

# Student Achievement and Learning Acceleration on Spring 2024 Ohio State Tests

Vladimir Kogan  
Department of Political Science  
The Ohio State University  
[kogan.18@osu.edu](mailto:kogan.18@osu.edu)

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## Abstract

As of spring 2024, the performance of Ohio students in English language arts (ELA) has mostly recovered to levels seen before the start of the pandemic (apart from eighth grade), and indeed now exceeds pre-pandemic achievement in several grades. In addition, large gaps in ELA achievement between student demographic subgroups and districts that emerged during the first year of the pandemic have substantially narrowed and are now near their pre-pandemic levels. Students with disabilities and English learners remain behind each group's respective pre-pandemic baseline, however.

In math, achievement remains considerably lower (except in ninth grade Algebra), and students have made minimal improvements in math over the past year in most grades. The remaining shortfalls represent about a month of learning in elementary grades and grow to between one-third and one-half of a school year in middle school grades. Achievement also remains lower in science and social studies in some grades, although the magnitudes vary.

In third-grade ELA, students learned 28 percent less between the fall and spring testing windows during the 2023-24 school year relative to the pre-pandemic trajectories. This represents a larger decline than seen during the 2020-21 school year, which was marked by attendance and staffing disruptions.

*\*Any opinions or recommendations presented in this analysis are those of the author and do not represent policy positions or views of the John Glenn College of Public Affairs, the Department of Political Science, the Ohio Department of Education and Workforce, or The Ohio State University.*

# I. Summary

This document provides an overview of student performance on the spring 2024 Ohio State Tests, using preliminary scores from the statewide test vendor files. It is the latest in a series of analyses completed since February 2021 to track how the Covid-19 pandemic has impacted student achievement in the state and the recovery since then.

Methodologically, this report generally follows the approach used in the analysis of spring 2023 test scores released a year ago. To make student achievement comparable over time and hold constant potential student compositional changes, the estimates presented below statistically adjust (or “control”) for important student demographic characteristics, including race, gender, socioeconomic status, and school district of attendance.

Achievement comparisons are provided for end-of-year exams in English language arts (ELA) and mathematics spanning grades three through eight as well as for the high school ELA II, Algebra, and Geometry end-of-course exams. For science, the comparisons include fifth and eighth grade end-of-year exams and tenth grade Biology end-of-course exams, and for social studies, the U.S. History and U.S. Government end-of-course exams.

The report also provides estimates of *annual* gains in student achievement compared to similar gains among pre-pandemic cohorts to quantify the extent to which efforts to “accelerate” learning in Ohio have been successful.<sup>1</sup> These estimates cover grades four through eight in ELA and math.<sup>2</sup>

The final set of figures focus on learning *during* the academic year, examining achievement growth between the fall and spring testing windows on the third-grade ELA exams, which are taken by most students twice during each academic year.

When describing changes in tested student performance across student cohorts, the presentation focuses on two outcomes. First, the report examines the share of students attaining grade-level proficiency — demonstrated by scoring 700 or higher on the relevant Ohio State Test (OST). One limitation of this metric, however, is that it captures changes in achievement among a relatively narrow subset of students who are likely to be near the proficiency threshold (i.e., students for whom modest changes in achievement will cause scores to fall below or move above 700). As discussed below, the *dispersion* of test scores (as measured by the “standard deviation”) has also changed significantly over time for some tests, potentially affecting the proficiency rates independent of changes in average scores.

The second measure examines changes in standardized continuous scaled scores. This is reported in student “standard deviation” units and captures learning impacts across a much broader range of baseline achievement, one reason standard deviation units are preferred by researchers.<sup>3</sup> Table A3 in the Appendix reports the means and standard deviations for each exam based on the pre-

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<sup>1</sup> One reason for why achievement has changed from one year to the next, even after accounting for demographic characteristics, is that the pandemic affected these cohorts at different ages and age may have moderated the associated learning disruptions. Focusing on one-year gains provides a clean estimate of learning recovery and is not confounded by differences in age at the time the pandemic hit.

<sup>2</sup> One-year growth estimates are not available for high school students because they do not take the state exams every year.

<sup>3</sup> See Andrew Dean Ho, 2008, “The Problem With ‘Proficiency’: Limitations of Statistics and Policy Under No Child Left Behind,” *Educational Researcher*, 37(6), 351-360.

pandemic distribution of achievement. The numbers in this table are used for standardizing the reported effect sizes.<sup>4</sup>

Unlike proficiency rates, standardized scale scores are less intuitive. To aid interpretation, these effect sizes can be compared to typical annual achievement growth in the relevant grade and subject observed on nationwide exams.<sup>5</sup> Such a comparison enables the reader to benchmark estimated impacts against a typical year's worth of learning in a grade and subject. Because the amount of typical growth varies across grades and subjects, it would be misleading to directly compare the numerical effect size estimates below across grades or subjects. Instead, the reader is encouraged to consider how the numeric estimates (in test score standard deviations) compare to typical annual achievement growth in each grade and subject. Unfortunately, national growth benchmarks are not available for science and social studies.

Here are the main findings:

- Student achievement in ELA has mostly recovered, and indeed now exceeds pre-pandemic levels in several grades. In addition, large gaps in ELA achievement between student demographic subgroups and districts that widened during the first year of the pandemic have now largely returned to pre-pandemic levels. In grades where gaps remain, Black students and those attending urban districts remain somewhat behind these students' pre-pandemic performance, with the difference representing about a month of learning.

There are several exceptions to this overall trend, however. ELA achievement in eighth grade remains below pre-pandemic levels, a shortfall among spring 2024 test takers that represents more than a third of a typical school year of learning. In addition, students with disabilities and English learners also appear to be below each group's respective pre-pandemic performance. This may be the result of a growing share of students with disabilities taking the regular state tests instead of alternative assessments and an increase in recent immigration (for English learners). The remaining achievement differences among these groups may not be attributable to pandemic disruptions alone.

In math, students remain considerably behind pre-pandemic levels (except in ninth grade Algebra), with minimal improvement from last spring. The remaining shortfall represents about a month of learning in elementary grades and grows to between one-third and one-half of a school year in middle school grades.

Shortfalls also remain in science and social studies in some grades, although the magnitudes vary across these grades. In science, fifth grade performance has recovered to pre-pandemic levels, with a modest gap remaining in eighth grade and a larger shortfall on the Biology exam, typically taken by tenth graders. In social studies, students continue to perform below pre-pandemic levels in both history and government exams taken by high school students.

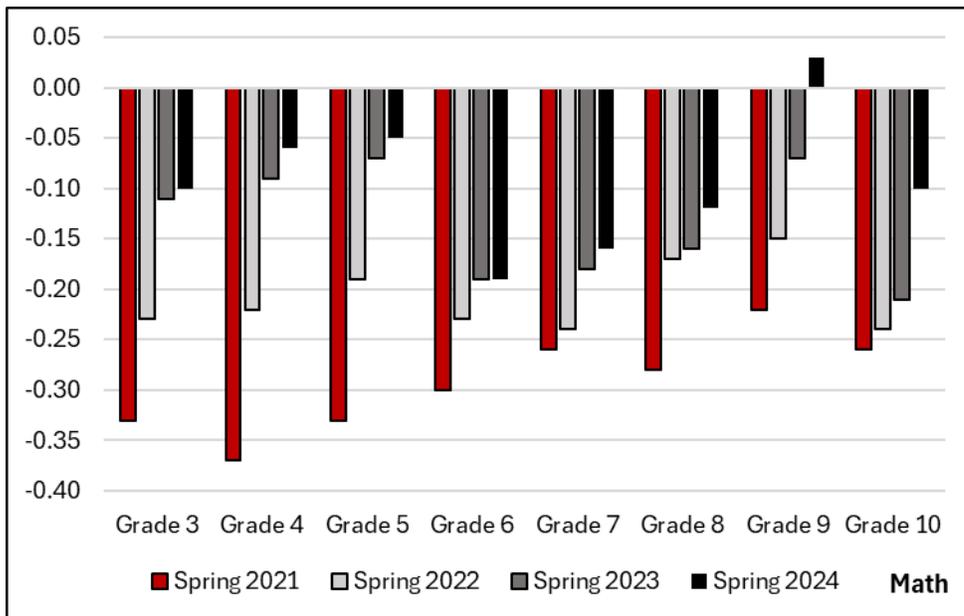
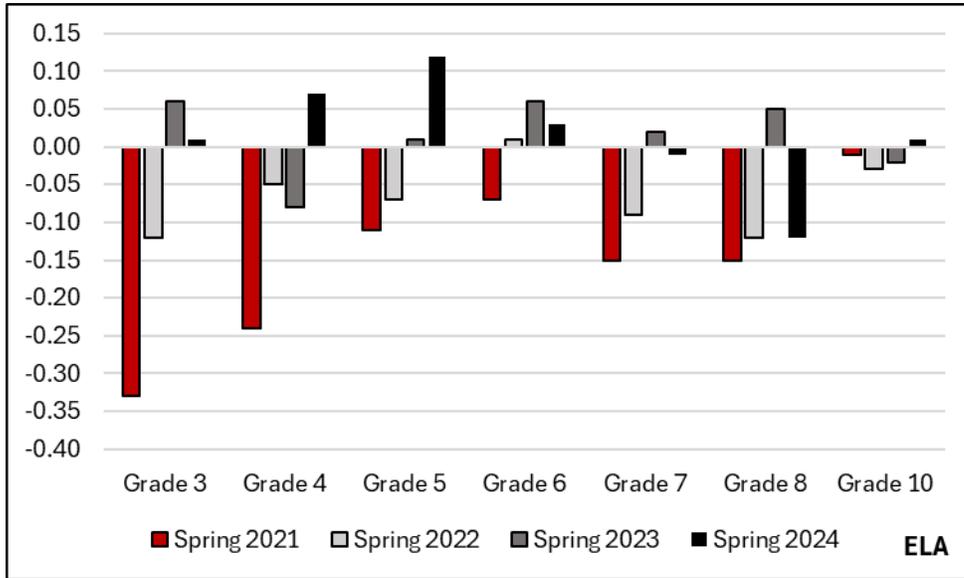
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<sup>4</sup> Scores are standardized by subtracting the pre-pandemic mean and dividing by the pre-pandemic standard deviation of the relevant exam.

<sup>5</sup> These benchmarks are based on national tests, but the estimates for Ohio November-to-April achievement growth in third-grade ELA are quite similar in magnitude. That suggests that the national benchmarks provide useful points of comparison for interpreting the effect sizes reported below.

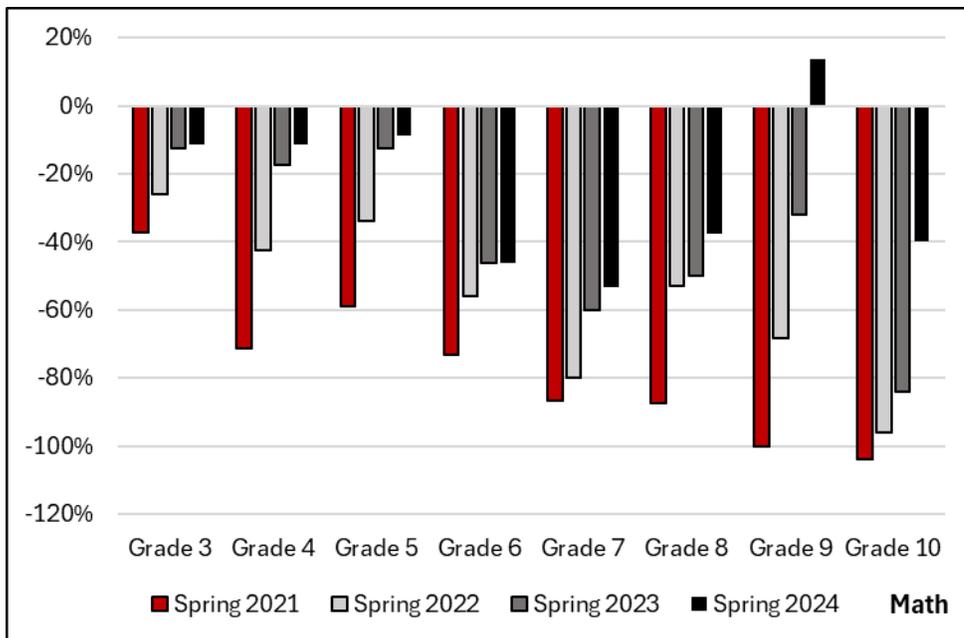
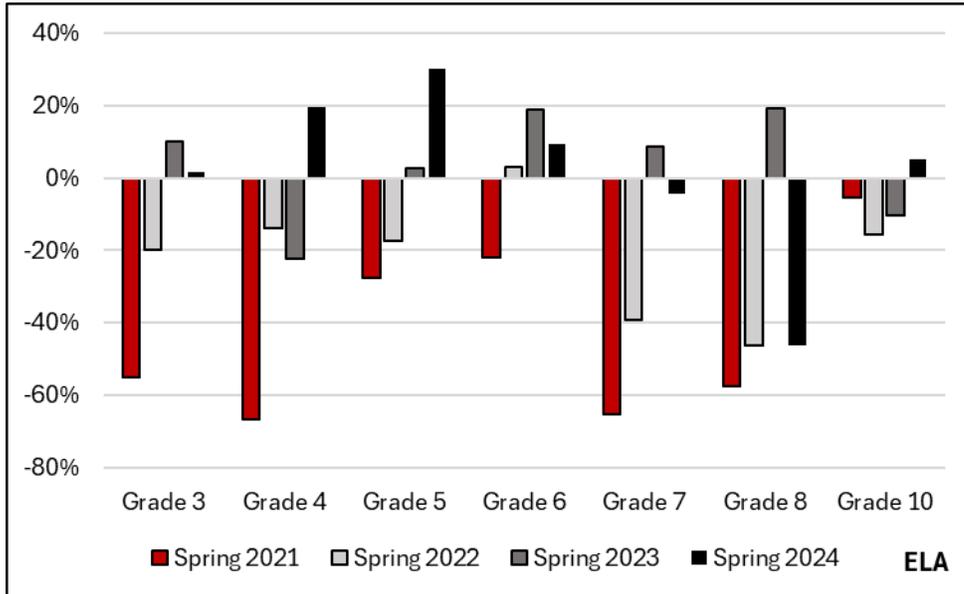
See Tables 1 through 20 for full results.

**Figure 1. Changes in scaled scores (standard deviation units) compared to pre-pandemic baseline, by grade and subject**



Note: The figure presents the average differences in normalized test scores in standard deviation units compared to the pre-pandemic period (spring 2019). Changes in test scores are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Grade 10 scores are based on the ELA II and Geometry end-of-course exams, which are not taken by all tenth graders. Grade 9 math scores are based on Algebra end-of-course exams, which some students may also take in other grades. Scores from students who took these exams in other grades are excluded from these estimates (see tables in Appendix for full results that include students in all grades for the high school exams).

**Figure 2. Changes in scaled scores (as percent of a year of learning) compared to pre-pandemic baseline, by grade and subject**



Note: The figure presents the differences in normalized test scores as a percent of a typical year of learning compared to the pre-pandemic period (spring 2019). Changes in test scores are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." Estimates are converted to percent of a year of learning using national benchmarks in Appendix Table A2. Grade 10 scores are based on the ELA II and Geometry end-of-course exams, which are not taken by all tenth graders. Grade 9 math scores are based on Algebra end-of-course exams, which some students may also take in other grades. Scores from students who took these exams in other grades are excluded from these estimates (see tables in Appendix for full results that include students in all grades for the high school exams).

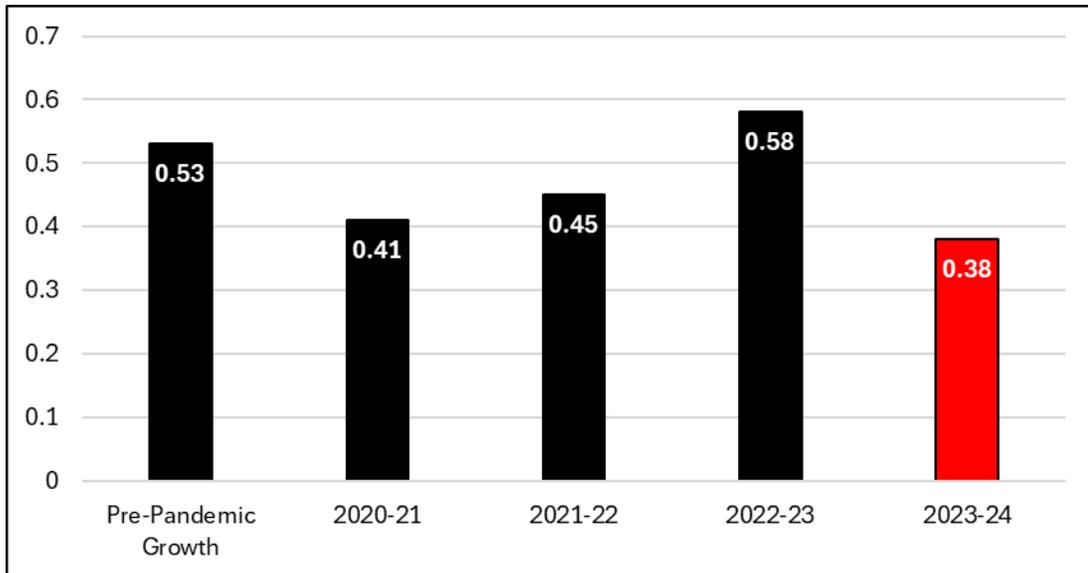
- The over-time patterns in achievement may reflect both changes in learning rates as well as differences in initial declines across different cohorts of students, who were at different ages when the pandemic hit. To directly quantify the magnitude of “learning acceleration,” the analysis examines whether one-year growth rates have increased compared to pre-pandemic cohorts. In other words, it asks whether students are learning more from one year to the next — as measured by state assessments — compared to learning trajectories observed among students with similar starting levels of achievement before the pandemic.

These results (see Tables 21 through 25) confirm that year-to-year ELA growth continued to exceed pre-pandemic benchmarks across most grades during the 2023-24 school year, but at a slower pace than seen during the previous two years. There was no evidence of learning acceleration in math over the past year — indeed, in some grades, math achievement increased at a slower pace than was the case before the pandemic. One-year growth rates are not available for high school students because they are not tested yearly.

- In third-grade ELA, students learned 28 percent less between the fall and spring testing windows during the 2023-24 school year relative to the pre-pandemic norms. This represented less growth than seen during the 2020-21 school year, which was marked by many attendance and staffing disruptions.

Unlike the 2020-21 shortfalls, which were concentrated in specific student subgroups, last year’s decline was widespread and affected nearly every student demographic.

**Figure 3. Changes in fall-to-spring standardized test score growth on third-grade ELA OST compared to pre-pandemic years**



Note: The figure presents the average fall-to-spring growth of normalized test scores in standard deviation units relative to pre-pandemic years (2018 and 2019). These are regression estimates that compare changes in test scores over time for students who took the same exam in fall and spring of each year.

- There is considerable district-level variation in the achievement trends that are not captured in the statewide averages described above. In math, some of this variation appears to be due to differences in the amount of federal pandemic aid allocated to districts. Statistical models designed to isolate the causal effect of aid (described in more detail in the technical appendix) suggest that each \$1,000 in per-student federal aid increased math achievement growth by a cumulative 0.02 standard deviations over the past three years.<sup>6</sup> By contrast, there is no evidence that federal aid produced meaningful acceleration in ELA or that such aid explains variation in ELA recovery seen across districts. Both findings are consistent with recent research on the impact of federal pandemic aid seen in national achievement data.<sup>7</sup>
- For some grades and subjects, the trajectories of average test scores and the proficiency rates appear to be moving in opposite directions, with improvements evident on one metric but declines on another. This appears to be driven by an increase in the *dispersion* of test scores over time, which is particularly pronounced on some science and social studies exams. Table A4 in the Appendix tracks how the standard deviation of scores on each test has changed over time. The growing dispersion of test scores suggests caution in using changes in proficiency rates as the primary metric for tracking achievement trajectories over time as this may paint a misleading picture of the broader achievement trends.

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<sup>6</sup> The analysis focuses on growth in grades four through eight in math and ELA. This likely understates the *total* impact of federal aid since it also paid for services provided to younger students (grades K through 3) and high school students (grades 9 through 12) as well as programming in other subjects.

<sup>7</sup> Dan Goldhaber and Grace Falken, 2024, “ESSER and Student Achievement: Assessing the Impacts of the Largest One-Time Federal Investment in K12 Schools,” CALDER Working Paper No. 301-0624; Dan Dewey, Erin Fahle, Thomas J. Kane, Sean F. Reardon, and Douglas O. Staiger, 2024, “Federal Pandemic Relief and Academic Recovery,” Education Recovery Scorecard. These papers estimate that each \$1,000 in federal aid increased math achievement by between 0.008 and 0.0168 on average. However, both studies examine achievement only through spring 2023. Through this period, our estimates for Ohio are 0.016, with an additional 0.004 in acceleration over the 2023-24 academic year. See Table A1 for year-by-year estimates.

## **II. Tables of Full Results, by Subject and Grade**

*English language arts results by grade:*

**Table 1. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, third grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.33 [N=114,236]	-0.12 [N=120,253]	+0.06 [N=120,656]	+0.01 [N=117,050]	-16.1% [N=114,236]	-7.4% [N=120,253]	-3.9% [N=120,656]	-1.2% [N=117,050]
<b>Race/ethnicity</b>								
White	-0.27	-0.12	+0.10	+0.01	-14.1%	-6.7%	-2.8%	-0.7%
Black	-0.53	-0.15	-0.04	-0.01	-22.6%	-10.0%	-6.9%	-2.2%
Hispanic	-0.43	-0.14	-0.02	-0.04	-19.6%	-8.5%	-6.8%	-3.2%
Asian	-0.31	-0.07	+0.17	-0.02	-12.6%	-4.7%	-2.7%	-2.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.25	-0.12	+0.13	0	-12.7%	-6.3%	-2.6%	-1.5%
Economically Disadvantaged	-0.40	-0.11	+0.01	+0.01	-19.2%	-8.2%	-5.0%	-1.1%
<b>Disability</b>								
Not With Disabilities	-0.33	-0.12	+0.08	+0.01	-16.5%	-7.2%	-3.9%	-1.0%
With Disabilities	-0.34	-0.08	0	+0.02	-13.2%	-7.3%	-3.3%	-1.3%
<b>English learner</b>								
Not English Learner	-0.33	-0.12	+0.07	+0.01	-16.0%	-7.3%	-3.6%	-0.9%
English Learner	-0.46	-0.11	-0.11	-0.01	-18.5%	-7.8%	-8.3%	-5.7%
<b>Gifted</b>								
Not Gifted	-0.35	-0.12	+0.03	-0.01	-17.9%	-7.9%	-4.2%	-1.4%
Gifted	-0.14	+0.04	+0.37	+0.15	-4.1%	-0.3%	+0.6%	1.0%
<b>District mode of learning in 2020-21</b>								
In-person	-0.25	-0.11	+0.11	+0.03	-13.6%	-6.3%	-2.4%	-0.2%
Hybrid/mixed	-0.31	-0.11	+0.08	0	-15.2%	-6.7%	-3.3%	-1.4%
Remote	-0.56	-0.17	-0.04	0	-23.0%	-10.8%	-8.0%	-2.4%
<b>District type</b>								
Rural	-0.28	-0.13	+0.06	0	-15.6%	-8.0%	-3.5%	-1.1%
Town	-0.26	-0.12	+0.08	+0.02	-13.9%	-6.9%	-2.4%	-0.4%
Suburban	-0.27	-0.09	+0.13	+0.02	-13.5%	-5.4%	-2.5%	-0.7%
Urban	-0.50	-0.15	-0.03	-0.01	-21.2%	-9.7%	-6.9%	-2.2%
<b>District achievement quartile</b>								
1st Quartile	-0.44	-0.12	+0.01	+0.01	-19.3%	-8.6%	-5.2%	-1.2%
2nd Quartile	-0.28	-0.10	+0.08	+0.06	-15.4%	-6.7%	-3.1%	1.2%
3rd Quartile	-0.29	-0.13	+0.09	0	-15.6%	-7.2%	-3.0%	-1.6%
4th Quartile	-0.24	-0.12	+0.13	-0.02	-12.0%	-6.0%	-2.9%	-2.0%
<b>School Type</b>								
Traditional Public School	-0.33	-0.12	+0.07	+0.01	-15.8%	-7.3%	-3.7%	-1.1%
Site-Based Community School	-0.48	-0.17	-0.06	-0.02	-21.6%	-10.4%	-6.8%	-2.2%
Virtual Community School	-0.19	+0.04	+0.04	-0.03	-10.5%	-2.0%	-1.7%	-2.3%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 2. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, fourth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.24 [N=112,869]	-0.05 [N=117,923]	-0.08 [N=119,884]	+0.07 [N=119,465]	-6.8% [N=112,869]	-0.1% [N=117,923]	-2.8% [N=119,884]	+3.6% [N=119,465]
<b>Race/ethnicity</b>								
White	-0.18	0	-0.03	+0.11	-5.1%	+0.9%	-1.4%	+3.8%
Black	-0.41	-0.23	-0.24	-0.07	-12.2%	-3.8%	-6.7%	+2.6%
Hispanic	-0.32	-0.13	-0.17	-0.03	-9.4%	-0.8%	-4.7%	+3.2%
Asian	-0.21	+0.02	-0.13	+0.15	-4.9%	-0.1%	-5.0%	+2.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.15	+0.02	0	+0.15	-3.9%	+0.4%	-1.6%	+3.1%
Economically Disadvantaged	-0.31	-0.12	-0.15	+0.01	-9.5%	-0.3%	-3.8%	+3.8%
<b>Disability</b>								
Not With Disabilities	-0.23	-0.03	-0.06	+0.11	-7.2%	+0.2%	-2.8%	+4.1%
With Disabilities	-0.26	-0.19	-0.16	-0.13	-4.3%	-0.6%	-1.8%	+1.7%
<b>English learner</b>								
Not English Learner	-0.23	-0.05	-0.07	+0.09	-6.8%	0%	-2.5%	+3.8%
English Learner	-0.33	-0.22	-0.32	-0.23	-8.0%	-2.4%	-8.7%	+0.1%
<b>Gifted</b>								
Not Gifted	-0.26	-0.09	-0.12	+0.03	-7.9%	-0.2%	-3.2%	+3.8%
Gifted	-0.15	+0.12	+0.16	+0.25	-2.0%	+0.1%	+0.2%	+1.5%
<b>District mode of learning in 2020-21</b>								
In-person	-0.16	0	-0.03	+0.13	-4.1%	+1.6%	-0.9%	+4.8%
Hybrid/mixed	-0.23	-0.03	-0.06	+0.09	-6.9%	0%	-2.8%	+3.1%
Remote	-0.40	-0.19	-0.18	-0.03	-12.2%	-2.7%	-4.9%	+3.6%
<b>District type</b>								
Rural	-0.18	-0.04	-0.04	+0.10	-5.6%	+0.8%	-1.0%	+4.0%
Town	-0.18	-0.01	-0.04	+0.10	-5.1%	+1.5%	-1.5%	+4.4%
Suburban	-0.18	+0.02	-0.03	+0.14	-4.8%	+0.6%	-2.1%	+3.8%
Urban	-0.37	-0.17	-0.17	-0.03	-11.1%	-1.7%	-4.1%	+3.7%
<b>District achievement quartile</b>								
1st Quartile	-0.33	-0.12	-0.14	0	-9.7%	-0.3%	-3.1%	+4.1%
2nd Quartile	-0.21	-0.02	-0.05	+0.10	-6.2%	+1.2%	-2.0%	+4.8%
3rd Quartile	-0.18	+0.01	-0.02	+0.13	-4.8%	+1.1%	-1.2%	+4.6%
4th Quartile	-0.16	0	-0.03	+0.14	-4.4%	-0.4%	-2.4%	+2.6%
<b>School Type</b>								
Traditional Public School	-0.23	-0.04	-0.07	+0.09	-6.5%	+0.2%	-2.3%	+3.9%
Site-Based Community School	-0.43	-0.25	-0.31	-0.11	-14.2%	-6.0%	-10.2%	-0.2%
Virtual Community School	+0.01	-0.06	-0.17	-0.18	+3.0%	+0.8%	-4.4%	-4.3%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 3. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, fifth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.11 [N=113,364]	-0.07 [N=119,578]	+0.01 [N=119,385]	+0.12 [N=120,192]	-4.2% [N=113,364]	-3.7% [N=119,578]	-0.2% [N=119,385]	+4.1% [N=120,192]
<b>Race/ethnicity</b>								
White	-0.08	-0.06	+0.04	+0.14	-3.3%	-2.8%	+0.5%	+3.6%
Black	-0.24	-0.13	-0.10	+0.05	-8.5%	-6.6%	-3.4%	+4.9%
Hispanic	-0.14	-0.08	-0.02	+0.09	-4.2%	-4.6%	0%	+5.4%
Asian	+0.03	+0.01	+0.08	+0.21	+0.6%	-0.4%	+1.8%	+4.8%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.04	-0.04	+0.07	+0.18	-1.8%	-1.9%	+1.1%	+3.6%
Economically Disadvantaged	-0.17	-0.09	-0.04	+0.07	-6.6%	-5.3%	-1.6%	+4.1%
<b>Disability</b>								
Not With Disabilities	-0.10	-0.07	+0.03	+0.15	-4.3%	-3.6%	0%	+4.7%
With Disabilities	-0.17	-0.07	-0.09	-0.03	-4.0%	-3.8%	-1.0%	+1.3%
<b>English learner</b>								
Not English Learner	-0.11	-0.07	+0.02	+0.13	-4.3%	-3.7%	-0.2%	+4.1%
English Learner	-0.12	+0.02	-0.07	0	-1.8%	-0.5%	+0.6%	+5.0%
<b>Gifted</b>								
Not Gifted	-0.13	-0.08	-0.01	+0.09	-5.0%	-4.3%	-0.6%	+4.6%
Gifted	+0.01	-0.02	+0.08	+0.24	-0.6%	-0.5%	+0.6%	+1.2%
<b>District mode of learning in 2020-21</b>								
In-person	-0.05	-0.04	+0.05	+0.15	-2.1%	-2.1%	+1.2%	+4.5%
Hybrid/mixed	-0.10	-0.07	+0.03	+0.14	-4.0%	-3.5%	+0.1%	+3.9%
Remote	-0.25	-0.13	-0.09	+0.06	-8.9%	-7.1%	-3.1%	+4.2%
<b>District type</b>								
Rural	-0.08	-0.08	+0.04	+0.11	-3.5%	-3.7%	+0.6%	+3.8%
Town	-0.09	-0.07	+0.04	+0.12	-3.8%	-3.2%	+0.5%	+3.6%
Suburban	-0.03	-0.02	+0.08	+0.20	-1.5%	-1.5%	+1.6%	+5.0%
Urban	-0.23	-0.12	-0.09	+0.05	-8.3%	-6.6%	-3.0%	+4.0%
<b>District achievement quartile</b>								
1st Quartile	-0.19	-0.10	-0.05	+0.07	-6.9%	-5.7%	-1.9%	+4.5%
2nd Quartile	-0.09	-0.06	+0.05	+0.14	-3.4%	-2.8%	+1.4%	+5.5%
3rd Quartile	-0.08	-0.05	+0.05	+0.16	-3.3%	-2.6%	+1.0%	+4.5%
4th Quartile	-0.02	-0.04	+0.06	+0.17	-1.5%	-1.9%	+0.8%	+3.0%
<b>School Type</b>								
Traditional Public School	-0.10	-0.07	+0.02	+0.13	-4.0%	-3.5%	0%	+4.2%
Site-Based Community School	-0.26	-0.16	-0.13	0	-9.8%	-7.9%	-4.9%	+2.6%
Virtual Community School	0	-0.06	-0.14	-0.13	0%	-4.0%	-4.4%	-4.2%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 4. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, sixth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.07 [N=116,446]	+0.01 [N=119,818]	+0.06 [N=120,145]	+0.03 [N=119,258]	-3.7% [N=116,446]	+0.8% [N=119,818]	+1.1% [N=120,145]	+2.0% [N=119,258]
<b>Race/ethnicity</b>								
White	-0.03	+0.03	+0.09	+0.05	-2.8%	+1.2%	+1.4%	+2.2%
Black	-0.22	-0.04	-0.04	-0.06	-6.3%	-0.3%	+0.8%	+1.5%
Hispanic	-0.11	+0.02	+0.02	0	-4.6%	+0.7%	+1.2%	+2.6%
Asian	+0.01	+0.05	+0.09	+0.04	-2.6%	-0.1%	+0.4%	-0.5%
<b>Economic disadvantage</b>								
Not Disadvantaged	+0.01	+0.03	+0.11	+0.07	-2.5%	+0.8%	+1.3%	+1.9%
Economically Disadvantaged	-0.15	0	0	-0.02	-5.0%	+0.9%	+0.9%	+1.9%
<b>Disability</b>								
Not With Disabilities	-0.05	+0.02	+0.08	+0.05	-3.9%	+1.0%	+1.4%	+2.3%
With Disabilities	-0.20	-0.04	-0.07	-0.11	-2.9%	+0.0%	+0.2%	+0.6%
<b>English learner</b>								
Not English Learner	-0.07	+0.01	+0.06	+0.03	-3.8%	+0.8%	+1.2%	+2.1%
English Learner	-0.16	+0.05	-0.05	-0.12	-1.5%	+1.9%	+0.5%	+1.2%
<b>Gifted</b>								
Not Gifted	-0.11	0	+0.02	-0.01	-4.0%	+1.1%	+1.2%	+1.7%
Gifted	+0.12	+0.07	+0.17	+0.10	-1.4%	-0.2%	-0.1%	+0.3%
<b>District mode of learning in 2020-21</b>								
In-person	0	+0.04	+0.09	+0.06	-1.7%	+1.9%	+1.8%	+2.6%
Hybrid/mixed	-0.07	+0.02	+0.08	+0.05	-4.4%	+0.7%	+1.4%	+2.4%
Remote	-0.23	-0.05	-0.05	-0.06	-7.0%	-1.3%	-0.8%	+0.9%
<b>District type</b>								
Rural	+0.01	+0.05	+0.09	+0.03	-1.2%	+2.3%	+1.9%	+1.6%
Town	-0.04	+0.01	+0.07	+0.04	-3.2%	+0.8%	+1.5%	+2.5%
Suburban	-0.02	+0.04	+0.10	+0.08	-3.2%	+1.1%	+1.5%	+2.7%
Urban	-0.21	-0.03	-0.03	-0.05	-6.3%	-0.2%	+0.1%	+1.7%
<b>District achievement quartile</b>								
1st Quartile	-0.16	0	+0.01	-0.01	-4.8%	+0.8%	+1.2%	+2.8%
2nd Quartile	-0.06	+0.03	+0.10	+0.05	-3.0%	+1.8%	+2.8%	+2.6%
3rd Quartile	-0.04	+0.01	+0.08	+0.06	-3.4%	+0.5%	+1.1%	+2.4%
4th Quartile	+0.02	+0.03	+0.09	+0.06	-2.8%	+0.7%	+0.2%	+1.2%
<b>School Type</b>								
Traditional Public School	-0.06	+0.02	+0.06	+0.03	-3.6%	+0.9%	+1.2%	+2.2%
Site-Based Community School	-0.24	-0.07	-0.05	-0.08	-8.3%	-1.9%	+0.4%	-0.1%
Virtual Community School	+0.08	+0.03	-0.06	-0.14	+3.5%	+0.1%	-3.3%	-7.0%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 5. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, seventh grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.15 [N=117,857]	-0.09 [N=123,441]	+0.02 [N=120,600]	-0.01 [N=120,373]	-8.3% [N=117,857]	-6.4% [N=123,441]	-1.1% [N=120,600]	-2.8% [N=120,373]
<b>Race/ethnicity</b>								
White	-0.15	-0.10	+0.02	+0.01	-8.0%	-6.1%	-1.0%	-2.5%
Black	-0.14	-0.07	+0.02	-0.06	-8.8%	-7.0%	-1.3%	-4.1%
Hispanic	-0.16	-0.08	+0.01	-0.07	-10.3%	-7.8%	-1.6%	-3.2%
Asian	-0.14	-0.09	-0.01	+0.08	-6.2%	-4.4%	-0.3%	-0.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.14	-0.10	+0.03	+0.05	-6.8%	-5.5%	-0.6%	-1.5%
Economically Disadvantaged	-0.16	-0.08	+0.01	-0.06	-9.9%	-7.1%	-1.6%	-4.2%
<b>Disability</b>								
Not With Disabilities	-0.16	-0.11	+0.02	+0.01	-8.5%	-6.5%	-1.0%	-2.7%
With Disabilities	-0.12	-0.01	+0.01	-0.08	-7.4%	-5.2%	-1.0%	-3.1%
<b>English learner</b>								
Not English Learner	-0.15	-0.10	+0.02	0	-8.4%	-6.4%	-1.0%	-2.8%
English Learner	-0.06	+0.13	+0.05	-0.08	-5.3%	-3.0%	-0.8%	-2.2%
<b>Gifted</b>								
Not Gifted	-0.16	-0.10	+0.01	-0.05	-9.7%	-7.3%	-1.4%	-3.8%
Gifted	-0.10	-0.01	+0.05	+0.12	-2.2%	-1.2%	-0.2%	-0.6%
<b>District mode of learning in 2020-21</b>								
In-person	-0.13	-0.09	+0.03	+0.01	-7.7%	-5.7%	-0.7%	-2.5%
Hybrid/mixed	-0.18	-0.11	+0.01	+0.01	-8.8%	-6.9%	-1.3%	-2.4%
Remote	-0.14	-0.06	+0.05	-0.04	-8.7%	-6.4%	-1.0%	-3.0%
<b>District type</b>								
Rural	-0.14	-0.08	+0.02	0	-8.2%	-5.3%	+0.1%	-2.5%
Town	-0.17	-0.12	+0.01	-0.02	-9.1%	-7.6%	-1.4%	-3.3%
Suburban	-0.14	-0.08	+0.04	+0.06	-7.1%	-5.2%	-0.7%	-1.4%
Urban	-0.15	-0.08	+0.02	-0.06	-9.4%	-7.3%	-1.7%	-3.9%
<b>District achievement quartile</b>								
1st Quartile	-0.13	-0.06	+0.04	-0.03	-8.5%	-6.3%	-0.4%	-2.7%
2nd Quartile	-0.16	-0.10	+0.03	+0.01	-9.6%	-6.9%	-0.6%	-2.2%
3rd Quartile	-0.16	-0.12	+0.01	0	-8.6%	-6.8%	-1.2%	-3.0%
4th Quartile	-0.16	-0.11	+0.01	+0.04	-6.9%	-5.6%	-1.5%	-2.3%
<b>School Type</b>								
Traditional Public School	-0.15	-0.09	+0.02	0	-8.3%	-6.3%	-1.0%	-2.6%
Site-Based Community School	-0.20	-0.13	-0.04	-0.11	-11.5%	-9.2%	-2.8%	-6.2%
Virtual Community School	+0.02	-0.02	-0.01	-0.16	-0.9%	-3.8%	-2.2%	-8.6%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 6. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, eighth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.15 [N=119,296]	-0.12 [N=125,454]	+0.05 [N=124,606]	-0.12 [N=120,946]	-4.9% [N=119,296]	-4.3% [N=125,454]	+1.9% [N=124,606]	-5.4% [N=120,946]
<b>Race/ethnicity</b>								
White	-0.12	-0.10	+0.06	-0.10	-3.8%	-3.8%	+2.0%	-5.0%
Black	-0.23	-0.18	+0.03	-0.18	-8.2%	-5.0%	+2.4%	-6.5%
Hispanic	-0.22	-0.22	-0.01	-0.20	-8.3%	-7.1%	+1.1%	-7.3%
Asian	-0.13	-0.07	+0.13	-0.09	-3.5%	-3.1%	+1.7%	-4.6%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.12	-0.09	+0.09	-0.07	-3.4%	-4.1%	+2.3%	-4.3%
Economically Disadvantaged	-0.18	-0.15	0	-0.17	-6.6%	-4.3%	+1.4%	-6.6%
<b>Disability</b>								
Not With Disabilities	-0.15	-0.10	+0.07	-0.10	-5.3%	-4.6%	+2.1%	-5.9%
With Disabilities	-0.15	-0.22	-0.08	-0.19	-2.5%	-2.2%	+0.8%	-2.8%
<b>English learner</b>								
Not English Learner	-0.15	-0.12	+0.05	-0.11	-4.9%	-4.3%	+2.0%	-5.5%
English Learner	-0.14	-0.23	-0.04	-0.23	-3.5%	-2.9%	+1.6%	-3.0%
<b>Gifted</b>								
Not Gifted	-0.17	-0.15	+0.02	-0.16	-5.8%	-5.1%	+2.0%	-6.9%
Gifted	-0.07	+0.02	+0.19	0	-0.9%	-0.7%	+1.5%	-1.0%
<b>District mode of learning in 2020-21</b>								
In-person	-0.11	-0.10	+0.07	-0.10	-3.3%	-4.2%	+2.4%	-5.3%
Hybrid/mixed	-0.16	-0.12	+0.05	-0.11	-5.3%	-4.5%	+1.6%	-5.3%
Remote	-0.23	-0.17	0	-0.15	-8.0%	-4.7%	+1.7%	-4.7%
<b>District type</b>								
Rural	-0.10	-0.12	+0.06	-0.13	-2.5%	-4.1%	+2.8%	-6.3%
Town	-0.13	-0.10	+0.05	-0.12	-4.3%	-3.9%	+2.1%	-6.0%
Suburban	-0.14	-0.10	+0.09	-0.07	-4.8%	-4.5%	+2.0%	-4.2%
Urban	-0.21	-0.17	-0.01	-0.15	-7.2%	-4.8%	+1.2%	-5.4%
<b>District achievement quartile</b>								
1st Quartile	-0.17	-0.14	+0.03	-0.12	-5.6%	-3.4%	+2.9%	-4.3%
2nd Quartile	-0.13	-0.11	+0.04	-0.09	-3.5%	-3.9%	+2.6%	-4.9%
3rd Quartile	-0.15	-0.12	+0.05	-0.13	-5.5%	-5.6%	+1.6%	-6.7%
4th Quartile	-0.14	-0.11	+0.07	-0.09	-4.3%	-4.9%	+0.7%	-5.5%
<b>School Type</b>								
Traditional Public School	-0.15	-0.12	+0.05	-0.11	-4.8%	-4.4%	+2.0%	-5.2%
Site-Based Community School	-0.25	-0.22	-0.01	-0.23	-9.7%	-6.3%	+1.1%	-9.3%
Virtual Community School	+0.07	-0.06	+0.01	-0.21	+2.4%	+1.1%	+2.4%	-6.7%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 7. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, tenth grade (ELA II)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.01 [N=110,400]	-0.03 [N=113,238]	-0.02 [N=116,858]	+0.01 [N=114,464]	-2.5% [N=110,400]	-2.5% [N=113,238]	-2.5% [N=116,858]	-1.1% [N=114,464]
<b>Race/ethnicity</b>								
White	0	-0.03	-0.02	+0.02	-2.0%	-1.8%	-2.3%	-0.4%
Black	-0.06	-0.03	+0.01	-0.02	-3.6%	-4.5%	-2.9%	-2.5%
Hispanic	-0.06	-0.07	-0.05	-0.06	-3.9%	-5.1%	-4.4%	-4.6%
Asian	+0.01	-0.12	-0.07	-0.09	-3.2%	-3.8%	-2.2%	-3.3%
<b>Economic disadvantage</b>								
Not Disadvantaged	+0.01	-0.04	-0.02	+0.03	-1.5%	-2.0%	-1.8%	0%
Economically Disadvantaged	-0.05	-0.02	-0.02	-0.02	-3.7%	-3.2%	-3.5%	-2.4%
<b>Disability</b>								
Not With Disabilities	-0.01	-0.04	-0.02	+0.01	-2.5%	-2.5%	-2.3%	-1.0%
With Disabilities	-0.04	0	-0.01	-0.02	-2.3%	-2.6%	-3.3%	-1.6%
<b>English learner</b>								
Not English Learner	-0.01	-0.03	-0.02	+0.01	-2.4%	-2.5%	-2.4%	-1.0%
English Learner	-0.06	-0.03	-0.03	-0.11	-5.3%	-5.7%	-5.2%	-5.5%
<b>Gifted</b>								
Not Gifted	-0.03	-0.04	-0.02	-0.01	-3.0%	-3.1%	-3.0%	-1.5%
Gifted	+0.06	-0.02	-0.01	+0.06	-0.4%	0%	-0.3%	+0.4%
<b>District mode of learning in 2020-21</b>								
In-person	+0.01	-0.03	-0.03	+0.02	-1.8%	-1.8%	-2.2%	-0.5%
Hybrid/mixed	-0.01	-0.04	-0.01	+0.02	-2.9%	-2.6%	-2.2%	-0.5%
Remote	-0.09	-0.06	-0.03	-0.03	-4.5%	-5.0%	-4.1%	-3.0%
<b>District type</b>								
Rural	-0.01	-0.03	-0.04	+0.02	-2.6%	-2.1%	-2.6%	-0.4%
Town	0	-0.03	-0.04	0	-2.2%	-2.6%	-3.4%	-1.3%
Suburban	0	-0.04	-0.02	+0.02	-1.9%	-1.9%	-1.4%	-0.1%
Urban	-0.07	-0.04	0	0	-4.4%	-4.2%	-3.3%	-2.2%
<b>District achievement quartile</b>								
1st Quartile	-0.04	-0.01	0	+0.02	-3.4%	-2.8%	-2.6%	-1.3%
2nd Quartile	-0.01	-0.04	-0.02	+0.01	-2.6%	-2.7%	-2.6%	-1.1%
3rd Quartile	-0.01	-0.04	-0.02	+0.03	-2.3%	-2.6%	-2.4%	-0.4%
4th Quartile	+0.01	-0.06	-0.05	0	-2.0%	-2.3%	-2.3%	-0.7%
<b>School Type</b>								
Traditional Public School	-0.01	-0.04	-0.02	+0.01	-2.6%	-2.6%	-2.5%	-0.9%
Site-Based Community School	-0.13	-0.09	-0.08	-0.12	-5.4%	-6.2%	-5.5%	-7.1%
Virtual Community School	+0.21	+0.05	+0.03	-0.03	+6.8%	+0.4%	-1.1%	-2.7%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

*Mathematics results by grade:*

**Table 8. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, third grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.33 [N=110,687]	-0.23 [N=118,557]	-0.11 [N=118,924]	-0.10 [N=115,064]	-12.4% [N=110,687]	-8.7% [N=118,557]	-4.3% [N=118,924]	-3.9% [N=115,064]
<b>Race/ethnicity</b>								
White	-0.28	-0.21	-0.08	-0.08	-9.7%	-7.3%	-3.4%	-3.5%
Black	-0.51	-0.30	-0.16	-0.13	-20.3%	-12.7%	-6.7%	-4.9%
Hispanic	-0.41	-0.27	-0.17	-0.15	-16.8%	-10.9%	-6.0%	-5.2%
Asian	-0.29	-0.22	-0.08	-0.06	-8.5%	-5.9%	-2.9%	-2.2%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.25	-0.21	-0.07	-0.07	-7.6%	-6.6%	-2.9%	-2.9%
Economically Disadvantaged	-0.40	-0.25	-0.14	-0.12	-16.7%	-10.4%	-5.5%	-4.9%
<b>Disability</b>								
Not With Disabilities	-0.35	-0.23	-0.11	-0.09	-13.1%	-8.8%	-4.6%	-4.2%
With Disabilities	-0.23	-0.22	-0.08	-0.09	-7.6%	-7.3%	-2.3%	-1.8%
<b>English learner</b>								
Not English Learner	-0.33	-0.23	-0.10	-0.09	-12.2%	-8.6%	-4.3%	-3.9%
English Learner	-0.35	-0.23	-0.16	-0.13	-14.3%	-9.9%	-5.0%	-3.8%
<b>Gifted</b>								
Not Gifted	-0.33	-0.22	-0.11	-0.11	-13.6%	-9.2%	-4.5%	-4.4%
Gifted	-0.25	-0.13	+0.01	+0.03	-3.7%	-1.3%	-0.4%	-0.2%
<b>District mode of learning in 2020-21</b>								
In-person	-0.25	-0.19	-0.06	-0.07	-8.4%	-6.7%	-2.6%	-3.0%
Hybrid/mixed	-0.32	-0.23	-0.11	-0.11	-12.0%	-8.6%	-4.6%	-4.4%
Remote	-0.54	-0.31	-0.17	-0.11	-21.9%	-12.8%	-7.3%	-4.6%
<b>District type</b>								
Rural	-0.29	-0.20	-0.07	-0.10	-10.7%	-7.5%	-2.6%	-4.1%
Town	-0.28	-0.22	-0.09	-0.09	-10.6%	-8.3%	-3.8%	-4.0%
Suburban	-0.28	-0.21	-0.09	-0.07	-9.0%	-6.6%	-3.5%	-2.8%
Urban	-0.47	-0.28	-0.16	-0.12	-18.9%	-11.9%	-6.5%	-5.0%
<b>District achievement quartile</b>								
1st Quartile	-0.42	-0.24	-0.11	-0.09	-17.6%	-10.5%	-4.9%	-4.1%
2nd Quartile	-0.28	-0.22	-0.10	-0.07	-11.4%	-8.8%	-4.8%	-3.3%
3rd Quartile	-0.27	-0.21	-0.09	-0.09	-9.9%	-7.9%	-3.4%	-4.2%
4th Quartile	-0.28	-0.22	-0.10	-0.11	-7.1%	-5.9%	-3.3%	-3.5%
<b>School Type</b>								
Traditional Public School	-0.33	-0.23	-0.10	-0.09	-12.1%	-8.5%	-4.2%	-3.9%
Site-Based Community School	-0.51	-0.33	-0.19	-0.13	-20.3%	-13.2%	-6.9%	-4.2%
Virtual Community School	+0.08	-0.06	-0.06	-0.16	+4.9%	-0.6%	-0.2%	-6.1%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 9. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, fourth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.37 [N=111,610]	-0.22 [N=117,201]	-0.09 [N=119,063]	-0.06 [N=118,539]	-14.9% [N=111,610]	-10.5% [N=117,201]	-6.3% [N=119,063]	-4.9% [N=118,539]
<b>Race/ethnicity</b>								
White	-0.31	-0.17	-0.06	-0.01	-11.7%	-7.8%	-4.6%	-3.1%
Black	-0.54	-0.37	-0.21	-0.18	-24.2%	-18.9%	-11.9%	-9.7%
Hispanic	-0.45	-0.29	-0.13	-0.15	-20.6%	-14.4%	-8.0%	-8.8%
Asian	-0.36	-0.21	-0.07	-0.05	-9.6%	-6.9%	-4.0%	-4.2%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.27	-0.16	-0.03	+0.02	-8.5%	-5.9%	-2.9%	-1.8%
Economically Disadvantaged	-0.45	-0.28	-0.15	-0.12	-20.6%	-14.4%	-9.3%	-7.7%
<b>Disability</b>								
Not With Disabilities	-0.36	-0.21	-0.08	-0.04	-15.0%	-10.2%	-6.1%	-4.6%
With Disabilities	-0.38	-0.25	-0.16	-0.14	-14.0%	-11.4%	-6.9%	-6.0%
<b>English learner</b>								
Not English Learner	-0.36	-0.22	-0.09	-0.05	-14.7%	-10.2%	-6.2%	-4.7%
English Learner	-0.45	-0.29	-0.17	-0.21	-20.4%	-15.9%	-9.4%	-10.6%
<b>Gifted</b>								
Not Gifted	-0.38	-0.24	-0.11	-0.09	-17.1%	-12.1%	-7.2%	-5.9%
Gifted	-0.29	-0.14	0	+0.06	-3.6%	-2.0%	-0.9%	-0.4%
<b>District mode of learning in 2020-21</b>								
In-person	-0.25	-0.14	-0.03	+0.02	-10.1%	-6.8%	-3.8%	-2.5%
Hybrid/mixed	-0.39	-0.22	-0.10	-0.06	-14.7%	-9.6%	-5.6%	-4.6%
Remote	-0.57	-0.36	-0.18	-0.17	-25.0%	-18.0%	-10.9%	-9.6%
<b>District type</b>								
Rural	-0.29	-0.16	-0.03	+0.01	-12.8%	-8.3%	-4.1%	-2.9%
Town	-0.30	-0.17	-0.05	-0.02	-12.7%	-8.1%	-4.8%	-3.5%
Suburban	-0.32	-0.18	-0.07	-0.01	-10.1%	-7.1%	-3.9%	-2.7%
Urban	-0.52	-0.32	-0.16	-0.15	-23.2%	-16.3%	-10.2%	-9.0%
<b>District achievement quartile</b>								
1st Quartile	-0.46	-0.27	-0.11	-0.12	-21.2%	-14.4%	-8.3%	-7.8%
2nd Quartile	-0.35	-0.20	-0.07	-0.02	-15.5%	-10.2%	-6.1%	-4.0%
3rd Quartile	-0.31	-0.18	-0.04	0	-11.2%	-7.9%	-4.2%	-2.5%
4th Quartile	-0.28	-0.17	-0.07	-0.01	-7.5%	-5.3%	-3.4%	-2.3%
<b>School Type</b>								
Traditional Public School	-0.36	-0.21	-0.08	-0.05	-14.4%	-9.8%	-5.8%	-4.5%
Site-Based Community School	-0.57	-0.43	-0.30	-0.22	-26.6%	-22.5%	-16.2%	-11.5%
Virtual Community School	-0.05	-0.17	-0.18	-0.23	+0.3%	-6.7%	-6.6%	-8.9%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 10. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, fifth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.33 [N=111,186]	-0.19 [N=117,565]	-0.07 [N=117,133]	-0.05 [N=118,037]	-14.3% [N=111,186]	-7.6% [N=117,565]	-4.2% [N=117,133]	-2.1% [N=118,037]
<b>Race/ethnicity</b>								
White	-0.31	-0.17	-0.04	-0.03	-13.2%	-6.2%	-2.9%	-1.5%
Black	-0.40	-0.26	-0.15	-0.10	-17.5%	-10.8%	-7.9%	-3.8%
Hispanic	-0.36	-0.23	-0.10	-0.07	-17.0%	-9.9%	-5.5%	-3.2%
Asian	-0.41	-0.20	-0.13	-0.08	-12.8%	-5.7%	-5.6%	-2.6%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.31	-0.17	-0.04	-0.02	-11.3%	-5.5%	-2.5%	-1.1%
Economically Disadvantaged	-0.36	-0.21	-0.10	-0.07	-17.3%	-9.4%	-5.9%	-3.2%
<b>Disability</b>								
Not With Disabilities	-0.35	-0.20	-0.07	-0.03	-15.1%	-7.6%	-4.3%	-1.7%
With Disabilities	-0.23	-0.18	-0.04	-0.10	-10.3%	-6.9%	-3.3%	-3.5%
<b>English learner</b>								
Not English Learner	-0.33	-0.19	-0.07	-0.04	-14.4%	-7.5%	-4.1%	-2.0%
English Learner	-0.32	-0.21	-0.10	-0.09	-12.7%	-8.4%	-5.4%	-3.4%
<b>Gifted</b>								
Not Gifted	-0.33	-0.20	-0.08	-0.06	-15.8%	-8.5%	-4.9%	-2.6%
Gifted	-0.38	-0.17	-0.04	-0.01	-6.8%	-2.3%	-1.5%	-0.6%
<b>District mode of learning in 2020-21</b>								
In-person	-0.26	-0.15	-0.03	-0.02	-10.7%	-5.2%	-2.2%	-1.3%
Hybrid/mixed	-0.38	-0.20	-0.06	-0.04	-16.5%	-8.1%	-4.0%	-1.9%
Remote	-0.45	-0.28	-0.15	-0.09	-19.4%	-11.7%	-8.0%	-3.7%
<b>District type</b>								
Rural	-0.26	-0.14	-0.01	-0.01	-12.3%	-5.5%	-1.5%	-0.4%
Town	-0.31	-0.17	-0.04	-0.05	-14.3%	-6.6%	-3.2%	-2.5%
Suburban	-0.33	-0.17	-0.05	-0.01	-12.6%	-6.0%	-3.1%	-0.6%
Urban	-0.42	-0.27	-0.14	-0.10	-18.5%	-11.4%	-7.3%	-4.2%
<b>District achievement quartile</b>								
1st Quartile	-0.37	-0.22	-0.08	-0.05	-16.6%	-9.4%	-4.7%	-1.7%
2nd Quartile	-0.34	-0.20	-0.06	-0.03	-17.1%	-8.8%	-4.3%	-2.2%
3rd Quartile	-0.31	-0.16	-0.02	0	-13.0%	-5.8%	-2.8%	-0.6%
4th Quartile	-0.31	-0.17	-0.08	-0.07	-10.1%	-4.7%	-3.5%	-2.9%
<b>School Type</b>								
Traditional Public School	-0.33	-0.19	-0.06	-0.04	-14.4%	-7.4%	-3.9%	-1.9%
Site-Based Community School	-0.45	-0.30	-0.21	-0.16	-18.9%	-13.2%	-10.4%	-5.9%
Virtual Community School	+0.18	+0.11	+0.09	0	+5.3%	+2.8%	0%	-2.5%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 11. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, sixth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.30 [N=112,739]	-0.23 [N=116,405]	-0.19 [N=116,531]	-0.19 [N=115,358]	-14.2% [N=112,739]	-9.8% [N=116,405]	-8.4% [N=116,531]	-7.5% [N=115,358]
<b>Race/ethnicity</b>								
White	-0.29	-0.21	-0.16	-0.15	-13.4%	-8.9%	-7.3%	-6.4%
Black	-0.30	-0.29	-0.25	-0.28	-15.6%	-11.8%	-10.9%	-10.4%
Hispanic	-0.29	-0.24	-0.19	-0.22	-15.5%	-11.0%	-8.5%	-8.4%
Asian	-0.37	-0.24	-0.23	-0.26	-11.9%	-8.8%	-7.0%	-7.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.31	-0.21	-0.17	-0.15	-12.6%	-8.6%	-6.8%	-5.6%
Economically Disadvantaged	-0.29	-0.24	-0.20	-0.22	-15.7%	-10.9%	-9.8%	-9.2%
<b>Disability</b>								
Not With Disabilities	-0.32	-0.23	-0.19	-0.18	-15.1%	-10.2%	-8.6%	-7.7%
With Disabilities	-0.18	-0.21	-0.19	-0.21	-9.4%	-7.5%	-6.9%	-5.9%
<b>English learner</b>								
Not English Learner	-0.30	-0.23	-0.19	-0.18	-14.3%	-9.8%	-8.4%	-7.5%
English Learner	-0.18	-0.22	-0.18	-0.24	-10.4%	-8.7%	-7.3%	-6.9%
<b>Gifted</b>								
Not Gifted	-0.29	-0.24	-0.20	-0.21	-15.8%	-11.1%	-9.7%	-9.0%
Gifted	-0.32	-0.18	-0.17	-0.16	-5.0%	-3.1%	-2.3%	-2.5%
<b>District mode of learning in 2020-21</b>								
In-person	-0.27	-0.19	-0.16	-0.14	-12.6%	-8.5%	-7.5%	-6.0%
Hybrid/mixed	-0.34	-0.23	-0.18	-0.18	-15.7%	-10.0%	-8.3%	-7.5%
Remote	-0.34	-0.33	-0.26	-0.29	-16.4%	-13.2%	-10.7%	-10.0%
<b>District type</b>								
Rural	-0.25	-0.20	-0.15	-0.14	-13.1%	-9.2%	-7.8%	-6.8%
Town	-0.32	-0.25	-0.20	-0.18	-15.8%	-11.1%	-9.3%	-8.0%
Suburban	-0.33	-0.20	-0.17	-0.15	-13.6%	-8.2%	-7.3%	-5.8%
Urban	-0.31	-0.27	-0.22	-0.24	-15.3%	-11.3%	-9.3%	-8.9%
<b>District achievement quartile</b>								
1st Quartile	-0.26	-0.24	-0.18	-0.20	-13.9%	-10.3%	-7.7%	-7.9%
2nd Quartile	-0.30	-0.22	-0.17	-0.15	-16.1%	-10.8%	-9.4%	-7.5%
3rd Quartile	-0.34	-0.23	-0.17	-0.15	-15.8%	-10.4%	-8.4%	-7.1%
4th Quartile	-0.34	-0.23	-0.23	-0.21	-12.3%	-7.9%	-8.1%	-6.4%
<b>School Type</b>								
Traditional Public School	-0.31	-0.23	-0.19	-0.18	-14.4%	-9.9%	-8.4%	-7.3%
Site-Based Community School	-0.30	-0.30	-0.25	-0.30	-15.1%	-12.3%	-10.9%	-11.9%
Virtual Community School	+0.27	+0.04	+0.01	-0.15	+6.3%	-1.5%	-2.7%	-7.6%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 12. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, seventh grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.26 [N=108,819]	-0.24 [N=115,046]	-0.18 [N=111,308]	-0.16 [N=110,730]	-13.7% [N=108,819]	-11.0% [N=115,046]	-8.0% [N=111,308]	-5.3% [N=110,730]
<b>Race/ethnicity</b>								
White	-0.28	-0.24	-0.20	-0.15	-13.8%	-10.8%	-7.8%	-4.4%
Black	-0.17	-0.20	-0.09	-0.17	-12.3%	-10.4%	-8.2%	-6.6%
Hispanic	-0.24	-0.23	-0.15	-0.19	-14.7%	-12.7%	-9.8%	-7.7%
Asian	-0.36	-0.30	-0.29	-0.22	-13.0%	-9.8%	-9.1%	-6.7%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.31	-0.26	-0.23	-0.15	-13.2%	-10.1%	-6.9%	-3.5%
Economically Disadvantaged	-0.21	-0.20	-0.14	-0.17	-14.0%	-11.5%	-9.1%	-6.7%
<b>Disability</b>								
Not With Disabilities	-0.29	-0.25	-0.21	-0.17	-14.8%	-11.8%	-8.7%	-5.6%
With Disabilities	-0.11	-0.13	-0.02	-0.13	-7.1%	-6.1%	-4.2%	-3.2%
<b>English learner</b>								
Not English Learner	-0.27	-0.24	-0.18	-0.16	-13.8%	-11.1%	-8.1%	-5.2%
English Learner	-0.14	-0.12	0	-0.15	-8.0%	-6.2%	-4.1%	-4.7%
<b>Gifted</b>								
Not Gifted	-0.24	-0.22	-0.15	-0.16	-14.7%	-11.7%	-8.7%	-6.0%
Gifted	-0.39	-0.29	-0.32	-0.22	-6.7%	-4.7%	-3.9%	-2.7%
<b>District mode of learning in 2020-21</b>								
In-person	-0.25	-0.23	-0.19	-0.14	-12.5%	-9.9%	-7.3%	-4.3%
Hybrid/mixed	-0.32	-0.26	-0.20	-0.17	-15.7%	-11.9%	-8.1%	-5.0%
Remote	-0.21	-0.22	-0.12	-0.18	-13.3%	-11.6%	-8.7%	-7.1%
<b>District type</b>								
Rural	-0.24	-0.20	-0.18	-0.13	-12.9%	-9.7%	-7.4%	-4.6%
Town	-0.27	-0.23	-0.18	-0.13	-14.2%	-11.0%	-6.8%	-3.4%
Suburban	-0.33	-0.27	-0.22	-0.17	-14.5%	-10.9%	-7.8%	-4.6%
Urban	-0.20	-0.22	-0.13	-0.18	-13.2%	-12.0%	-9.3%	-7.5%
<b>District achievement quartile</b>								
1st Quartile	-0.20	-0.20	-0.11	-0.15	-13.2%	-11.4%	-7.9%	-5.7%
2nd Quartile	-0.24	-0.24	-0.17	-0.14	-14.5%	-11.8%	-8.0%	-4.9%
3rd Quartile	-0.31	-0.26	-0.20	-0.17	-15.5%	-11.6%	-7.9%	-5.4%
4th Quartile	-0.34	-0.27	-0.27	-0.17	-12.6%	-9.1%	-7.6%	-3.8%
<b>School Type</b>								
Traditional Public School	-0.27	-0.24	-0.18	-0.16	-13.9%	-11.0%	-7.9%	-5.0%
Site-Based Community School	-0.25	-0.26	-0.19	-0.24	-15.0%	-13.9%	-12.2%	-9.5%
Virtual Community School	+0.15	-0.03	-0.06	-0.10	+3.6%	-2.6%	-6.0%	-5.0%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 13. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, eighth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.28 [N=90,893]	-0.17 [N=97,191]	-0.16 [N=97,168]	-0.12 [N=94,062]	-14.8% [N=90,893]	-13.8% [N=97,191]	-9.4% [N=97,168]	-8.8% [N=94,062]
<b>Race/ethnicity</b>								
White	-0.28	-0.19	-0.16	-0.13	-14.3%	-13.9%	-8.8%	-8.1%
Black	-0.23	-0.09	-0.12	-0.07	-14.6%	-12.2%	-9.8%	-10.0%
Hispanic	-0.30	-0.18	-0.18	-0.15	-18.4%	-15.5%	-11.4%	-11.7%
Asian	-0.41	-0.22	-0.21	-0.18	-18.2%	-14.6%	-11.4%	-10.3%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.31	-0.21	-0.17	-0.14	-14.3%	-13.5%	-7.9%	-7.0%
Economically Disadvantaged	-0.25	-0.14	-0.15	-0.11	-15.3%	-13.8%	-10.6%	-10.1%
<b>Disability</b>								
Not With Disabilities	-0.32	-0.22	-0.19	-0.16	-16.4%	-15.2%	-10.2%	-9.7%
With Disabilities	-0.07	+0.02	-0.02	+0.04	-7.7%	-7.2%	-5.6%	-5.2%
<b>English learner</b>								
Not English Learner	-0.28	-0.18	-0.16	-0.12	-14.9%	-13.9%	-9.5%	-8.9%
English Learner	-0.17	-0.08	-0.07	-0.06	-11.0%	-9.6%	-7.2%	-7.3%
<b>Gifted</b>								
Not Gifted	-0.27	-0.17	-0.16	-0.12	-15.0%	-14.1%	-9.6%	-9.2%
Gifted	-0.39	-0.21	-0.18	-0.17	-11.6%	-9.1%	-5.3%	-5.6%
<b>District mode of learning in 2020-21</b>								
In-person	-0.25	-0.19	-0.17	-0.14	-12.3%	-13.6%	-8.8%	-7.9%
Hybrid/mixed	-0.35	-0.20	-0.17	-0.13	-18.0%	-14.2%	-9.4%	-8.8%
Remote	-0.24	-0.11	-0.13	-0.06	-16.0%	-13.5%	-10.6%	-9.6%
<b>District type</b>								
Rural	-0.23	-0.17	-0.13	-0.12	-12.2%	-13.9%	-8.2%	-8.1%
Town	-0.27	-0.19	-0.16	-0.14	-14.0%	-14.1%	-8.9%	-8.4%
Suburban	-0.37	-0.23	-0.20	-0.15	-17.2%	-14.3%	-9.3%	-7.8%
Urban	-0.24	-0.11	-0.13	-0.08	-15.3%	-12.9%	-10.3%	-9.9%
<b>District achievement quartile</b>								
1st Quartile	-0.21	-0.10	-0.10	-0.03	-14.3%	-12.7%	-8.8%	-7.0%
2nd Quartile	-0.25	-0.16	-0.14	-0.12	-15.4%	-14.8%	-9.7%	-10.1%
3rd Quartile	-0.32	-0.22	-0.19	-0.14	-16.2%	-15.0%	-10.2%	-8.7%
4th Quartile	-0.40	-0.27	-0.24	-0.25	-14.6%	-13.2%	-8.7%	-9.2%
<b>School Type</b>								
Traditional Public School	-0.29	-0.18	-0.16	-0.12	-15.1%	-13.8%	-9.3%	-8.5%
Site-Based Community School	-0.29	-0.19	-0.18	-0.15	-16.3%	-15.8%	-12.4%	-13.1%
Virtual Community School	+0.15	+0.03	-0.04	-0.04	+0.8%	-8.0%	-5.9%	-9.8%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 14. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, ninth grade (Algebra)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.22 [N=77,852]	-0.15 [N=84,363]	-0.07 [N=84,989]	+0.03 [N=83,565]	-12.7% [N=77,852]	-8.1% [N=84,363]	-4.7% [N=84,989]	-0.2% [N=83,565]
<b>Race/ethnicity</b>								
White	-0.23	-0.14	-0.06	+0.03	-12.6%	-7.8%	-4.3%	+0.2%
Black	-0.21	-0.16	-0.10	+0.02	-12.2%	-7.7%	-5.5%	-1.1%
Hispanic	-0.19	-0.17	-0.04	+0.06	-12.3%	-8.9%	-4.5%	-0.4%
Asian	-0.37	-0.21	-0.15	-0.05	-16.2%	-10.0%	-8.4%	-3.4%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.25	-0.15	-0.05	+0.04	-13.4%	-8.5%	-4.0%	+0.7%
Economically Disadvantaged	-0.19	-0.14	-0.08	+0.03	-11.8%	-7.5%	-5.1%	-0.7%
<b>Disability</b>								
Not With Disabilities	-0.24	-0.15	-0.07	+0.02	-13.9%	-8.9%	-5.2%	-0.5%
With Disabilities	-0.13	-0.12	-0.04	+0.09	-6.2%	-3.2%	-1.4%	+1.3%
<b>English learner</b>								
Not English Learner	-0.22	-0.15	-0.06	+0.03	-12.8%	-8.2%	-4.6%	-0.3%
English Learner	-0.21	-0.21	-0.16	+0.08	-10.2%	-6.6%	-6.4%	+0.5%
<b>Gifted</b>								
Not Gifted	-0.22	-0.14	-0.07	+0.03	-13.1%	-8.2%	-4.8%	-0.2%
Gifted	-0.24	-0.13	-0.02	+0.03	-7.0%	-5.5%	-2.4%	-0.4%
<b>District mode of learning in 2020-21</b>								
In-person	-0.21	-0.14	-0.06	+0.04	-12.6%	-8.2%	-4.8%	+0.1%
Hybrid/mixed	-0.27	-0.15	-0.06	+0.03	-14.8%	-8.7%	-4.5%	-0.2%
Remote	-0.14	-0.16	-0.06	+0.06	-8.4%	-6.2%	-3.0%	+0.9%
<b>District type</b>								
Rural	-0.16	-0.09	-0.02	+0.08	-10.5%	-6.6%	-2.9%	+1.7%
Town	-0.23	-0.14	-0.06	+0.03	-14.5%	-9.0%	-4.9%	-0.1%
Suburban	-0.31	-0.19	-0.09	+0.01	-14.9%	-9.5%	-5.4%	-0.4%
Urban	-0.15	-0.13	-0.05	+0.06	-9.5%	-6.1%	-3.4%	+0.2%
<b>District achievement quartile</b>								
1st Quartile	-0.11	-0.09	-0.01	+0.09	-8.3%	-4.8%	-1.3%	+2.2%
2nd Quartile	-0.17	-0.09	0	+0.09	-12.3%	-7.5%	-2.9%	+2.0%
3rd Quartile	-0.27	-0.16	-0.07	+0.03	-16.4%	-9.6%	-6.0%	-0.8%
4th Quartile	-0.35	-0.24	-0.15	-0.06	-14.4%	-10.5%	-7.2%	-2.6%
<b>School Type</b>								
Traditional Public School	-0.23	-0.15	-0.06	+0.04	-12.8%	-8.1%	-4.4%	+0.1%
Site-Based Community School	-0.32	-0.23	-0.32	-0.16	-17.8%	-13.0%	-16.7%	-9.3%
Virtual Community School	+0.11	-0.06	-0.05	-0.06	+1.5%	-4.2%	-4.1%	-5.1%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Students who took this end-of-course exam for the first time in other grades are excluded. See Table A2 in the typical annual growth benchmarks.

**Table 15. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, tenth grade (Geometry)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.26 [N=68,309]	-0.24 [N=71,336]	-0.21 [N=74,870]	-0.10 [N=74,767]	-10.6% [N=68,309]	-7.9% [N=71,336]	-6.0% [N=74,870]	-7.1% [N=74,767]
<b>Race/ethnicity</b>								
White	-0.25	-0.23	-0.16	-0.09	-10.7%	-7.9%	-5.3%	-7.0%
Black	-0.33	-0.30	-0.36	-0.11	-9.1%	-7.0%	-6.7%	-6.1%
Hispanic	-0.28	-0.25	-0.27	-0.12	-10.3%	-7.4%	-7.5%	-8.0%
Asian	-0.43	-0.32	-0.26	-0.21	-16.7%	-13.4%	-12.0%	-14.0%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.26	-0.24	-0.16	-0.10	-11.9%	-9.1%	-6.2%	-7.9%
Economically Disadvantaged	-0.26	-0.24	-0.26	-0.10	-8.7%	-6.2%	-5.4%	-6.0%
<b>Disability</b>								
Not With Disabilities	-0.26	-0.24	-0.18	-0.10	-11.6%	-8.7%	-6.4%	-8.0%
With Disabilities	-0.29	-0.26	-0.33	-0.07	-3.9%	-2.8%	-2.6%	-2.1%
<b>English learner</b>								
Not English Learner	-0.26	-0.24	-0.20	-0.10	-10.6%	-8.0%	-6.0%	-7.2%
English Learner	-0.36	-0.30	-0.39	-0.08	-6.3%	-6.1%	-4.9%	-2.9%
<b>Gifted</b>								
Not Gifted	-0.26	-0.24	-0.21	-0.10	-10.5%	-7.8%	-5.9%	-7.1%
Gifted	-0.29	-0.21	-0.08	-0.06	-10.2%	-7.1%	-3.7%	-6.1%
<b>District mode of learning in 2020-21</b>								
In-person	-0.22	-0.21	-0.15	-0.08	-8.8%	-6.9%	-4.4%	-6.4%
Hybrid/mixed	-0.32	-0.28	-0.22	-0.13	-14.1%	-9.9%	-7.7%	-8.8%
Remote	-0.32	-0.27	-0.32	-0.06	-8.5%	-6.3%	-6.0%	-4.5%
<b>District type</b>								
Rural	-0.15	-0.18	-0.12	-0.05	-6.0%	-5.0%	-2.7%	-4.7%
Town	-0.25	-0.24	-0.16	-0.09	-11.5%	-8.4%	-5.4%	-7.1%
Suburban	-0.34	-0.28	-0.21	-0.14	-14.5%	-10.1%	-8.0%	-9.3%
Urban	-0.29	-0.27	-0.30	-0.08	-8.5%	-6.6%	-5.7%	-5.4%
<b>District achievement quartile</b>								
1st Quartile	-0.23	-0.20	-0.23	-0.02	-6.1%	-2.8%	-2.3%	-1.6%
2nd Quartile	-0.20	-0.23	-0.18	-0.08	-8.5%	-7.5%	-4.7%	-6.3%
3rd Quartile	-0.27	-0.25	-0.17	-0.12	-12.6%	-9.7%	-6.7%	-9.3%
4th Quartile	-0.37	-0.30	-0.21	-0.18	-16.0%	-11.7%	-9.4%	-11.1%
<b>School Type</b>								
Traditional Public School	-0.27	-0.25	-0.20	-0.10	-10.9%	-8.0%	-6.0%	-7.1%
Site-Based Community School	-0.30	-0.35	-0.40	-0.27	-11.7%	-12.3%	-11.7%	-13.2%
Virtual Community School	+0.16	-0.10	-0.12	-0.02	+6.4%	-2.7%	-0.6%	-4.0%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Students who took this end-of-course exam for the first time in other grades are excluded. See Table A2 in the typical annual growth benchmarks.

*Science results by grade:*

**Table 16. Change in science OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, fifth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.19 [N=112,614]	-0.05 [N=119,493]	-0.02 [N=119,415]	0 [N=120,357]	-7.3% [N=112,614]	-0.9% [N=119,493]	+0.3% [N=119,415]	+1.6% [N=120,357]
<b>Race/ethnicity</b>								
White	-0.16	-0.01	0	+0.03	-6.3%	-0.4%	+0.9%	+1.8%
Black	-0.29	-0.17	-0.10	-0.12	-10.4%	-2.4%	-2.4%	+0.3%
Hispanic	-0.25	-0.12	-0.04	-0.05	-9.1%	-1.7%	+1.3%	+2.7%
Asian	-0.20	0	-0.09	-0.01	-6.9%	+0.1%	-1.5%	+0.7%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.13	+0.01	0	+0.06	-4.6%	0%	+1.1%	+1.9%
Economically Disadvantaged	-0.25	-0.10	-0.04	-0.05	-9.9%	-1.6%	-0.5%	+1.2%
<b>Disability</b>								
Not With Disabilities	-0.19	-0.03	-0.01	+0.03	-7.5%	-0.5%	+0.5%	+2.2%
With Disabilities	-0.22	-0.19	-0.07	-0.17	-6.5%	-2.8%	-0.3%	-1.2%
<b>English learner</b>								
Not English Learner	-0.19	-0.05	-0.02	+0.01	-7.3%	-0.8%	+0.3%	+1.7%
English Learner	-0.23	-0.17	-0.07	-0.15	-6.6%	-1.6%	0%	+0.4%
<b>Gifted</b>								
Not Gifted	-0.21	-0.07	-0.03	-0.04	-8.4%	-1.0%	+0.2%	+1.6%
Gifted	-0.11	+0.05	-0.03	+0.14	-2.4%	0%	+0.1%	+1.0%
<b>District mode of learning in 2020-21</b>								
In-person	-0.13	0	+0.02	+0.04	-4.7%	+0.4%	+2.1%	+2.4%
Hybrid/mixed	-0.20	-0.03	-0.01	+0.03	-7.9%	-0.8%	+0.5%	+2.1%
Remote	-0.33	-0.18	-0.11	-0.11	-12.3%	-3.5%	-3.0%	-0.4%
<b>District type</b>								
Rural	-0.14	-0.02	+0.03	+0.03	-6.2%	-0.5%	+2.2%	+2.3%
Town	-0.19	-0.04	0	+0.01	-7.4%	-0.8%	+1.0%	+1.3%
Suburban	-0.15	+0.01	0	+0.06	-5.2%	+0.2%	+1.1%	+2.8%
Urban	-0.29	-0.15	-0.08	-0.09	-10.5%	-2.3%	-1.6%	+0.5%
<b>District achievement quartile</b>								
1st Quartile	-0.25	-0.09	-0.02	-0.02	-9.3%	-0.2%	+0.8%	+3.0%
2nd Quartile	-0.17	-0.02	+0.03	+0.03	-7.3%	-1.1%	+1.4%	+2.1%
3rd Quartile	-0.17	-0.01	-0.01	+0.05	-6.5%	-0.6%	+0.5%	+2.0%
4th Quartile	-0.16	-0.04	-0.05	-0.01	-4.8%	-1.3%	-0.3%	-0.3%
<b>School Type</b>								
Traditional Public School	-0.19	-0.04	-0.01	+0.01	-7.2%	-0.8%	+0.6%	+1.8%
Site-Based Community School	-0.33	-0.21	-0.15	-0.16	-12.8%	-5.5%	-5.0%	-1.6%
Virtual Community School	+0.07	+0.03	-0.04	-0.10	+5.3%	+5.6%	+1.1%	+2.2%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 17. Change in science OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, eighth grade**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.20 [N=117,180]	-0.08 [N=123,895]	-0.08 [N=123,101]	-0.06 [N=119,315]	-8.7% [N=117,180]	-4.3% [N=123,895]	-1.9% [N=123,101]	-3.0% [N=119,315]
<b>Race/ethnicity</b>								
White	-0.19	-0.08	-0.08	-0.06	-7.7%	-4.1%	-1.6%	-2.5%
Black	-0.21	-0.06	-0.06	-0.03	-11.8%	-4.0%	-2.1%	-4.5%
Hispanic	-0.23	-0.12	-0.10	-0.07	-12.2%	-6.5%	-3.1%	-5.1%
Asian	-0.34	-0.12	-0.19	-0.18	-8.9%	-3.6%	-3.1%	-2.7%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.20	-0.08	-0.09	-0.07	-6.9%	-3.6%	-1.3%	-1.9%
Economically Disadvantaged	-0.19	-0.08	-0.08	-0.05	-10.7%	-4.9%	-2.7%	-4.2%
<b>Disability</b>								
Not With Disabilities	-0.21	-0.08	-0.09	-0.07	-9.0%	-4.1%	-2.0%	-3.2%
With Disabilities	-0.11	-0.09	-0.05	+0.01	-6.5%	-4.7%	-1.2%	-1.9%
<b>English learner</b>								
Not English Learner	-0.20	-0.08	-0.08	-0.06	-8.6%	-4.2%	-1.9%	-2.9%
English Learner	-0.16	-0.10	-0.06	0	-9.4%	-5.7%	-2.1%	-3.7%
<b>Gifted</b>								
Not Gifted	-0.19	-0.09	-0.07	-0.05	-10.1%	-4.8%	-2.0%	-3.6%
Gifted	-0.23	-0.04	-0.09	-0.13	-2.3%	-1.1%	-0.5%	-1.2%
<b>District mode of learning in 2020-21</b>								
In-person	-0.16	-0.08	-0.09	-0.06	-7.0%	-4.1%	-2.0%	-2.3%
Hybrid/mixed	-0.24	-0.10	-0.08	-0.06	-9.8%	-4.6%	-1.5%	-2.7%
Remote	-0.23	-0.09	-0.08	-0.04	-11.5%	-4.8%	-3.3%	-4.7%
<b>District type</b>								
Rural	-0.17	-0.11	-0.08	-0.09	-8.2%	-5.3%	-1.8%	-3.4%
Town	-0.19	-0.09	-0.08	-0.06	-8.3%	-4.4%	-1.9%	-2.4%
Suburban	-0.23	-0.08	-0.09	-0.05	-7.7%	-3.7%	-1.4%	-1.6%
Urban	-0.21	-0.09	-0.09	-0.04	-11.4%	-5.0%	-3.3%	-4.9%
<b>District achievement quartile</b>								
1st Quartile	-0.17	-0.05	-0.05	0	-9.9%	-3.4%	-1.7%	-2.7%
2nd Quartile	-0.18	-0.09	-0.06	-0.05	-9.0%	-5.4%	-1.9%	-2.9%
3rd Quartile	-0.24	-0.12	-0.11	-0.08	-9.6%	-5.7%	-2.7%	-3.6%
4th Quartile	-0.24	-0.11	-0.13	-0.11	-6.7%	-3.9%	-1.8%	-2.3%
<b>School Type</b>								
Traditional Public School	-0.20	-0.09	-0.09	-0.06	-8.7%	-4.4%	-2.0%	-2.8%
Site-Based Community School	-0.20	-0.06	-0.07	-0.08	-12.1%	-4.3%	-2.4%	-5.7%
Virtual Community School	+0.17	+0.09	+0.08	0	+5.4%	+3.4%	+5.3%	-2.1%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table 18. Change in science OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, tenth grade (Biology)**

		Test Scores (SDs)				Proficiency Rates (%)			
		Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>		-0.23 [N=76,952]	-0.17 [N=78,424]	-0.20 [N=81,329]	-0.15 [N=76,692]	-10.1% [N=76,952]	-7.4% [N=78,424]	-8.5% [N=81,329]	-8.9% [N=76,692]
<b>Race/ethnicity</b>									
	White	-0.23	-0.15	-0.20	-0.15	-9.5%	-6.5%	-7.5%	-8.3%
	Black	-0.23	-0.21	-0.15	-0.15	-13.0%	-10.6%	-11.1%	-10.5%
	Hispanic	-0.21	-0.20	-0.20	-0.18	-11.8%	-10.3%	-12.0%	-11.6%
	Asian	-0.20	-0.14	-0.29	-0.14	-6.9%	-4.7%	-7.9%	-7.2%
<b>Economic disadvantage</b>									
	Not Disadvantaged	-0.24	-0.16	-0.21	-0.12	-8.9%	-6.4%	-7.0%	-6.9%
	Economically Disadvantaged	-0.23	-0.18	-0.18	-0.17	-11.6%	-8.7%	-10.3%	-10.9%
<b>Disability</b>									
	Not With Disabilities	-0.24	-0.17	-0.21	-0.15	-10.2%	-7.6%	-8.5%	-9.0%
	With Disabilities	-0.17	-0.15	-0.10	-0.13	-9.7%	-6.4%	-8.1%	-8.1%
<b>English learner</b>									
	Not English Learner	-0.23	-0.17	-0.20	-0.15	-10.1%	-7.4%	-8.4%	-8.8%
	English Learner	-0.19	-0.14	-0.12	-0.20	-10.8%	-7.8%	-10.0%	-10.2%
<b>Gifted</b>									
	Not Gifted	-0.23	-0.18	-0.19	-0.16	-11.4%	-8.3%	-9.5%	-9.9%
	Gifted	-0.21	-0.08	-0.20	-0.06	-2.4%	-1.4%	-1.6%	-1.9%
<b>District mode of learning in 2020-21</b>									
	In-person	-0.21	-0.15	-0.20	-0.13	-9.3%	-6.7%	-8.0%	-8.0%
	Hybrid/mixed	-0.27	-0.17	-0.21	-0.16	-11.0%	-7.1%	-8.6%	-8.9%
	Remote	-0.24	-0.22	-0.17	-0.18	-11.9%	-10.4%	-10.9%	-10.5%
<b>District type</b>									
	Rural	-0.22	-0.16	-0.21	-0.17	-9.8%	-6.8%	-8.7%	-9.8%
	Town	-0.24	-0.19	-0.21	-0.14	-10.6%	-8.0%	-8.8%	-8.5%
	Suburban	-0.25	-0.13	-0.21	-0.11	-9.2%	-5.1%	-6.9%	-6.2%
	Urban	-0.22	-0.22	-0.17	-0.19	-12.2%	-10.9%	-11.2%	-12.0%
<b>District achievement quartile</b>									
	1st Quartile	-0.17	-0.16	-0.11	-0.13	-11.0%	-9.4%	-9.1%	-10.0%
	2nd Quartile	-0.23	-0.17	-0.19	-0.14	-11.2%	-8.1%	-9.8%	-10.2%
	3rd Quartile	-0.28	-0.20	-0.26	-0.20	-11.4%	-8.2%	-10.1%	-10.3%
	4th Quartile	-0.26	-0.14	-0.23	-0.12	-8.4%	-4.7%	-6.5%	-5.5%
<b>School Type</b>									
	Traditional Public School	-0.24	-0.17	-0.20	-0.15	-10.3%	-7.4%	-8.7%	-8.7%
	Site-Based Community School	-0.35	-0.31	-0.22	-0.22	-17.3%	-12.6%	-8.9%	-11.1%
	Virtual Community School	+0.07	-0.14	-0.03	-0.14	+1.3%	-7.5%	-3.1%	-10.3%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Students who took this end-of-course exam for the first time in other grades are excluded. See Table A2 in the typical annual growth benchmarks.

*Social studies results by grade:*

**Table 19. Change in social studies OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, tenth grade (U.S. History)**

		Test Scores (SDs)				Proficiency Rates (%)			
		Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>		-0.28 [N=73,705]	-0.21 [N=87,174]	-0.18 [N=89,556]	-0.09 [N=88,008]	-9.8% [N=73,705]	-8.1% [N=87,174]	-6.3% [N=89,556]	-7.1% [N=88,008]
<b>Race/ethnicity</b>									
	White	-0.28	-0.20	-0.17	-0.07	-8.4%	-6.7%	-5.2%	-5.9%
	Black	-0.30	-0.26	-0.22	-0.16	-15.6%	-13.6%	-10.5%	-11.5%
	Hispanic	-0.24	-0.20	-0.17	-0.11	-11.4%	-10.0%	-8.0%	-10.3%
	Asian	-0.34	-0.18	-0.21	-0.08	-10.4%	-6.7%	-6.1%	-6.3%
<b>Economic disadvantage</b>									
	Not Disadvantaged	-0.29	-0.20	-0.17	-0.05	-7.5%	-6.2%	-4.9%	-4.9%
	Economically Disadvantaged	-0.27	-0.21	-0.18	-0.12	-12.7%	-10.5%	-8.2%	-9.8%
<b>Disability</b>									
	Not With Disabilities	-0.30	-0.21	-0.19	-0.09	-9.6%	-7.9%	-6.2%	-7.0%
	With Disabilities	-0.17	-0.17	-0.12	-0.07	-10.9%	-9.6%	-7.0%	-7.9%
<b>English learner</b>									
	Not English Learner	-0.28	-0.21	-0.18	-0.08	-9.7%	-8.0%	-6.2%	-7.0%
	English Learner	-0.22	-0.22	-0.17	-0.15	-16.1%	-12.2%	-10.8%	-11.8%
<b>Gifted</b>									
	Not Gifted	-0.28	-0.21	-0.18	-0.12	-11.6%	-9.6%	-7.4%	-8.5%
	Gifted	-0.29	-0.19	-0.16	+0.01	-2.0%	-1.4%	-1.3%	-1.3%
<b>District mode of learning in 2020-21</b>									
	In-person	-0.28	-0.20	-0.19	-0.08	-9.0%	-6.9%	-5.8%	-6.4%
	Hybrid/mixed	-0.28	-0.20	-0.16	-0.08	-9.6%	-8.1%	-6.1%	-7.0%
	Remote	-0.32	-0.25	-0.21	-0.11	-14.3%	-11.9%	-8.8%	-9.2%
<b>District type</b>									
	Rural	-0.27	-0.20	-0.18	-0.07	-9.3%	-7.8%	-6.4%	-6.6%
	Town	-0.29	-0.23	-0.19	-0.10	-9.7%	-8.3%	-6.5%	-7.0%
	Suburban	-0.31	-0.19	-0.16	-0.06	-8.7%	-6.3%	-4.9%	-5.2%
	Urban	-0.27	-0.23	-0.19	-0.12	-13.1%	-11.3%	-8.5%	-10.2%
<b>District achievement quartile</b>									
	1st Quartile	-0.24	-0.20	-0.14	-0.07	-12.3%	-10.4%	-7.2%	-8.7%
	2nd Quartile	-0.27	-0.20	-0.18	-0.09	-11.8%	-9.9%	-8.3%	-9.0%
	3rd Quartile	-0.29	-0.21	-0.17	-0.09	-9.4%	-7.7%	-5.9%	-6.7%
	4th Quartile	-0.34	-0.22	-0.21	-0.08	-7.9%	-5.8%	-4.9%	-4.7%
<b>School Type</b>									
	Traditional Public School	-0.29	-0.21	-0.18	-0.09	-10.1%	-8.2%	-6.4%	-7.1%
	Site-Based Community School	-0.37	-0.31	-0.33	-0.29	-13.2%	-11.9%	-10.5%	-13.1%
	Virtual Community School	+0.14	-0.02	-0.02	-0.04	+5.2%	-1.4%	-1.4%	-7.8%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Students who took this end-of-course exam for the first time in other grades are excluded. See Table A2 in the typical annual growth benchmarks.

**Table 20. Change in social studies OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, eleventh grade (U.S. Government)**

		Test Scores (SDs)				Proficiency Rates (%)			
		Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>		-0.18 [N=65,545]	-0.08 [N=70,796]	-0.06 [N=72,904]	-0.05 [N=61,669]	-6.5% [N=65,545]	-4.3% [N=70,796]	-5.2% [N=72,904]	-6.7% [N=61,669]
<b>Race/ethnicity</b>									
	White	-0.17	-0.05	-0.03	-0.02	-4.7%	-3.0%	-3.7%	-5.5%
	Black	-0.25	-0.17	-0.15	-0.17	-13.6%	-9.0%	-9.8%	-10.5%
	Hispanic	-0.14	-0.07	-0.08	-0.08	-7.4%	-4.9%	-7.4%	-8.3%
	Asian	-0.27	-0.12	-0.10	-0.10	-9.2%	-7.6%	-8.8%	-7.7%
<b>Economic disadvantage</b>									
	Not Disadvantaged	-0.18	-0.05	-0.02	+0.02	-4.6%	-2.7%	-3.0%	-4.1%
	Economically Disadvantaged	-0.18	-0.11	-0.11	-0.12	-9.0%	-6.4%	-8.1%	-9.6%
<b>Disability</b>									
	Not With Disabilities	-0.20	-0.07	-0.05	-0.04	-6.2%	-4.0%	-4.6%	-6.1%
	With Disabilities	-0.09	-0.10	-0.13	-0.15	-8.9%	-6.9%	-9.3%	-10.2%
<b>English learner</b>									
	Not English Learner	-0.18	-0.07	-0.05	-0.04	-6.2%	-4.1%	-4.9%	-6.4%
	English Learner	-0.26	-0.25	-0.30	-0.31	-15.3%	-13.3%	-17.5%	-16.4%
<b>Gifted</b>									
	Not Gifted	-0.19	-0.11	-0.09	-0.09	-7.7%	-5.4%	-6.2%	-7.9%
	Gifted	-0.19	+0.04	+0.06	+0.07	-1.2%	-0.3%	-0.5%	-1.0%
<b>District mode of learning in 2020-21</b>									
	In-person	-0.18	-0.07	-0.04	-0.02	-5.4%	-3.8%	-4.1%	-5.6%
	Hybrid/mixed	-0.20	-0.08	-0.05	-0.05	-6.2%	-4.2%	-5.1%	-6.4%
	Remote	-0.23	-0.14	-0.14	-0.12	-11.4%	-7.5%	-9.3%	-8.8%
<b>District type</b>									
	Rural	-0.18	-0.09	-0.07	-0.05	-5.9%	-4.0%	-4.7%	-5.5%
	Town	-0.16	-0.06	-0.05	-0.04	-5.3%	-4.0%	-5.3%	-6.4%
	Suburban	-0.21	-0.06	-0.02	+0.01	-5.5%	-3.3%	-3.2%	-4.8%
	Urban	-0.21	-0.15	-0.14	-0.12	-10.4%	-7.3%	-8.9%	-9.2%
<b>District achievement quartile</b>									
	1st Quartile	-0.13	-0.07	-0.04	-0.04	-7.7%	-5.0%	-6.0%	-7.2%
	2nd Quartile	-0.16	-0.06	-0.03	-0.02	-7.3%	-4.9%	-5.8%	-6.7%
	3rd Quartile	-0.21	-0.11	-0.11	-0.09	-6.1%	-5.3%	-6.0%	-7.4%
	4th Quartile	-0.30	-0.11	-0.09	-0.05	-5.8%	-3.2%	-3.7%	-4.4%
<b>School Type</b>									
	Traditional Public School	-0.19	-0.09	-0.06	-0.05	-6.8%	-4.6%	-5.4%	-6.5%
	Site-Based Community School	-0.26	-0.17	-0.18	-0.17	-11.8%	-8.3%	-10.9%	-9.7%
	Virtual Community School	+0.29	+0.28	+0.23	+0.02	+8.6%	+8.9%	+6.2%	-7.5%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Students who took this end-of-course exam for the first time in other grades are excluded. See Table A2 in the typical annual growth benchmarks.

*One-year growth results by grade:*

**Table 21. Change in one-year standardized test score growth relative to pre-pandemic years, fourth grade**

	Relative ELA Growth (SDs)			Relative Math Growth (SDs)		
	Spring 2022	Spring 2023	Spring 2024	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	+0.20	+0.02	+0.05	+0.07	+0.09	+0.02
<b>Race/ethnicity</b>						
White	+0.19	+0.06	+0.05	+0.07	+0.10	+0.02
Black	+0.19	-0.07	+0.02	+0.09	+0.06	0
Hispanic	+0.21	-0.04	+0.06	+0.08	+0.09	+0.01
Asian	+0.26	-0.08	+0.07	+0.09	+0.10	-0.01
<b>Economic disadvantage</b>						
Not Disadvantaged	+0.21	+0.08	+0.07	+0.07	+0.11	+0.03
Economically Disadvantaged	+0.19	-0.03	+0.03	+0.08	+0.08	0
<b>Disability</b>						
Not With Disabilities	+0.23	+0.04	+0.08	+0.08	+0.10	+0.02
With Disabilities	+0.03	-0.06	-0.10	+0.03	+0.06	-0.01
<b>English learner</b>						
Not English Learner	+0.20	+0.03	+0.05	+0.08	+0.09	+0.02
English Learner	+0.10	-0.18	-0.03	+0.04	+0.07	+0.01
<b>Gifted</b>						
Not Gifted	+0.18	-0.01	+0.04	+0.07	+0.08	+0.01
Gifted	+0.24	+0.18	+0.10	+0.04	+0.09	+0.03
<b>District mode of learning in 2020-21</b>						
In-person	+0.19	+0.05	+0.05	+0.06	+0.11	+0.03
Hybrid/mixed	+0.21	+0.03	+0.05	+0.07	+0.08	+0.01
Remote	+0.26	-0.01	+0.05	+0.13	+0.09	+0.01
<b>District type</b>						
Rural	+0.15	+0.04	+0.04	+0.07	+0.12	+0.04
Town	+0.18	+0.05	+0.04	+0.06	+0.10	0
Suburban	+0.23	+0.05	+0.07	+0.07	+0.09	+0.02
Urban	+0.23	-0.01	+0.04	+0.11	+0.09	+0.01
<b>District achievement quartile</b>						
1st Quartile	+0.22	-0.01	+0.03	+0.13	+0.11	+0.02
2nd Quartile	+0.19	+0.03	+0.06	+0.07	+0.08	+0.02
3rd Quartile	+0.22	+0.06	+0.07	+0.07	+0.12	+0.03
4th Quartile	+0.18	+0.06	+0.05	+0.03	+0.07	0
<b>School Type</b>						
Traditional Public School	+0.20	+0.03	+0.05	+0.08	+0.10	+0.02
Site-Based Community School	+0.15	-0.11	+0.02	-0.02	-0.03	-0.03
Virtual Community School	+0.10	-0.11	-0.15	+0.03	+0.02	-0.07

Note: The table summarizes the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive numbers indicate greater growth during the 2021-22, 2022-23, and 2023-24 school years, relative to the pre-pandemic period, and negative numbers indicate less growth. In the quartile analysis, districts are grouped into quartiles based on their pre-pandemic test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table 22. Change in one-year standardized test score growth relative to pre-pandemic years, fifth grade**

	Relative ELA Growth (SDs)			Relative Math Growth (SDs)		
	Spring 2022	Spring 2023	Spring 2024	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	+0.12	+0.07	+0.16	0.07	+0.06	-0.01
<b>Race/ethnicity</b>						
White	+0.10	+0.07	+0.15	+0.06	+0.05	-0.02
Black	+0.19	+0.06	+0.19	+0.09	+0.07	+0.03
Hispanic	+0.13	+0.05	+0.18	+0.07	+0.05	-0.01
Asian	+0.14	+0.08	+0.25	+0.11	+0.02	-0.01
<b>Economic disadvantage</b>						
Not Disadvantaged	+0.10	+0.07	+0.17	+0.05	+0.04	-0.02
Economically Disadvantaged	+0.15	+0.06	+0.16	+0.08	+0.07	0
<b>Disability</b>						
Not With Disabilities	+0.12	+0.08	+0.18	+0.07	+0.05	0
With Disabilities	+0.14	+0.03	+0.07	+0.05	+0.09	-0.02
<b>English learner</b>						
Not English Learner	+0.12	+0.07	+0.16	+0.07	+0.06	-0.01
English Learner	+0.17	+0.05	+0.14	+0.05	+0.05	-0.01
<b>Gifted</b>						
Not Gifted	+0.12	+0.07	+0.16	+0.06	+0.06	0
Gifted	+0.09	+0.06	+0.18	+0.03	+0.02	-0.04
<b>District mode of learning in 2020-21</b>						
In-person	+0.09	+0.07	+0.15	+0.04	+0.05	-0.02
Hybrid/mixed	+0.13	+0.08	+0.17	+0.08	+0.06	-0.01
Remote	+0.20	+0.06	+0.18	+0.12	+0.07	+0.02
<b>District type</b>						
Rural	+0.07	+0.07	+0.12	+0.05	+0.07	-0.02
Town	+0.09	+0.07	+0.13	+0.04	+0.05	-0.05
Suburban	+0.13	+0.09	+0.20	+0.07	+0.05	+0.01
Urban	+0.18	+0.05	+0.16	+0.09	+0.06	0
<b>District achievement quartile</b>						
1st Quartile	+0.17	+0.06	+0.17	+0.11	+0.09	+0.03
2nd Quartile	+0.11	+0.08	+0.14	+0.04	+0.04	-0.03
3rd Quartile	+0.11	+0.08	+0.16	+0.07	+0.06	0
4th Quartile	+0.08	+0.07	+0.17	+0.03	+0.01	-0.05
<b>School Type</b>						
Traditional Public School	+0.12	+0.07	+0.16	+0.07	+0.05	-0.01
Site-Based Community School	+0.13	+0.05	+0.20	+0.05	+0.05	+0.04
Virtual Community School	+0.07	-0.01	+0.07	+0.26	+0.25	+0.17

Note: The table summarizes the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive numbers indicate greater growth during the 2021-22, 2022-23, and 2023-24 school years, relative to the pre-pandemic period, and negative numbers indicate less growth. In the quartile analysis, districts are grouped into quartiles based on their pre-pandemic test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table 23. Change in one-year standardized test score growth relative to pre-pandemic years, sixth grade**

	Relative ELA Growth (SDs)			Relative Math Growth (SDs)		
	Spring 2022	Spring 2023	Spring 2024	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	+0.09	+0.07	-0.05	0	-0.08	-0.18
<b>Race/ethnicity</b>						
White	+0.09	+0.09	-0.05	+0.01	-0.06	-0.17
Black	+0.12	+0.01	-0.05	-0.05	-0.13	-0.22
Hispanic	+0.10	+0.03	-0.03	-0.01	-0.08	-0.19
Asian	+0.11	+0.09	-0.03	+0.05	-0.12	-0.21
<b>Economic disadvantage</b>						
Not Disadvantaged	+0.09	+0.10	-0.03	0.01	-0.07	-0.16
Economically Disadvantaged	+0.11	+0.04	-0.06	-0.01	-0.08	-0.2
<b>Disability</b>						
Not With Disabilities	+0.10	+0.09	-0.03	+0.01	-0.07	-0.18
With Disabilities	+0.05	-0.06	-0.13	-0.06	-0.11	-0.21
<b>English learner</b>						
Not English Learner	+0.09	+0.07	-0.05	0	-0.08	-0.18
English Learner	+0.10	-0.07	-0.10	-0.06	-0.13	-0.20
<b>Gifted</b>						
Not Gifted	+0.08	+0.04	-0.06	-0.02	-0.09	-0.19
Gifted	+0.08	+0.15	0	+0.06	-0.07	-0.17
<b>District mode of learning in 2020-21</b>						
In-person	+0.08	+0.08	-0.05	-0.01	-0.07	-0.16
Hybrid/mixed	+0.11	+0.08	-0.04	+0.03	-0.08	-0.19
Remote	+0.13	+0.02	-0.05	-0.02	-0.10	-0.21
<b>District type</b>						
Rural	+0.09	+0.09	-0.09	-0.01	-0.06	-0.17
Town	+0.09	+0.09	-0.05	-0.02	-0.07	-0.18
Suburban	+0.10	+0.09	-0.02	+0.02	-0.08	-0.17
Urban	+0.11	+	-0.06	-0.01	-0.08	-0.19
<b>District achievement quartile</b>						
1st Quartile	0.12	0.04	-0.05	0	-0.07	-0.18
2nd Quartile	0.11	0.11	-0.04	+0.03	-0.03	-0.15
3rd Quartile	0.09	0.1	-0.04	-0.01	-0.09	-0.19
4th Quartile	0.05	0.05	-0.06	-0.02	-0.13	-0.20
<b>School Type</b>						
Traditional Public School	+0.10	+0.07	-0.05	0	-0.08	-0.18
Site-Based Community School	+0.08	+0.02	-0.05	-0.07	-0.11	-0.21
Virtual Community School	+0.07	0	-0.10	+0.06	0	-0.18

Note: The table summarizes the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive numbers indicate greater growth during the 2021-22, 2022-23, and 2023-24 school years, relative to the pre-pandemic period, and negative numbers indicate less growth. In the quartile analysis, districts are grouped into quartiles based on their pre-pandemic test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table 24. Change in one-year standardized test score growth relative to pre-pandemic years, seventh grade**

	Relative ELA Growth (SDs)			Relative Math Growth (SDs)		
	Spring 2022	Spring 2023	Spring 2024	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	+0.13	+0.16	+0.09	+0.01	-0.02	-0.04
<b>Race/ethnicity</b>						
White	+0.10	+0.16	+0.09	-0.01	-0.06	-0.05
Black	+0.21	+0.18	+0.09	+0.06	+0.09	-0.01
Hispanic	+0.16	+0.16	+0.10	+0.03	+0.03	-0.03
Asian	+0.12	+0.15	+0.16	-0.01	-0.13	-0.09
<b>Economic disadvantage</b>						
Not Disadvantaged	+0.09	+0.16	+0.11	-0.03	-0.09	-0.06
Economically Disadvantaged	+0.17	+0.17	+0.07	+0.04	+0.04	-0.02
<b>Disability</b>						
Not With Disabilities	+0.12	+0.17	+0.10	-0.01	-0.06	-0.06
With Disabilities	+0.20	+0.14	+0.05	+0.08	+0.15	+0.04
<b>English learner</b>						
Not English Learner	+0.12	+0.16	+0.09	0	-0.03	-0.04
English Learner	+0.28	+0.18	+0.12	+0.04	+0.13	0
<b>Gifted</b>						
Not Gifted	+0.13	+0.16	+0.08	+0.01	+0.01	-0.03
Gifted	+0.09	+0.14	+0.15	-0.08	-0.21	-0.13
<b>District mode of learning in 2020-21</b>						
In-person	+0.10	+0.16	+0.09	-0.01	-0.05	-0.04
Hybrid/mixed	+0.13	+0.16	+0.10	+0.01	-0.04	-0.05
Remote	+0.21	+0.20	+0.09	+0.04	+0.08	-0.02
<b>District type</b>						
Rural	+0.10	+0.16	+0.08	0	-0.03	-0.04
Town	+0.09	+0.16	+0.06	0	-0.01	-0.03
Suburban	+0.12	+0.17	+0.12	-0.01	-0.08	-0.06
Urban	+0.20	+0.18	+0.09	+0.04	+0.05	-0.03
<b>District achievement quartile</b>						
1st Quartile	+0.20	+0.19	+0.10	+0.05	+0.07	-0.01
2nd Quartile	+0.10	+0.16	+0.08	-0.01	-0.02	-0.04
3rd Quartile	+0.11	+0.16	+0.08	+0.01	-0.04	-0.06
4th Quartile	+0.08	+0.14	+0.11	-0.05	-0.13	-0.07
<b>School Type</b>						
Traditional Public School	+0.13	+0.17	+0.09	0	-0.03	-0.04
Site-Based Community School	+0.16	+0.14	+0.06	+0.01	+0.03	-0.05
Virtual Community School	+0.11	+0.12	0	+0.05	+0.05	+0.01

Note: The table summarizes the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive numbers indicate greater growth during the 2021-22, 2022-23, and 2023-24 school years, relative to the pre-pandemic period, and negative numbers indicate less growth. In the quartile analysis, districts are grouped into quartiles based on their pre-pandemic test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table 25. Change in one-year standardized test score growth relative to pre-pandemic years, eighth grade**

	Relative ELA Growth (SDs)			Relative Math Growth (SDs)		
	Spring 2022	Spring 2023	Spring 2024	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.01	+0.10	-0.17	0	-0.02	-0.04
<b>Race/ethnicity</b>						
White	0	+0.10	-0.16	-0.01	-0.02	-0.05
Black	-0.05	+0.10	-0.18	+0.04	-0.01	-0.02
Hispanic	-0.07	+0.06	-0.20	0	-0.03	-0.06
Asian	+0.02	+0.19	-0.14	0	-0.05	-0.07
<b>Economic disadvantage</b>						
Not Disadvantaged	+0.02	+0.14	-0.13	-0.01	-0.02	-0.04
Economically Disadvantaged	-0.04	+0.06	-0.20	+0.01	-0.02	-0.04
<b>Disability</b>						
Not With Disabilities	+0.01	+0.13	-0.15	-0.02	-0.04	-0.06
With Disabilities	-0.14	-0.07	-0.24	+0.11	+0.04	+0.03
<b>English learner</b>						
Not English Learner	-0.01	+0.10	-0.16	0	-0.02	-0.04
English Learner	-0.18	-0.08	-0.27	+0.01	-0.04	-0.06
<b>Gifted</b>						
Not Gifted	-0.03	+0.08	-0.19	0	-0.02	-0.05
Gifted	+0.08	+0.19	-0.05	-0.01	-0.03	-0.03
<b>District mode of learning in 2020-21</b>						
In-person	-0.01	+0.11	-0.16	-0.03	-0.04	-0.07
Hybrid/mixed	0	+0.10	-0.16	+0.01	-0.01	-0.05
Remote	-0.04	+0.07	-0.18	+0.06	+0.01	+0.01
<b>District type</b>						
Rural	-0.03	+0.08	-0.20	-0.04	-0.04	-0.08
Town	0	+0.10	-0.18	-0.01	-0.02	-0.07
Suburban	+0.02	+0.14	-0.13	-0.01	-0.03	-0.05
Urban	-0.05	+0.06	-0.17	+0.04	0	0
<b>District achievement quartile</b>						
1st Quartile	-0.03	+0.08	-0.17	0.03	0.01	0.02
2nd Quartile	0	+0.10	-0.17	0.01	-0.02	-0.06
3rd Quartile	0	+0.10	-0.17	-0.01	-0.02	-0.04
4th Quartile	+0.01	+0.13	-0.14	-0.05	-0.08	-0.14
<b>School Type</b>						
Traditional Public School	-0.01	+0.10	-0.16	0	-0.02	-0.05
Site-Based Community School	-0.05	+0.10	-0.19	-0.01	-0.02	-0.04
Virtual Community School	-0.09	+0.02	-0.19	+0.12	+0.08	+0.10

Note: The table summarizes the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive numbers indicate greater growth during the 2021-22, 2022-23, and 2023-24 school years, relative to the pre-pandemic period, and negative numbers indicate less growth. In the quartile analysis, districts are grouped into quartiles based on their pre-pandemic test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

*Fall-to-spring growth on third-grade ELA exam:*

**Table 26. Fall-to-spring standardized test score growth on third-grade ELA OST compared to pre-pandemic years**

	Pre-Covid Growth	2020-21 SY Diff.	2021-22 SY Diff.	2022-23 SY Diff.	2023-24 SY Diff.
<i>Statewide Average</i>	0.53	-0.12	-0.08	+0.05	-0.15
<b><i>Race/ethnicity</i></b>					
White	0.53	-0.09	-0.08	+0.09	-0.15
Black	0.49	-0.20	-0.08	-0.09	-0.13
Hispanic	0.53	-0.18	-0.10	-0.06	-0.18
Asian	0.58	-0.17	-0.11	+0.11	-0.16
<b><i>Economic disadvantage</i></b>					
Not Disadvantaged	0.55	-0.09	-0.09	+0.13	-0.15
Economically Disadvantaged	0.51	-0.15	-0.08	-0.03	-0.14
<b><i>Disability</i></b>					
Not With Disabilities	0.54	-0.11	-0.08	+0.08	-0.15
With Disabilities	0.47	-0.14	-0.09	-0.10	-0.12
<b><i>English Learner</i></b>					
Not English Learner	0.53	-0.11	-0.08	+0.06	-0.14
English Learner	0.54	-0.27	-0.12	-0.20	-0.21
<b><i>Gifted</i></b>					
Not Gifted	0.53	-0.13	-0.07	+0.03	-0.15
Gifted	0.53	-0.05	-0.14	+0.16	-0.09
<b><i>District mode of learning in 2020-21</i></b>					
In-person	0.54	-0.09	-0.08	+0.08	-0.15
Hybrid/mixed	0.53	-0.12	-0.08	+0.08	-0.15
Remote	0.50	-0.19	-0.09	-0.08	-0.13
<b><i>District type</i></b>					
Rural	0.53	-0.09	-0.07	+0.08	-0.13
Town	0.53	-0.09	-0.08	+0.07	-0.16
Suburban	0.55	-0.11	-0.08	+0.12	-0.16
Urban	0.50	-0.18	-0.09	-0.07	-0.14
<b><i>Fall achievement quartile</i></b>					
1st Quartile	0.74	-0.16	-0.09	-0.13	-0.15
2nd Quartile	0.50	-0.13	-0.06	+0.04	-0.16
3rd Quartile	0.46	-0.14	-0.10	+0.15	-0.16
4th Quartile	0.29	-0.04	-0.10	+0.20	-0.05
<b><i>School type</i></b>					
Traditional Public School	0.52	-0.11	-0.08	+0.05	-0.15
Site-Based Community School	0.50	-0.20	-0.09	-0.07	-0.11
Virtual Community School	0.36	-0.12	-0.05	-0.07	-0.18

Note: The table summarizes the average fall-to-spring growth in normalized test scores in standard deviation units compared to pre-pandemic years (2018 and 2019). These are regression estimates that compare changes in test scores over time for students who took the same exam in fall and spring of each year. In the quartile analysis, students are grouped into quartiles based on their fall test scores, from lower (quartile 1) to higher (quartile 4) baseline test scores.

### III. Methodological Appendices

The primary analysis estimates the over-time changes in student achievement on the annual spring administrations of the Ohio State Tests (OSTs). Specifically, it compares test scores in spring 2021, 2022, 2023, and 2024 (holding constant student demographic characteristics) to student scores in 2019 (again, holding constant student demographic characteristics). For third-grade ELA, the analysis also compares November-to-April changes in student test scores during the 2020-21, 2021-22, 2022-23 and 2023-24 school years to fall-to-spring changes in student test scores during the 2017-18 and 2018-19 school years.

The analysis employs Education Management Information System (EMIS) data on students who were enrolled for the first time in each tested grade during each academic year, to establish the baseline population of students. In high school grades, where students can take the same exam multiple times, it uses only the first reported score. Test scores for years 2023 and earlier come from the Ohio Department of Education and Workforce data warehouse while scores from spring 2024 are from ODE test vendor files. We pre-processed the data to remove alternative assessments and to drop potentially problematic values (e.g., recoding scores as missing if they are below the minimum reported in the OST Annual Technical Reports). Scores of individual students are assigned to school districts — and buildings within school districts — based on where students spent the most time during each academic year.

#### *Statistical Adjustment*

To address potential selection bias due to changes in student composition over time, each year's estimates adjust for student demographic characteristics and school district of attendance. In the final analysis, we combine scores from 2019, 2021, 2022, 2023, and 2024 into a separate pooled dataset for each grade and subject and estimate the following Ordinary Least Squares (OLS) model:

$$y_{idt} = \alpha_d + X'_{idt}\theta + \beta_1 2021_{idt} + \beta_2 2022_{idt} + \beta_3 2023_{idt} + \beta_4 2024_{idt} + \epsilon_{idt} \quad (A1)$$

where  $y_{idt}$  is a test score (or proficiency indicator) for student  $i$  in district of attendance  $d$  and school year  $t$ . The model includes fixed effects for students' district of attendance ( $\alpha_d$ ). We also control for a vector of student demographic characteristics ( $X_{idt}$ ). Importantly, for third-grade ELA, we use the highest of the fall and spring exam scores for each student during the most recent year to make the 2024 results comparable to how historical scores are recorded in the warehouse data. This is a change from the methodology used in earlier reports and explains why the third-grade ELA estimates in this report are somewhat different for spring 2023 than in earlier presentations.

The variables  $2021_{it}$ ,  $2022_{it}$ ,  $2023_{it}$  and  $2024_{it}$  indicate whether the test score is from the last four testing cycles or from the pre-pandemic period, which serves as the omitted baseline category. Thus, the parameter  $\beta_1$  captures the difference between the average test score in spring 2021 and the average test score in spring 2019, holding constant observable students' demographics. Similarly, the parameters  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  capture the difference between each respective year's scores relative to the 2019 baseline. Standard errors are clustered by school district of attendance. We estimate the model above separately for each grade and subject, and we normalize the test

scores to have a mean zero and standard deviation of one based on the distribution of pre-pandemic scores in each grade and subject.<sup>8</sup>

The one-year growth and “learning acceleration” models follow a similar specification, except the matrix of covariates ( $X_{idt}$ ) includes third-order polynomials of lagged test scores in both ELA and math from year  $t-1$ . For example, when examining spring 2024 scores, the lagged test scores are from spring 2023. The growth estimates also include one additional year of pre-pandemic data to increase precision.

The district-level achievement and growth estimates use the same models as the statewide calculations, with several modifications. The estimates are generated separately for each district using a “random effects” model, and to increase statistical power, all grades are pooled. Each district’s “random effect” is allowed to vary across years. To allow direct comparison between achievement and growth, both sets of estimates are averaged across grades four through eight. After pooling, the demographic characteristics and lagged tests scores are interacted with separate indicator variables for each grade level. As with the “learning acceleration” estimates, the district models include one additional year of pre-pandemic data to increase precision.

The analysis of high-school end-of-course exams focuses on the “modal” grade in which students typically take each exam: ninth grade for Algebra, tenth grade for ELA II, Geometry, Biology and U.S. History, and eleventh grade for U.S. Government. As an additional robustness check, the supplemental Appendix presents results that include students taking these exams in other grades. For those models, demographic variables are interacted with an indicator variable for each grade level, as in the district-specific models described above. In addition, for the high school exams, the analysis focuses on first-time test-takers, dropping observations from students who have a recorded score for each exam in prior years. For all exams, students who are recorded as repeating a grade in the EMIS data are dropped from the analysis sample.

For third-grade ELA, we observe fall and spring test scores for students who participated in both rounds of assessment. When analyzing fall-to-spring growth, we estimate the following difference-in-differences model:

$$y_{it} = \alpha_i + \gamma SPRING_{it} + \beta_1 SPRING_{it} * 2021_{it} + \beta_2 SPRING_{it} * 2022_{it} + \beta_3 SPRING_{it} * 2023_{it} + \beta_4 SPRING_{it} * 2024_{it} + \epsilon_{it} \quad (A2)$$

where  $y_{it}$  is a test score for student  $i$  in assessment cycle  $t$ . The model includes fixed effects for each student ( $\alpha_i$ ). Note that this absorbs time-invariant student characteristics, including demographics and prior achievement. The coefficient  $\gamma$  captures the average growth in scores between the fall and spring assessment cycles in pre-pandemic years. The parameters  $\beta$  captures the *change* in fall-to-spring growth in 2021, 2022, 2023 and 2024, respectively, compared to the pre-pandemic years.<sup>9</sup>

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<sup>8</sup> To make the estimates as comparable as possible to previous reports, the analysis still uses the same normalization sample for converting raw test scores into standard deviation units.

<sup>9</sup> We exclude students who repeat third grade, so the main effects of the post-pandemic years are absorbed in the student-level fixed effects.

## Estimating Causal Effect of ESSER Spending

The central challenge to estimating the effects of federal pandemic aid is that the money was allocated as a function of each district’s socioeconomic student composition. Because high-poverty districts also suffered larger achievement declines in the first year of the pandemic — and perhaps would have experienced more catch-up growth — it is difficult to empirically separate the impact of additional financial resources from the student demographics that drove the funding allocations using standard statistical methods.

To get around these challenges, we follow several recent national reports and take advantage of the precise formula used to distribute pandemic aid across districts. In particular, the per-pupil allocation was based in large part on 2019 district-level student poverty estimates from the Census Bureau’s “Small Area Income and Poverty Estimates.” Thus, 2019 poverty rates can serve as an “instrument” for per-pupil Elementary and Secondary School Emergency Relief (ESSER)<sup>10</sup> funding, and the effects of spending can be estimated using a two-stage least squares (2SLS) system of equations. Statistically controlling for poverty estimates in subsequent years (i.e., 2022) isolates “as-if random” variation in ESSER funding due to quirks and statistical imprecision in the 2019 poverty estimates that were used in the formula for allocating pandemic aid. The 2019 poverty estimates satisfy the requirements for an instrumental variable, strongly predicting differences in district-level ESSER allocations (with a first-stage F-statistic of 125, well above the minimum required for valid instruments).

In the 2SLS models, district-level estimates of “learning acceleration,” defined as changes in one-year growth relative to each district’s pre-pandemic benchmarks, are regressed on per-pupil ESSER spending instrumented by 2019 poverty rates. We estimate separate effects for each year as well as the total effects on “cumulative” acceleration, summing estimates from the 2022, 2023, and 2024 academic years. Note that ESSER spending is measured at the school district level, while acceleration estimates are based only on grades 4 through 8, so the estimates likely understate the total returns to federal aid by failing to capture effects in other grades (and in other subjects).

**Table A1. Estimated effects of each \$1,000 increase in ESSER funding on district-level “learning acceleration”**

Outcome	ELA	Math
2021-22 Learning Acceleration	0.007 (p=0.14)	0.009 (p=0.13)
2022-23 Learning Acceleration	-0.003 (p=0.54)	0.007 (p=0.15)
2023-24 Learning Acceleration	-0.003 (p=0.54)	0.004 (p=0.42)
<b>Cumulative Learning Acceleration</b>	<b>0.001 (p=0.11)</b>	<b>0.020 (p=0.11)</b>

Note: Estimated using a two-stage least squares (2SLS) model with 2019 Census Bureau’s “Small Area Income and Poverty Estimates” used as an “instrument” for district-level per-pupil ESSER allocation. All models statistically control for 2022 poverty rates and use yearly and total learning acceleration estimates as dependent variables of interest.

<sup>10</sup> ESSER funding was provided through three different programs created by different pieces of federal legislation, and we focus on the total, summing each district’s ESSER I, ESSER II, and ESSER III allocations.

## IV. Supplemental Appendix

**Table A2. Average annual growth in national standardized test scores, by grade and subject**

	<b>Reading</b>	<b>Math</b>
Grade 3	0.60	0.89
Grade 4	0.36	0.52
Grade 5	0.40	0.56
Grade 6	0.32	0.41
Grade 7	0.23	0.30
Grade 8	0.26	0.32
Grade 9	0.24	0.22
Grade 10	0.19	0.25

Source: Carolyn J. Hill, Howard S. Bloom, Alison Rebeck Black, and Mark W. Lipsey, 2008, "Empirical Benchmarks for Interpreting Effect Sizes in Research," *Child Development Perspectives* 2(3): pp. 172-177.

Note: The estimates represent average spring-to-spring growth in standardized test scores in each grade based on national norming samples from half a dozen major standardized tests in each subject. The estimates include learning in school, growth due to experiences outside of school, and typical summer learning loss between grades.

**Table A3. Distribution of pre-pandemic test scores, used for normalization and effect size calculations**

	<b>Assessment Type</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b><i>ELA</i></b>			
	Grade 3	717.0	45.1
	Grade 4	714.9	43.0
	Grade 5	719.8	45.9
	Grade 6	705.7	40.7
	Grade 7	712.3	40.8
	Grade 8	702.2	30.8
	ELA II (Grade 10)	710.3	28.4
	ELA II (All Grades)	709.5	29.0
<b><i>Math</i></b>			
	Grade 3	720.8	47.4
	Grade 4	729.2	47.6
	Grade 5	711.3	38.1
	Grade 6	707.9	37.1
	Grade 7	706.7	39.2
	Grade 8	700.7	26.1
	Algebra (Grade 9)	701.9	28.9
	Algebra (All Grades)	710.5	34.4
	Geometry (Grade 10)	691.8	33.2
	Geometry (All Grades)	701.4	39.5
<b><i>Science</i></b>			
	Grade 5	720.2	46.4
	Grade 8	719.9	46.0
	Biology (Grade 10)	715.9	27.4
	Biology (All Grades)	718.8	29.2
<b><i>Social Studies</i></b>			
	U.S. History (Grade 10)	721.6	25.5
	U.S. History (All Grades)	720.5	25.7
	U.S. Government (Grade 11)	714.9	17.5
	U.S. Government (All Grades)	714.7	18.1

**Table A4. Standard deviation of OST scores by exam type and year (spring only)**

		2017-18	2018-19	2020-21	2021-22	2022-23	2023-24
<b>ELA</b>							
	Grade 3	45.5	44.6	50.1	45.9	52.1	46.4
	Grade 4	43.7	42.2	46.8	49.6	49.6	51.2
	Grade 5	46.2	45.7	49.8	46.8	50	51.1
	Grade 6	41.8	39.5	45.4	41.9	45.1	44.7
	Grade 7	39.9	41.5	41.6	41.2	42.2	46.1
	Grade 8	30.4	31	31.7	34.1	34.3	33.6
	ELA II (Grade 10)	28	28.9	30.2	28.5	28.9	29.7
	ELA II (All Grades)	28.6	29.4	31	29.1	29.4	30.3
<b>Math</b>							
	Grade 3	47.9	47	48.8	48.6	49.8	50
	Grade 4	48.9	46.2	50.4	50.2	51.3	51.9
	Grade 5	39	37.2	36.7	37.8	38.2	39.1
	Grade 6	37	37.3	34.7	37.9	37.6	38.8
	Grade 7	39.9	38.5	33.7	35.7	33.7	37.3
	Grade 8	26.6	25.5	21.6	22.5	23.1	22.4
	Algebra (Grade 9)	28.1	29.6	27.4	30.3	30.2	29.4
	Algebra (All Grades)	33.3	35.5	33.2	35.5	35.7	35.4
	Geometry (Grade 10)	34.6	31.6	31.2	32.8	35.7	31.7
	Geometry (All Grades)	40.6	38.3	37.4	39.7	42.9	38.9
<b>Science</b>							
	Grade 5	46.4	46.5	49.7	51.6	48.1	52.4
	Grade 8	44.6	47.4	45.2	47.6	46.4	45.1
	Biology (Grade 10)	26.6	28.2	27.7	29.2	26.6	29.3
	Biology (All Grades)	28.3	30	29.5	31.1	28.2	31.2
<b>Social Studies</b>							
	U.S. History (Grade 10)	24.9	25.9	24.8	26.6	26.2	28
	U.S. History (All Grades)	25.2	26.2	24.7	26.7	26.3	28.2
	U.S. Government (Grade 11)	16	18.8	18.1	20.1	20.4	21.4
	U.S. Government (All Grades)	16.7	19.2	18.4	20.3	20.6	21.7

**Table A5. Change in ELA OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, ELA II end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.02	-0.03	-0.02	0	-3.0%	-2.5%	-2.4%	-1.5%
<b>Race/ethnicity</b>								
White	-0.01	-0.02	-0.02	+0.01	-2.6%	-1.8%	-2.2%	-0.7%
Black	-0.06	-0.02	+0.02	-0.03	-4.0%	-4.2%	-2.6%	-2.8%
Hispanic	-0.06	-0.05	-0.04	-0.07	-4.5%	-4.6%	-4.2%	-4.9%
Asian	+0.01	-0.09	-0.06	-0.08	-3.0%	-3.2%	-2.0%	-3.3%
<b>Economic disadvantage</b>								
Not Disadvantaged	0	-0.04	-0.02	+0.03	-2.0%	-1.9%	-1.6%	-0.2%
Economically Disadvantaged	-0.06	-0.02	-0.02	-0.03	-4.2%	-3.1%	-3.3%	-2.8%
<b>Disability</b>								
Not With Disabilities	-0.02	-0.04	-0.02	0	-3.1%	-2.5%	-2.2%	-1.4%
With Disabilities	-0.03	0	0	-0.02	-2.3%	-2.5%	-3.1%	-1.7%
<b>English learner</b>								
Not English Learner	-0.02	-0.03	-0.02	0	-3.0%	-2.4%	-2.3%	-1.3%
English Learner	-0.06	-0.02	-0.02	-0.13	-4.5%	-4.7%	-4.6%	-5.4%
<b>Gifted</b>								
Not Gifted	-0.04	-0.03	-0.02	-0.02	-3.7%	-3.0%	-2.8%	-2.0%
Gifted	0.06	-0.02	-0.01	+0.05	-0.5%	-0.1%	-0.3%	+0.3%
<b>District mode of learning in 2020-21</b>								
In-person	-0.01	-0.03	-0.03	+0.01	-2.4%	-1.8%	-2.2%	-0.8%
Hybrid/mixed	-0.02	-0.04	-0.01	+0.01	-3.3%	-2.5%	-1.9%	-0.7%
Remote	-0.09	-0.05	-0.02	-0.05	-4.8%	-4.9%	-3.8%	-3.5%
<b>District type</b>								
Rural	-0.02	-0.03	-0.04	+0.02	-3.1%	-2.1%	-2.5%	-0.7%
Town	-0.01	-0.03	-0.03	0	-2.8%	-2.6%	-3.2%	-1.5%
Suburban	-0.01	-0.04	-0.02	+0.02	-2.4%	-1.9%	-1.3%	-0.4%
Urban	-0.08	-0.03	+0.01	-0.02	-4.8%	-4.1%	-3.1%	-2.7%
<b>District achievement quartile</b>								
1st Quartile	-0.06	-0.02	+0.01	0	-4.0%	-3.0%	-2.3%	-1.6%
2nd Quartile	-0.01	-0.02	-0.01	+0.01	-2.8%	-2.1%	-2.4%	-1.1%
3rd Quartile	-0.03	-0.05	-0.04	0	-3.0%	-3.1%	-2.8%	-1.4%
4th Quartile	0	-0.05	-0.04	+0.01	-2.5%	-2.1%	-1.9%	-0.6%
<b>School Type</b>								
Traditional Public School	-0.02	-0.03	-0.02	0	-3.2%	-2.6%	-2.3%	-1.2%
Site-Based Community School	-0.13	-0.09	-0.09	-0.12	-5.9%	-5.7%	-5.8%	-6.9%
Virtual Community School	+0.14	+0.06	+0.02	-0.05	+3.6%	+0.5%	-1.8%	-3.8%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table A6. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, Algebra end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.20	-0.13	-0.05	+0.01	-11.1%	-6.9%	-3.5%	-0.6%
<b>Race/ethnicity</b>								
White	-0.20	-0.12	-0.04	+0.02	-10.7%	-6.5%	-3.0%	-0.1%
Black	-0.18	-0.14	-0.08	+0.01	-12.0%	-7.9%	-5.2%	-1.6%
Hispanic	-0.15	-0.11	-0.03	+0.04	-10.9%	-6.7%	-3.1%	-0.8%
Asian	-0.32	-0.17	-0.12	-0.06	-11.4%	-6.2%	-5.5%	-3.0%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.23	-0.14	-0.04	+0.01	-10.8%	-6.8%	-2.8%	-0.1%
Economically Disadvantaged	-0.16	-0.12	-0.05	+0.02	-11.2%	-6.7%	-4.1%	-0.9%
<b>Disability</b>								
Not With Disabilities	-0.21	-0.13	-0.05	+0.01	-12.0%	-7.5%	-3.8%	-0.9%
With Disabilities	-0.10	-0.10	-0.04	+0.07	-5.4%	-2.8%	-1.5%	+1.3%
<b>English learner</b>								
Not English Learner	-0.20	-0.13	-0.05	+0.01	-11.2%	-6.9%	-3.5%	-0.6%
English Learner	-0.15	-0.13	-0.09	+0.07	-8.8%	-5.2%	-4.8%	-0.2%
<b>Gifted</b>								
Not Gifted	-0.19	-0.12	-0.05	+0.02	-12.3%	-7.4%	-3.9%	-0.5%
Gifted	-0.25	-0.16	-0.05	-0.01	-4.6%	-3.5%	-1.3%	-0.6%
<b>District mode of learning in 2020-21</b>								
In-person	-0.18	-0.11	-0.03	+0.03	-10.4%	-6.3%	-2.8%	0.3%
Hybrid/mixed	-0.25	-0.15	-0.06	0	-13.1%	-7.8%	-4.0%	-1.0%
Remote	-0.15	-0.14	-0.05	+0.04	-9.5%	-6.9%	-3.4%	-0.1%
<b>District type</b>								
Rural	-0.15	-0.09	-0.01	+0.06	-10.0%	-6.5%	-2.2%	1.3%
Town	-0.19	-0.11	-0.03	+0.03	-12.2%	-7.2%	-3.3%	0%
Suburban	-0.28	-0.18	-0.09	-0.02	-12.3%	-7.6%	-4.1%	-1.2%
Urban	-0.14	-0.11	-0.03	+0.04	-9.6%	-6.0%	-3.0%	-0.1%
<b>District achievement quartile</b>								
1st Quartile	-0.13	-0.09	-0.02	+0.06	-9.5%	-6.0%	-2.6%	+0.6%
2nd Quartile	-0.17	-0.09	0	+0.07	-12.3%	-6.3%	-2.2%	+1.6%
3rd Quartile	-0.21	-0.13	-0.02	+0.03	-12.1%	-8.1%	-3.5%	-0.5%
4th Quartile	-0.30	-0.20	-0.12	-0.06	-11.5%	-7.2%	-4.4%	-1.8%
<b>School Type</b>								
Traditional Public School	-0.21	-0.13	-0.05	0.02	-11.4%	-7.0%	-3.4%	-0.3%
Site-Based Community School	-0.29	-0.23	-0.24	-0.12	-16.9%	-13.4%	-13.0%	-6.8%
Virtual Community School	+0.16	+0.07	+0.06	+0.01	+5.5%	+2.4%	+2.1%	-0.9%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table A7. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, Geometry end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.23	-0.19	-0.14	-0.07	-8.8%	-6.4%	-4.6%	-5.6%
<b>Race/ethnicity</b>								
White	-0.22	-0.19	-0.11	-0.08	-8.9%	-6.5%	-4.2%	-5.7%
Black	-0.25	-0.21	-0.26	-0.06	-7.6%	-5.0%	-4.7%	-4.2%
Hispanic	-0.23	-0.20	-0.20	-0.09	-9.2%	-6.5%	-5.9%	-6.7%
Asian	-0.33	-0.23	-0.13	-0.12	-9.5%	-8.1%	-7.2%	-7.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.23	-0.19	-0.10	-0.08	-9.4%	-7.0%	-4.7%	-5.9%
Economically Disadvantaged	-0.21	-0.19	-0.20	-0.07	-7.9%	-5.4%	-4.4%	-5.1%
<b>Disability</b>								
Not With Disabilities	-0.23	-0.19	-0.13	-0.08	-9.5%	-6.9%	-4.9%	-6.2%
With Disabilities	-0.23	-0.21	-0.27	-0.05	-3.1%	-2.2%	-1.9%	-1.6%
<b>English learner</b>								
Not English Learner	-0.22	-0.19	-0.14	-0.08	-8.9%	-6.4%	-4.5%	-5.7%
English Learner	-0.31	-0.26	-0.35	-0.09	-5.9%	-5.4%	-5.2%	-2.8%
<b>Gifted</b>								
Not Gifted	-0.21	-0.20	-0.17	-0.08	-9.5%	-7.0%	-5.1%	-6.2%
Gifted	-0.27	-0.18	-0.03	-0.06	-5.7%	-3.5%	-2.2%	-3.3%
<b>District mode of learning in 2020-21</b>								
In-person	-0.19	-0.17	-0.10	-0.06	-7.5%	-5.8%	-3.4%	-5.0%
Hybrid/mixed	-0.28	-0.23	-0.16	-0.10	-11.5%	-8.2%	-6.2%	-7.3%
Remote	-0.27	-0.21	-0.24	-0.04	-8.3%	-5.0%	-4.6%	-3.6%
<b>District type</b>								
Rural	-0.14	-0.16	-0.09	-0.05	-6.1%	-5.3%	-2.8%	-4.7%
Town	-0.21	-0.19	-0.11	-0.06	-9.9%	-7.1%	-4.3%	-5.5%
Suburban	-0.29	-0.22	-0.14	-0.11	-11.0%	-7.6%	-5.9%	-7.0%
Urban	-0.23	-0.19	-0.21	-0.05	-7.7%	-5.1%	-4.1%	-4.3%
<b>District achievement quartile</b>								
1st Quartile	-0.19	-0.17	-0.17	-0.03	-5.3%	-2.7%	-2.0%	-1.9%
2nd Quartile	-0.20	-0.20	-0.13	-0.06	-9.6%	-7.5%	-4.3%	-5.9%
3rd Quartile	-0.25	-0.19	-0.11	-0.07	-10.7%	-7.6%	-5.1%	-6.3%
4th Quartile	-0.29	-0.23	-0.14	-0.13	-10.7%	-8.0%	-6.5%	-8.1%
<b>School Type</b>								
Traditional Public School	-0.23	-0.20	-0.14	-0.07	-9.2%	-6.5%	-4.6%	-5.6%
Site-Based Community School	-0.23	-0.25	-0.31	-0.18	-9.4%	-8.3%	-9.8%	-9.7%
Virtual Community School	+0.05	-0.09	-0.13	-0.04	+3.7%	-1.6%	-1.1%	-4.3%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table A8. Change in science OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, Biology end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.22	-0.16	-0.20	-0.16	-9.4%	-7.0%	-7.9%	-8.4%
<b>Race/ethnicity</b>								
White	-0.22	-0.15	-0.21	-0.15	-8.6%	-6.1%	-6.8%	-7.6%
Black	-0.22	-0.19	-0.16	-0.17	-13.0%	-10.3%	-11.5%	-11.5%
Hispanic	-0.20	-0.19	-0.19	-0.18	-11.1%	-9.3%	-10.6%	-10.5%
Asian	-0.19	-0.15	-0.30	-0.15	-6.2%	-4.6%	-5.9%	-5.4%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.22	-0.15	-0.22	-0.13	-7.8%	-5.6%	-6.0%	-6.1%
Economically Disadvantaged	-0.22	-0.18	-0.18	-0.18	-11.6%	-8.8%	-10.3%	-11.2%
<b>Disability</b>								
Not With Disabilities	-0.23	-0.16	-0.22	-0.16	-9.5%	-7.1%	-7.9%	-8.5%
With Disabilities	-0.15	-0.14	-0.08	-0.13	-8.9%	-6.2%	-7.3%	-7.7%
<b>English learner</b>								
Not English Learner	-0.22	-0.16	-0.21	-0.16	-9.4%	-7.0%	-7.8%	-8.4%
English Learner	-0.17	-0.14	-0.11	-0.16	-11.4%	-8.4%	-10.1%	-8.9%
<b>Gifted</b>								
Not Gifted	-0.22	-0.17	-0.19	-0.16	-11.2%	-8.3%	-9.2%	-9.8%
Gifted	-0.22	-0.09	-0.24	-0.09	-2.0%	-1.2%	-1.6%	-1.8%
<b>District mode of learning in 2020-21</b>								
In-person	-0.20	-0.14	-0.20	-0.14	-8.3%	-6.0%	-6.9%	-7.4%
Hybrid/mixed	-0.25	-0.17	-0.24	-0.17	-10.1%	-6.8%	-8.0%	-8.3%
Remote	-0.23	-0.20	-0.18	-0.18	-11.7%	-9.8%	-10.8%	-10.5%
<b>District type</b>								
Rural	-0.20	-0.15	-0.18	-0.15	-9.0%	-6.9%	-7.6%	-9.1%
Town	-0.23	-0.17	-0.21	-0.14	-10.0%	-7.5%	-8.4%	-8.3%
Suburban	-0.24	-0.14	-0.23	-0.14	-7.9%	-4.8%	-6.1%	-5.8%
Urban	-0.23	-0.20	-0.18	-0.20	-12.3%	-10.0%	-11.1%	-11.9%
<b>District achievement quartile</b>								
1st Quartile	-0.19	-0.17	-0.14	-0.16	-11.1%	-9.0%	-9.3%	-10.6%
2nd Quartile	-0.21	-0.16	-0.20	-0.13	-10.4%	-8.1%	-9.3%	-9.5%
3rd Quartile	-0.26	-0.17	-0.24	-0.17	-9.8%	-6.4%	-8.0%	-7.8%
4th Quartile	-0.25	-0.14	-0.26	-0.16	-7.3%	-4.4%	-5.8%	-5.4%
<b>School Type</b>								
Traditional Public School	-0.23	-0.16	-0.21	-0.16	-9.6%	-6.9%	-8.0%	-8.2%
Site-Based Community School	-0.29	-0.29	-0.21	-0.24	-16.7%	-13.8%	-10.7%	-13.4%
Virtual Community School	0.04	-0.14	-0.05	-0.15	-0.6%	-7.7%	-3.7%	-11.1%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table A9. Change in social studies OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, U.S. History end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.28	-0.21	-0.16	-0.07	-10.1%	-8.3%	-6.1%	-7.0%
<b>Race/ethnicity</b>								
White	-0.28	-0.20	-0.16	-0.06	-8.8%	-7.3%	-5.4%	-5.9%
Black	-0.27	-0.23	-0.18	-0.13	-15.0%	-12.3%	-8.9%	-10.3%
Hispanic	-0.24	-0.20	-0.15	-0.10	-11.4%	-9.4%	-7.0%	-9.4%
Asian	-0.32	-0.17	-0.18	-0.03	-9.7%	-6.0%	-5.4%	-5.5%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.29	-0.20	-0.16	-0.04	-7.7%	-6.6%	-4.9%	-4.8%
Economically Disadvantaged	-0.27	-0.20	-0.17	-0.11	-12.9%	-10.4%	-7.6%	-9.3%
<b>Disability</b>								
Not With Disabilities	-0.30	-0.21	-0.17	-0.07	-10.0%	-8.1%	-6.0%	-6.9%
With Disabilities	-0.16	-0.18	-0.11	-0.07	-10.3%	-9.4%	-6.8%	-7.4%
<b>English learner</b>								
Not English Learner	-0.28	-0.21	-0.17	-0.07	-10.0%	-8.2%	-6.0%	-6.9%
English Learner	-0.21	-0.20	-0.14	-0.12	-14.9%	-11.6%	-9.0%	-10.6%
<b>Gifted</b>								
Not Gifted	-0.28	-0.21	-0.17	-0.10	-11.8%	-9.8%	-7.1%	-8.2%
Gifted	-0.30	-0.18	-0.15	+0.03	-2.1%	-1.3%	-1.2%	-1.1%
<b>District mode of learning in 2020-21</b>								
In-person	-0.28	-0.19	-0.17	-0.06	-9.1%	-7.2%	-5.6%	-6.1%
Hybrid/mixed	-0.31	-0.22	-0.16	-0.07	-10.5%	-8.7%	-6.4%	-6.7%
Remote	-0.30	-0.23	-0.18	-0.09	-13.4%	-10.9%	-7.1%	-7.9%
<b>District type</b>								
Rural	-0.25	-0.19	-0.17	-0.06	-9.2%	-7.8%	-6.5%	-6.4%
Town	-0.30	-0.24	-0.19	-0.09	-10.7%	-9.0%	-6.8%	-7.2%
Suburban	-0.32	-0.19	-0.15	-0.04	-8.9%	-6.7%	-4.9%	-4.9%
Urban	-0.27	-0.22	-0.17	-0.10	-13.0%	-10.9%	-7.3%	-9.1%
<b>District achievement quartile</b>								
1st Quartile	-0.23	-0.19	-0.13	-0.05	-12.0%	-10.2%	-6.7%	-7.6%
2nd Quartile	-0.31	-0.21	-0.19	-0.10	-12.1%	-9.6%	-7.8%	-8.4%
3rd Quartile	-0.29	-0.21	-0.16	-0.07	-9.4%	-7.9%	-5.7%	-6.3%
4th Quartile	-0.34	-0.22	-0.19	-0.06	-7.5%	-5.6%	-4.4%	-4.2%
<b>School Type</b>								
Traditional Public School	-0.29	-0.21	-0.17	-0.07	-10.3%	-8.4%	-6.1%	-6.6%
Site-Based Community School	-0.32	-0.27	-0.27	-0.20	-13.2%	-12.4%	-10.5%	-11.9%
Virtual Community School	+0.01	-0.10	-0.07	-0.13	-3.1%	-6.6%	-4.2%	-12.4%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

**Table A10. Change in math OST standardized scaled scores and proficiency rates relative to pre-pandemic baseline, U.S. Government end-of-course exam (combining all grades)**

	Test Scores (SDs)				Proficiency Rates (%)			
	Spring 2021	Spring 2022	Spring 2023	Spring 2024	Spring 2021	Spring 2022	Spring 2023	Spring 2024
<i>Statewide Average</i>	-0.17	-0.07	-0.05	-0.05	-6.0%	-3.7%	-4.6%	-6.5%
<b>Race/ethnicity</b>								
White	-0.17	-0.05	-0.03	-0.02	-4.6%	-2.7%	-3.5%	-5.6%
Black	-0.21	-0.13	-0.12	-0.15	-11.8%	-7.6%	-7.8%	-9.8%
Hispanic	-0.13	-0.07	-0.07	-0.09	-6.4%	-3.5%	-5.7%	-8.2%
Asian	-0.21	-0.08	-0.06	-0.07	-7.3%	-5.7%	-6.9%	-6.9%
<b>Economic disadvantage</b>								
Not Disadvantaged	-0.18	-0.05	-0.02	+0.02	-4.3%	-2.4%	-2.7%	-4.0%
Economically Disadvantaged	-0.16	-0.09	-0.09	-0.12	-8.2%	-5.3%	-6.9%	-9.3%
<b>Disability</b>								
Not With Disabilities	-0.19	-0.06	-0.04	-0.03	-5.8%	-3.3%	-4.0%	-6.0%
With Disabilities	-0.08	-0.09	-0.11	-0.16	-7.7%	-5.7%	-7.9%	-9.7%
<b>English learner</b>								
Not English Learner	-0.17	-0.06	-0.05	-0.04	-5.7%	-3.4%	-4.2%	-6.3%
English Learner	-0.23	-0.23	-0.27	-0.30	-15.0%	-13.3%	-15.9%	-16.4%
<b>Gifted</b>								
Not Gifted	-0.18	-0.10	-0.08	-0.09	-7.1%	-4.6%	-5.5%	-7.9%
Gifted	-0.18	+0.04	+0.05	+0.08	-1.0%	-0.1%	-0.3%	-0.8%
<b>District mode of learning in 2020-21</b>								
In-person	-0.18	-0.07	-0.05	-0.02	-5.7%	-3.6%	-4.3%	-5.8%
Hybrid/mixed	-0.19	-0.07	-0.04	-0.04	-5.5%	-3.4%	-4.1%	-5.6%
Remote	-0.19	-0.10	-0.10	-0.11	-10.0%	-6.1%	-7.1%	-8.5%
<b>District type</b>								
Rural	-0.17	-0.08	-0.07	-0.06	-6.1%	-3.8%	-5.0%	-6.6%
Town	-0.18	-0.09	-0.06	-0.04	-5.8%	-4.3%	-5.4%	-6.3%
Suburban	-0.19	-0.04	-0.01	0.01	-4.7%	-2.4%	-2.4%	-4.2%
Urban	-0.19	-0.12	-0.11	-0.12	-9.5%	-6.2%	-7.4%	-8.8%
<b>District achievement quartile</b>								
1st Quartile	-0.11	-0.03	-0.02	-0.03	-7.0%	-4.1%	-5.1%	-7.0%
2nd Quartile	-0.17	-0.07	-0.03	-0.03	-6.8%	-4.4%	-5.2%	-6.5%
3rd Quartile	-0.21	-0.09	-0.07	-0.04	-5.9%	-4.1%	-4.7%	-6.2%
4th Quartile	-0.30	-0.13	-0.12	-0.08	-5.3%	-3.0%	-3.7%	-4.7%
<b>School Type</b>								
Traditional Public School	-0.19	-0.08	-0.06	-0.04	-6.3%	-3.9%	-4.7%	-6.2%
Site-Based Community School	-0.25	-0.22	-0.19	-0.16	-11.2%	-9.6%	-10.0%	-8.7%
Virtual Community School	+0.26	+0.24	+0.19	-0.01	+7.1%	+7.2%	+4.3%	-8.8%

Note: The table shows changes in test scores and proficiency rates relative to pre-pandemic performance from the 2018-19 school year. Changes in test scores and proficiency rate are estimated using statistical models that control for students' demographic characteristics and school district "fixed effects." The scaled scores are converted to Z-scores, so that effect sizes are comparable to those in other studies. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A2 in the typical annual growth benchmark for each grade and subject.

