two years in math and reading (on average) since 1990, in grades 4 and 8.[21] Figure 9 shows reading and math proficiency standards for fourth graders by year. [22]

Progress in reading has been positive and consistent over the past 15 years. In 2003, only about 20 percent of students were at grade level in reading, and nearly half were scoring below basic. This improved considerably by 2017, the most recent year of NAEP testing. Now 31 percent are at or above standard and 39 percent are below.

Math trends over this period also show some improvement, although performance has declined somewhat since 2011. California saw robust improvement from 2003 to 2011, with trends similar to those in reading. In 2003, only 25 percent of students were at or above proficient in fourth-grade math, increasing to nearly 34 percent in 2011. Unfortunately, this progress was short lived: score gains stalled in 2013, and declined in 2015. Results for 2017 were mixed. Proficiency rates increased slightly, from 30 to 31 percent, but the share of students below standard also increased, suggesting that progress was not uniform.

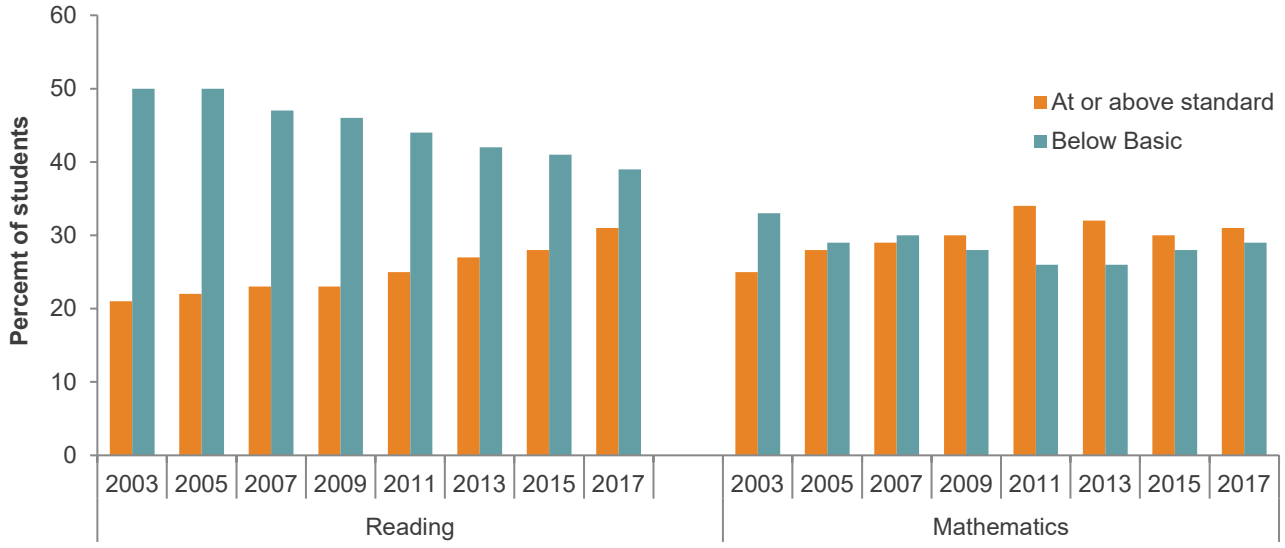
Though there are only two data points of overlap between NAEP scores and the past four years of SBAC data, the overall pattern of results paints a similar picture: improvement in English/reading is robust and ongoing; gains in math have been harder to come by in recent years.

[21] The State NAEP data, which rely on representative samples of each state, go back to 1990. However, results for the entire nation are available as far back as 1970, as a part of the Long-Term Trend Assessments.

[22] Unlike SBAC, the NAEP administers exams in reading, not English or English-Language Arts.

FIGURE 9

NAEP data show different trends in reading and mathematics for California fourth graders



SOURCE: U.S. Department of Education and authors' calculations.

NOTES: At or above standards includes scores at or above the proficient performance level. Below standard includes students who score in the "below basic" NAEP level.

NAEP testing in 2015 and 2017 took place after the California reforms were passed. The state was still implementing LCFF during this time, so the fiscal and accountability changes in the act may not have had time to generate improved teaching and instruction at the local level. Although reading and mathematics results generally improved in the post–LCFF years, there was no clear acceleration in gains.

And, in fact, California's overall reading gains since 2011 are not statistically significant: increases are not large enough to demonstrate a real change in student achievement. Reading gains by low-income students from 2011 to 2017, however, *are* statistically significant.[23] This affirms that the upward trend in California NAEP reading scores likely does reflect higher student achievement. But the statistical significance does not necessarily imply larger gains, and indeed, the amount of growth since 2011 is the same for both income groups. The 2019 NAEP results may provide a clearer measure of LCFF's impact than we have now.

The implementation of Common Core standards may have also had an impact on California's NAEP scores. In 2015, when statewide implementation began in earnest, the percent of students at or above standard fell and the portion scoring below standard increased. The 2017 NAEP results show a modest improvement, but it remains to be seen if the state has regained upward trajectory of the 2003–2011 period.

California NAEP Trends in National Context

Using NAEP trends to compare California's performance to other states broadens our understanding of California's academic performance. To maintain consistency we included Oregon and Washington in the comparison group. We also included Florida and Texas because, like California, they are both large states that serve a diverse set of students. Finally, we compare California's performance to the overall national average.

[23] Based on a significance test contained in the NAEP Data Explorer. The difference is significant at the 5 percent level.

(Interested readers can find long-term eighth-grade NAEP data for math and English in Technical Appendix D (see Figures D1 and D2).)

Compared to many states, California serves a greater share of economically disadvantaged students and a much greater share of students for whom English is a second language.[24] In addition, the demographic makeup of public schools has changed in many ways over the past 15 years. As noted earlier, trend data can be influenced by changes in the demographics of students over time, and NAEP data is susceptible to this problem. To address these differences across states and over different years, we report "constant-weighted" NAEP scores: we hold the share of economically disadvantaged students fixed at 60 percent, roughly where California is today.

Though this reweighting does not attempt to adjust for all demographic differences, it helps to make comparisons across states and years more directly comparable.[25] We also confirmed our findings using a national database that adjusts average state NEAP scores for student race, age, English-Learner status, and home language. (Technical Appendix D reports state NAEP average scores in reading and mathematics that have been adjusted for state differences in student demographics (see Figures D3 and D4).)[26]

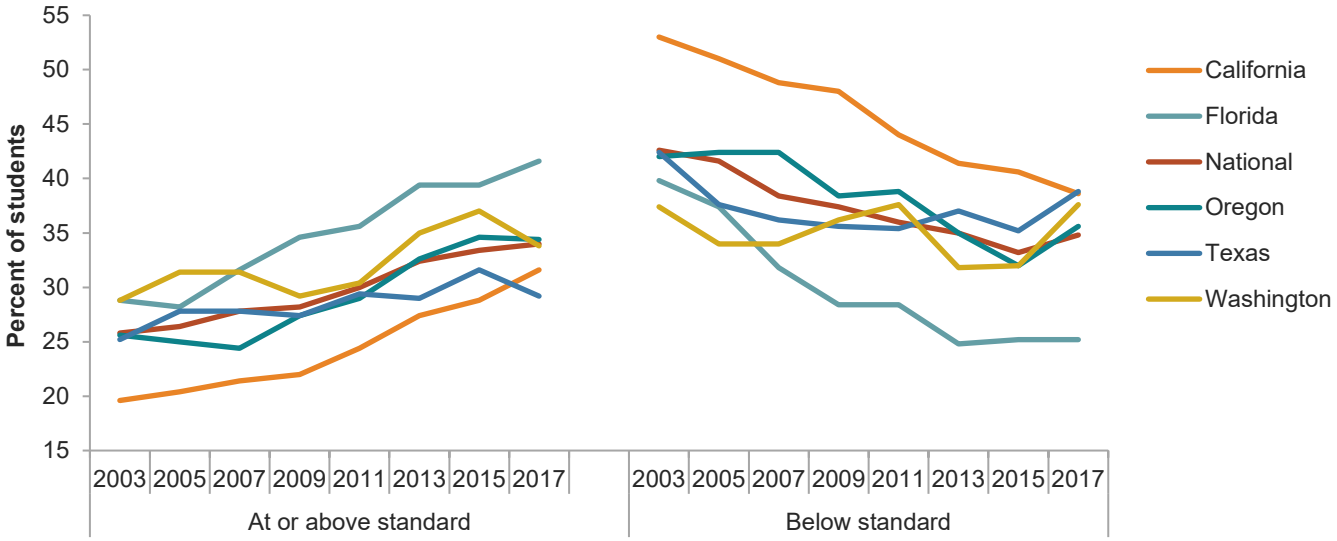
California Narrows Differences in Reading

Trends in the constant-weighted NAEP reading proficiency rates for fourth graders are reported in Figure 10. The groupings are similar to those used in the SBAC discussion above. The left side shows trends in the percent at or above the NAEP proficient standard; the right side shows the share in the lowest NAEP performance level, below basic. We omitted the share of students scoring in the NAEP basic level.

[24] California schools also comprise many more Hispanic/Latino and Asian students, but fewer white and African American students, as a share of total enrollment.
[25] Specifically, we rely on the subgroup scores reported by NAEP in each year for students who are/are not eligible for free or reduced-price lunch (FRPL). We compute a weighted average of the FRPL and non-FRPL scores for each subject-state-year combination, assigning 60 percent weight to the scores of the FRPL students within a state. For interested readers, eighth-grade NAEP scores are reported in Figures D1 and D2 in technical appendix D.
[26] The Urban Institute hosts a dataset containing average state NAEP scores from 1998 to 2017 that are adjusted for various student demographic characteristics, such as family income, race, age, and language and disability status.

FIGURE 10

California has made significant gains on the NAEP reading test, dramatically shrinking the gap with most other states



SOURCE: U.S. Department of Education and authors' calculations.

NOTES: Data represent a constant weight score, obtained by averaging the percent of students eligible for free or reduced-price meals with those of students who are not eligible. The figure assumes that 60 percent of students in all states qualify for the meals program and 40 percent do not—roughly California's proportions.

California's performance trend was more positive than the nation and all of the other comparison states shown here, with the exception of Florida.[27] For instance, the reading gap in the proportion of students scoring at or above the proficient level between California and the national average shrank from about 8 percentage points in 2003 to 2 in 2017.[28] Gaps in the share of students scoring at below standard also decreased significantly. Most of the comparison states grew at about the same rate as the national average on these two metrics.

California Trends in Mathematics Are Similar to Other States

As detailed earlier, California's performance trends in NAEP math were quite positive until 2011, after which gains subsided and performance slid back somewhat. Figure 11 places these trends in a national context, again using constant-weighting data to adjust for demographic differences in students across states and over time.

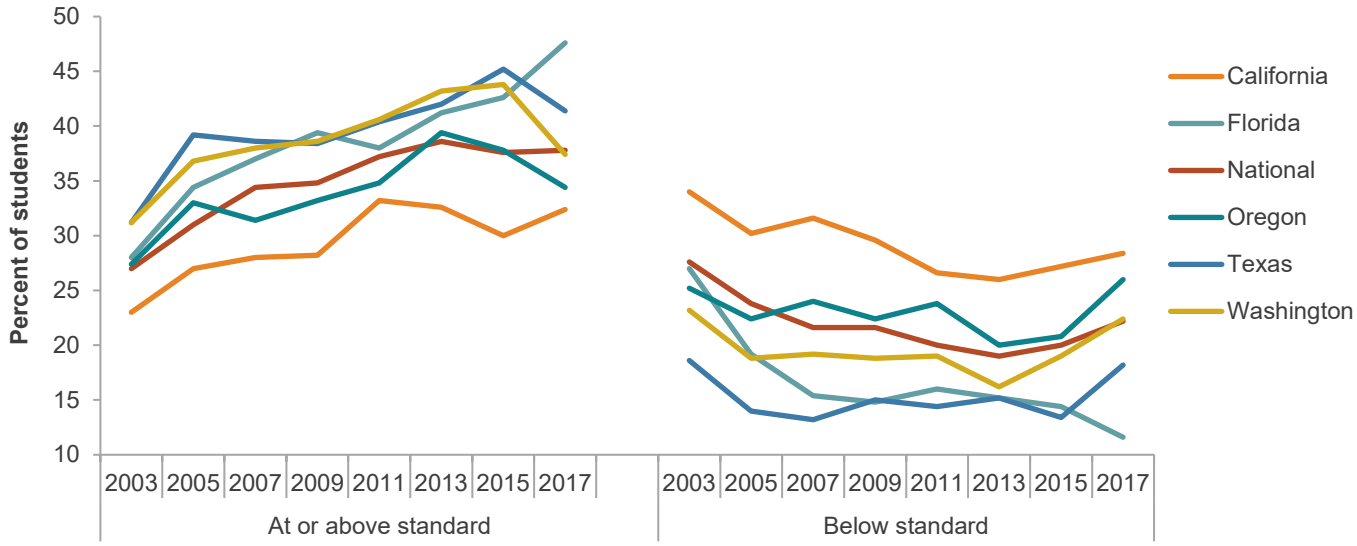
California's trends in math performance have roughly matched those of the comparison states and the national average. From 2003 to 2011, the percent of students reaching proficiency in fourth-grade math increased in California and the rest of the nation at a rate of about 1 percentage point per year. Similarly, the share of students below basic fell by about the same rate.

[27] Florida stands out for its rapid growth in reading and math scores. Florida made similar gains to California, although many more students in Florida scored at proficient levels and many fewer were at below standard. Several Florida reforms, such as a policy of retaining students in third grade if they were unable to score at certain levels on the state's English and math tests, may have resulted in NAEP overstating fourth graders' learning gains. Even after adjusting for this effect, the research concludes that Florida's system-wide improvements did in fact result in large learning gains (Winters 2012).

[28] The raw, unweighted gap went from 10 percentage points in 2003 to 6 percentage points in 2017, a 40 percent decline.

FIGURE 11

California's gains on the NAEP math test stopped in 2011



SOURCE: U.S. Department of Education and authors' calculations.

NOTES: Data represent a constant weight score, obtained by averaging the percent of students eligible for free or reduced-price meals with those of students who are not. The figure assumes that 60 percent of students in all states qualify for the meals program and 40 percent do not—roughly California's proportions.

Over the more recent period from 2011 to 2017, most state gains in mathematics slowed. California's trend in math during this period is actually slightly worse than the rest of the nation, and is mostly driven by declines between 2011 and 2015. The 2015 and 2017 trends are more encouraging for California. Its proficient share increased by nearly 5 percentage points, while the national share increased only very slightly. Oregon, Texas, and Washington saw notable declines.

Even so, California's increases are not statistically significant. Whether this upturn is a meaningless blip in the data or the start of an encouraging trend remains to be seen. The 2019 NAEP results will provide an important indication of the California direction, given the implementation challenges the new Common Core mathematics standards present.

Data Suggest California Is (Mostly) Headed in the Right Direction

In this report, we examined California's K–12 system performance by tracking student performance on state and federal tests. We looked at these data from several perspectives, and the results show surprisingly consistent findings about the functioning of our state's school system.

California is making broad strides in English. NAEP data from 2003 show that California students scored far below other states in reading proficiency. Over the next 15 years, performance on NAEP steadily improved: when weighted for California's share of low-income students, fourth graders' reading skills are now almost at the national average. SBAC data tell a similar story. California's third graders originally scored well below students in Oregon and Washington. They caught up with their counterparts in Oregon and narrowed the gap with those

in Washington. And they are growing faster as they progress from third to sixth grade than are students in Oregon and Washington.

The income achievement gap is holding constant in California as all groups of students appear to make consistent growth in English proficiency. District SBAC gains are the same for districts with low and high percentages of low-income students. Similarly, NAEP reading gains are almost identical for low- and higher-income students, and the sustained increases in low-income student scores are statistically significant.

Math continues to be a challenge. California's math scores are a mixed bag. As in reading, NAEP data showed 2003 fourth-grade scores falling well below most other states, with steady improvement through 2011; after that they plateaued. SBAC mathematics data tell a similar tale. The proportion of students scoring at or above proficient and at the lowest levels stayed relatively constant as students progressed from grade 3 to 6. On the positive side, however, third graders in California are catching up with their counterparts in Oregon and Washington, and California students make larger annual gains than students in these states as they move up the grades.

California's income achievement gap in math may actually be increasing as students move upwards through school. Low-income students seem to be having more trouble with mathematics than higher-income students. NAEP data indicate that neither group has made much progress since 2011, but our SBAC district analysis found that districts with high proportions of low-income students were making smaller annual gains than those with lower shares.

State progress is slow. Change is a gradual process for very large, complex K–12 systems like California's. The last 15 years of NAEP data show that states in our comparison group (and the nation as a whole) have been unable to generate achievement at levels that match our goals for students. These data also indicate that California made considerable progress in raising reading proficiency. But this progress is the result of small consistent increases over a sustained period of time.

It is important to acknowledge the conflict between California's goals and the pace of change. Leaps in the state's performance are unlikely from year to year. Moreover, progress should be broad-based, reflected in better outcomes for high- and low-performing students, and all student subgroups and districts. LCFF recognizes that the process of improvement is intensely local. Each school and district needs to determine how best to address performance issues. Many now focus on analyzing causes and identifying and implementing effective solutions, with mixed results. This is why the state's system of support for struggling districts is such a critical long-term element in the success of both LCFF and Common Core.

As our analysis shows, when relatively small gains are made consistently over time, the cumulative improvement can be significant. And when district gains are more widespread, state-level results will improve more rapidly. Policymakers should focus on whether students, schools, and districts are improving each year. Do schools consistently get better, or are many struggling to find more effective ways of teaching? What does it take to boost the gains of low-income students?

More help is needed for math instruction. Elementary and middle school math instruction focuses on fundamental skills that are needed for success in high school math courses—and thus for success in college and many jobs. Failure to grasp mathematics skills and concepts in these grades can have long-term consequences for students. But the data suggest that Common Core implementation has not yet translated into system-wide improvements in math.

Currently, the state has few resources for helping districts improve mathematics instruction. The state system of support, charged with helping county offices assist struggling districts, is implementing an early mathematics initiative, focused on improving math skills in children up to the age of eight. There are no similar programs

focused on math in grades 3–8, though. Districts also participate in a number of groups and programs aimed at improving K–8 math instruction. A modest amount of short-term state funding could provide the multi-year foundation needed to address instructional issues in math for grades 3–8 and ensure high-quality assistance to districts is available.

Better data are needed. Understanding the true progress of students—and subgroups like low-income students—requires better data than are now available. Because students move to new schools and districts, and because family income can change significantly over time, comparing scores for schools, districts, and subgroups using current SBAC data will likely yield misleading results. Accurate growth data are tremendously important to parents, educators, and policymakers, who want to know that students are learning at rates that are consistent with long-term success in school. Unfortunately, with California Department of Education's (CDE) existing published data, accurate growth estimates are mostly unavailable.

CDE is now in the early stages of planning for the development of better growth data. This should be done quickly so that educators, parents, and the public can easily assess how schools and districts are meeting the needs of students—and especially of students who are more likely to struggle in school. Our district analysis found some districts serving high proportions of low–income students in which student achievement grows much faster than the average. With more accurate student-level growth data, educators could focus attention on these districts, looking for instructional approaches that work in low-income districts. California should also use growth data as part of its accountability system, as is the norm nationally. In fact, California and Kansas are the only two states that do not use any growth measure when assessing student performance (Data Quality Campaign 2019).[29]

The problem of limited information on California's student achievement has major policy implications as well. Determining the success of LCFF and Common Core should be based on good data and realistic expectations about the pace of change with state-level reforms. Public access to useful and accurate performance data that chronicle the successes—and failures—of California's recent K–12 reform efforts is essential to tracking change and implementing effective improvements.

[29] The CDE does compute a measure, "change in distance to met standard," that is considered to be a growth measure by some definitions. But the state does not yet release measures of student-level grade-to-grade gains as is more common in other states.

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