

# Assessing the Academic Recovery of Ohio Students: An Analysis of Spring 2022 Ohio State Tests

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## Abstract

Student performance on the spring 2022 Ohio State Tests showed some significant improvements compared to one year earlier. However, the recovery has been most pronounced in English/language arts (ELA), where there is evidence of meaningful learning acceleration, and in lower grades. Although the ELA gains have been broad-based, they have not eliminated the achievement gaps that were exacerbated during the first year of the pandemic. Overall, ELA achievement remains between one-third and two-thirds of a year's worth of learning lower than in the pre-pandemic period, depending on the grade. If the current pace of recovery can be sustained, ELA achievement could return to pre-pandemic levels within the next two to three years in most grades. By contrast, math achievement levels remain between one-half and a whole year's worth of learning lower and if the current pace of recovery in math persists, it will take considerably longer for achievement to recover to pre-pandemic levels. In third-grade ELA, the only grade and subject where most students are tested twice during the academic year, there is no evidence that students learning grew at a faster pace during the 2021-22 school year. Although achievement increased substantially between the fall and spring assessments in this grade and spring 2022 scores were considerably higher than among the prior year's third-grade cohort, the growth recorded during the academic year was somewhat lower than in the pre-pandemic period, suggesting that at least some of the observed gains since spring 2021 may be due to expanded summer services and programming.

*\*Any opinions or recommendations presented in this analysis are those of the authors 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, or The Ohio State University.*

# I. Summary of Findings

This is the fourth in a series of reports that examine how the COVID-19 pandemic affected the academic achievement of Ohio students and the trajectory of the recovery over the past year. It focuses on student performance on the spring 2022 Ohio State Tests (OSTs) in grades three through eight and in high school.

The analysis has three distinct parts. First, it compares students' *three-year* gains on mathematics and English/language arts (ELA) exams—from spring 2019 to spring 2022—to the three-year gains of an earlier grade cohort (from 2016 to 2019) that was not affected by the pandemic.<sup>1</sup> By focusing on three-year gains, rather than performance at a single point in time, it is possible to adjust for differences in student achievement prior to the pandemic and more cleanly isolate the impact of learning disruptions from changes in the composition of students educated in Ohio schools over time. For ELA, this analysis covers grades three through eight and students in the tenth grade. For math, it examines grades six through ten.<sup>2</sup>

Second, the report provides estimates of *annual* gains in student achievement—spring 2021 to spring 2022—compared to similar gains among pre-pandemic cohorts to quantify the extent to which efforts to “accelerate” learning in Ohio have been successful.<sup>3</sup> These estimates cover grades four through nine in math and grades four through eight in ELA.

To begin to understand the precise timing and nature of the services that are helping students catch up, the final part of the report focuses on learning *during* the academic year, examining achievement growth between the fall and spring testing windows for the third-grade ELA exams, which are taken by students twice during each academic year. This can shed light on whether students are indeed making up lost ground during the school year or whether the observed gains in achievement are due to other services (e.g., expanded summer programming).

One challenge to comparing student performance on state assessments over time is that the pandemic led to changes in the composition of students who took the annual exams, as test participation rates were lower than in past years and some students exited their districts altogether to pursue different educational options. Test participation rates declined significantly in spring 2021. Although they partially recovered by spring 2022, overall participation rates were still approximately 1 to 3 percentage points lower than in pre-pandemic years, depending on grade and subject. The analysis addresses this issue by also generating “adjusted” estimates using a statistical model that controls for differences in student characteristics, including prior test scores. The analysis also imputes missing test scores using observed student characteristics—most importantly, their test scores on past exams—to make sure the estimates are representative of Ohio’s entire population of students, including those who did not participate in the spring 2021 or spring 2022 tests.

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<sup>1</sup> Because the state used different tests prior to 2016, the analysis is not extended to earlier cohorts.

<sup>2</sup> The difference in coverage is due to more limited availability of pre-pandemic achievement data for current students in math compared to ELA. Students take district reading diagnostics in lower grades, which can be used to adjust for differences in pre-pandemic achievement. By contrast, information on math performance is available only from the state assessments, which do not begin until third grade.

<sup>3</sup> One reason for why students in spring 2021 may have had different performance than students in spring 2022, even after accounting for demographic characteristics and baseline achievement, is that the pandemic affected these cohorts at different ages and age may have moderated the associated learning disruptions. Focusing on one-year gains—between spring 2021 and spring 2022—provides a clean estimate of learning recovery (or lack thereof) and is not confounded by differences in age at the time the pandemic hit.

When describing changes in student achievement levels 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 OST. One limitation of this metric, however, is that it captures changes in achievement among a relatively narrow subset of students who were likely to be near the proficiency threshold. The second (and preferred) measure examines changes in standardized continuous scale scores. This is reported in student “standard deviation” units and captures learning impacts across a much broader range of baseline achievement. Unlike proficiency rates, however, 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>4</sup> Such a comparison enables the reader to benchmark estimated impacts to 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 unwise to directly compare the numerical test score estimates below across grades or subjects. Instead, the reader is encouraged to consider how the numeric estimates (in standard deviations) compare to typical annual achievement growth in each grade and subject.

Although this analysis largely follows the format of an earlier report that evaluated spring 2021 assessments, there are several important differences that should be kept in mind. First, the present analysis includes all Ohio public school students—including those attending charter schools, known as community schools in Ohio. Second, the passage of an additional year necessitated some modifications to the methodology to allow over-time comparisons. In particular, this year’s analysis of student achievement levels focuses on three-year growth (vs. two-year growth in last year’s report). One consequence of extending the time gap is that the sample includes one fewer pre-pandemic cohort as the baseline for comparison.<sup>5</sup> Finally, this analysis is able to use additional information about which precise test each student was expected to take, allowing for more accurate calculations of participation rates. For all of these reasons, the precise estimates using spring 2021 scores vary somewhat across the two reports. However, the spring 2021 and spring 2022 figures in this document can be directly compared to one another.

Here are the main findings:

- After suffering large declines in spring 2021, ELA achievement on the OST has recovered meaningfully, especially in lower grades. Nevertheless, the performance of current Ohio students remains behind that of students in the last cohort that was not impacted by the pandemic. Overall, ELA achievement remained between 0.1 to 0.2 standard deviations lower in ELA in most grades in spring 2022. These declines are roughly equivalent to between one-third and two-thirds of year’s worth of learning.<sup>6</sup> In most grades, ELA proficiency rates remain between 5 and 10 percentage points lower than prior to the pandemic, based on the statistically adjusted estimates. If the pace of recovery observed between the 2021 and 2022 school years can be sustained, ELA achievement could return to pre-pandemic levels within the next two to three years in most grades.

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<sup>4</sup> These benchmarks are based on national tests, but our estimates for 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 we report below.

<sup>5</sup> To make the estimates as comparable as possible to last year’s report, the analysis still uses the same normalization sample for converting raw test scores into standard deviation units, including the additional pre-pandemic cohort included in last year’s report. That is why the pre-pandemic average test scores presented in the tables below do not average out to be exactly zero.

<sup>6</sup> See 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.

- In contrast to ELA, math achievement shortfalls show much more modest recovery. In most grades, math achievement remained between 0.25 to 0.35 standard deviations lower in spring 2022, corresponding to between one-half and a whole year's worth of learning. In some grades, student achievement has actually declined further over the past year. For middle and high school students, adjusted math proficiency rates remain 10 to 15 percentage points lower than prior to the pandemic. If the current pace of recovery in math persists, achievement would take much longer to recover for many cohorts of students.
- The analysis of one-year growth rates largely reinforces these findings. In ELA, achievement over the past year grew by between 0.05 and 0.15 standard deviations more than was typical prior to the pandemic. One exception is in the eighth grade, where average growth remained similar to pre-pandemic years. In math, one-year growth was only modestly larger than normal in elementary grades but was also modestly smaller than usual for most older students.
- In grades and subjects where students have posted significant gains over the past year, the recovery has been generally broad-based. However, Black and economically disadvantaged students as well as students attending urban schools and districts that spent most of the 2020-21 school year in virtual learning suffered larger achievement declines in spring 2021. With some exceptions, these student subgroups have not posted larger-than-average growth over the past year, so the achievement gaps that were exacerbated by the pandemic generally remained in spring 2022.
- Students attending site-based community schools experienced larger achievement drops in ELA in spring 2021 compared to students attending traditional public schools. However, more than 90% of students attending site-based community schools reside in an urban school district, and compared to the performance of urban districts, the initial declines among these students were largely similar. But students attending site-based community schools have generally experienced a slower recovery between spring 2021 and spring 2022, compared to all public school students and urban district students specifically. Students enrolled in online community schools experienced smaller achievement declines in spring 2021—although from an already low achievement baseline—and have generally made the smallest gains over the past year.
- Third-grade ELA exams, which students take twice during each academic year, show no evidence that learning during 2021-22 was accelerated compared to pre-pandemic periods. Although scores increased substantially between the November and April exams, the achievement growth during this period was approximately 15 percent lower than was typical before the pandemic. Unlike 2020-21, however, the 2021-22 shortfall was generally similar across different student subgroups and districts. Although significant caution should be used in extrapolating these patterns to other grades, where similar analysis is not possible, such evidence may suggest that the overall recovery in ELA performance observed in spring 2022 largely reflected interventions that took place prior to the fall testing window, such as expanded summer programming and tutoring options.

*Tables with complete results:*

**Table 1. Change in ELA OST participation rates and standardized scaled scores, grades three through eight**

	Pre-Covid	ELA			
		2020-21 SY	Diff.	2021-22 SY	Diff.
<b>Grade 3</b>					
Participation Rate	99.9	93.0	-6.8	97.0	-2.8
Test score (SDs, unadjusted)	0.03	-0.38	-0.4	-0.17	-0.2
Proficient (unadjusted)	68.3%	53.5%	-14.8%	59.8%	-8.4%
<i>Test score (SDs, adjusted)</i>	--	--	-0.41	--	-0.18
<i>Proficient (adjusted)</i>	--	--	-18.3%	--	-8.3%
<b>Grade 4</b>					
Participation Rate	99.8	94.5	-5.3	99.2	-0.6
Test score (SDs, unadjusted)	-0.01	-0.25	-0.23	-0.06	-0.05
Proficient (unadjusted)	63.0%	58.6%	-4.4%	63.2%	+0.2%
<i>Test score (SDs, adjusted)</i>	--	--	-0.21	--	0.00
<i>Proficient (adjusted)</i>	--	--	-5.4%	--	+2.0%
<b>Grade 5</b>					
Participation Rate	99.7	94.3	-5.5	99.1	-0.6
Test score (SDs, unadjusted)	0.01	-0.10	-0.11	-0.08	-0.09
Proficient (unadjusted)	69.7%	67.2%	-2.5%	65.2%	-4.5%
<i>Test score (SDs, adjusted)</i>	--	--	-0.17	--	-0.17
<i>Proficient (adjusted)</i>	--	--	-6.9%	--	-7.0%
<b>Grade 6</b>					
Participation Rate	99.6	93.8	-5.9	98.8	-0.8
Test score (SDs, unadjusted)	-0.05	-0.12	-0.07	-0.05	0.00
Proficient (unadjusted)	55.8%	55.1%	-0.8%	56.7%	0.8%
<i>Test score (SDs, adjusted)</i>	--	--	-0.14	--	-0.07
<i>Proficient (adjusted)</i>	--	--	-7.8%	--	-3.8%
<b>Grade 7</b>					
Participation Rate	99.4	93.2	-6.3	98.5	-1.0
Test score (SDs, unadjusted)	0.04	-0.09	-0.14	-0.06	-0.11
Proficient (unadjusted)	67.7%	62.5%	-5.2%	61.2%	-6.5%
<i>Test score (SDs, adjusted)</i>	--	--	-0.23	--	-0.17
<i>Proficient (adjusted)</i>	--	--	-11.8%	--	-9.7%
<b>Grade 8</b>					
Participation Rate	99.3	92.8	-6.5	98.2	-1.1
Test score (SDs, unadjusted)	0.06	-0.09	-0.16	-0.08	-0.14
Proficient (unadjusted)	58.1%	56.1%	-2.0%	53.7%	-4.4%
<i>Test score (SDs, adjusted)</i>	--	--	-0.23	--	-0.21
<i>Proficient (adjusted)</i>	--	--	-9.3%	--	-8.1%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were converted to Z-scores, so that effect sizes are comparable to those in other studies. Average pre-pandemic scores are not exactly equal to zero because the normalization sample included additional pre-pandemic cohorts that are not used in this year's analysis. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A1 in the typical growth benchmark for each grade and subject.

**Table 2. Change in math OST participation rates and standardized scaled scores, grades three through eight**

	Pre-Covid	Math			
		2020-21 SY	Diff.	2021-22 SY	Diff.
<b>Grade 3</b>					
Participation Rate	98.4	93	-5.4	97.8	-0.6
Test score (SDs, unadjusted)	0.01	-0.31	-0.32	-0.22	-0.23
Proficient (unadjusted)	68.5%	50.3%	-18.2%	60.2%	-8.3%
<i>Test score (SDs, adjusted)</i>	--	--	NA	--	NA
<i>Proficient (adjusted)</i>	--	--	NA	--	NA
<b>Grade 4</b>					
Participation Rate	99	93.4	-5.6	98.4	-0.6
Test score (SDs, unadjusted)	0.01	-0.35	-0.36	-0.21	-0.22
Proficient (unadjusted)	74.8%	62.3%	-12.5%	64.7%	-10.1%
<i>Test score (SDs, adjusted)</i>	--	--	NA	--	NA
<i>Proficient (adjusted)</i>	--	--	NA	--	NA
<b>Grade 5</b>					
Participation Rate	97.8	92.3	-5.5	97.2	-0.6
Test score (SDs, unadjusted)	0.01	-0.32	-0.33	-0.2	-0.21
Proficient (unadjusted)	63.0%	51.2%	-11.8%	55.0%	-8.0%
<i>Test score (SDs, adjusted)</i>	--	--	NA	--	NA
<i>Proficient (adjusted)</i>	--	--	NA	--	NA
<b>Grade 6</b>					
Participation Rate	99.6	93.3	-6.3	98.7	-0.9
Test score (SDs, unadjusted)	0.00	-0.29	-0.29	-0.24	-0.24
Proficient (unadjusted)	59.5%	49.1%	-10.3%	49.9%	-9.6%
<i>Test score (SDs, adjusted)</i>	--	--	-0.33	--	-0.27
<i>Proficient (adjusted)</i>	--	--	-16.2%	--	-12.1%
<b>Grade 7</b>					
Participation Rate	99.3	92.4	-6.9	98.2	-1.1
Test score (SDs, unadjusted)	-0.01	-0.27	-0.25	-0.27	-0.25
Proficient (unadjusted)	56.6%	47.4%	-9.2%	45.5%	-11.1%
<i>Test score (SDs, adjusted)</i>	--	--	-0.33	--	-0.30
<i>Proficient (adjusted)</i>	--	--	-16.9%	--	-13.8%

**Table 2 (continued). Change in math OST participation rates and standardized scaled scores, grades three through eight**

<b>Grade 8 (OST Math)</b>					
Participation Rate	99.0	90.8	-8.2	97.6	-1.4
Test score (SDs, unadjusted)	0.02	-0.26	-0.28	-0.17	-0.19
Proficient (unadjusted)	55.3%	45.2%	-10.1%	41.7%	-13.6%
<i>Test score (SDs, adjusted)</i>	--	--	-0.30	--	-0.21
<i>Proficient (adjusted)</i>	--	--	-16.6%	--	-15.6%
<b>Grade 8 (Algebra 1)</b>					
Participation Rate	99.7	98.4	-1.4	99.5	-0.2
Test score (SDs, unadjusted)	0.13	-0.17	-0.30	-0.09	-0.22
Proficient (unadjusted)	94.7%	88.5%	-6.2%	89.4%	-5.3%
<i>Test score (SDs, adjusted)</i>	--	--	-0.45	--	-0.34
<i>Proficient (adjusted)</i>	--	--	-7.8%	--	-6.1%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. "Adjusted" estimates are not available for grades three, four and five because no pre-pandemic baseline achievement data is available for these cohorts. The scaled scores were converted to Z-scores, so that effect sizes are comparable to those in other studies. Average pre-pandemic scores are not exactly equal to zero because the normalization sample included additional pre-pandemic cohorts that are not used in this year's analysis. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. See Table A1 in the typical growth benchmark for each grade and subject.



**Table 3. Change in OST participation rates and standardized scaled scores during 2020-21 school year, high school grades**

	Pre-Covid	2020-21 SY	Diff.
<b>Algebra (Grade 9)</b>			
Participation Rate	98.6	92.0	-6.5
Test score (SDs, unadjusted)	0.00	-0.22	-0.22
Proficient (unadjusted)	55.5%	46.8%	-8.7%
<i>Test score (SDs, adjusted)</i>			-0.28
<i>Proficient (adjusted)</i>			-15.9%
<b>Geometry (Grade 9)</b>			
Participation Rate	99.5	95.7	-3.8
Test score (SDs, unadjusted)	0.05	-0.17	-0.22
Proficient (unadjusted)	85.8%	82.5%	-3.3%
<i>Test score (SDs, adjusted)</i>			-0.35
<i>Proficient (adjusted)</i>			-7.3%
<b>Geometry (Grade 10)</b>			
Participation Rate	98.9	92.3	-6.6
Test score (SDs, unadjusted)	0.06	-0.18	-0.25
Proficient (unadjusted)	43.4%	38.1%	-5.3%
<i>Test score (SDs, adjusted)</i>			-0.33
<i>Proficient (adjusted)</i>			-14.1%
<b>English II (Grade 10)</b>			
Participation Rate	99.1	93.6	-5.5
Test score (SDs, unadjusted)	0.03	0.02	0.00
Proficient (unadjusted)	69.0%	68.6%	-0.4%
<i>Test score (SDs, adjusted)</i>			-0.09
<i>Proficient (adjusted)</i>			-6.4%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were converted to Z-scores, so that effect sizes are comparable to those in other studies. Average pre-pandemic scores are not exactly equal to zero because the normalization sample included additional pre-pandemic cohorts that are not used in this year's analysis. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Only the first test scores are used for students flagged as repeat test-takers in the vendor file. See Table A1 in the typical growth benchmark for each grade and subject.

**Table 5. Change in OST participation rates and standardized scaled scores during 2021-22 school year, high school grades**

	Pre-Covid	2021-22 SY	Diff.
<b>Algebra (Grade 9)</b>			
Participation Rate	98.6	95.4	-3.2
Test score (SDs, unadjusted)	0.00	-0.19	-0.19
Proficient (unadjusted)	55.5%	47.5%	-8.0%
<i>Test score (SDs, adjusted)</i>			-0.20
<i>Proficient (adjusted)</i>			-11.2%
<b>Geometry (Grade 9)</b>			
Participation Rate	99.5	96.8	-2.7
Test score (SDs, unadjusted)	0.05	-0.10	-0.15
Proficient (unadjusted)	85.8%	84.2%	-1.6%
<i>Test score (SDs, adjusted)</i>			-0.26
<i>Proficient (adjusted)</i>			-4.9%
<b>Geometry (Grade 10)</b>			
Participation Rate	98.9	95.1	-3.8
Test score (SDs, unadjusted)	0.06	-0.20	-0.27
Proficient (unadjusted)	43.4%	37.4%	-6.0%
<i>Test score (SDs, adjusted)</i>			-0.33
<i>Proficient (adjusted)</i>			-11.5%
<b>English II (Grade 10)</b>			
Participation Rate	99.1	95.8	-3.3
Test score (SDs, unadjusted)	0.03	-0.02	-0.05
Proficient (unadjusted)	69.0%	66.9%	-2.1%
<i>Test score (SDs, adjusted)</i>			-0.17
<i>Proficient (adjusted)</i>			-8.4%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were converted to Z-scores, so that effect sizes are comparable to those in other studies. Average pre-pandemic scores are not exactly equal to zero because the normalization sample included additional pre-pandemic cohorts that are not used in this year's analysis. The differences in normalized scaled scores can be interpreted as the change in student achievement in standard deviations. Only the first test scores are used for students flagged as repeat test-takers in the vendor file. See Table A1 in the typical growth benchmark for each grade and subject.

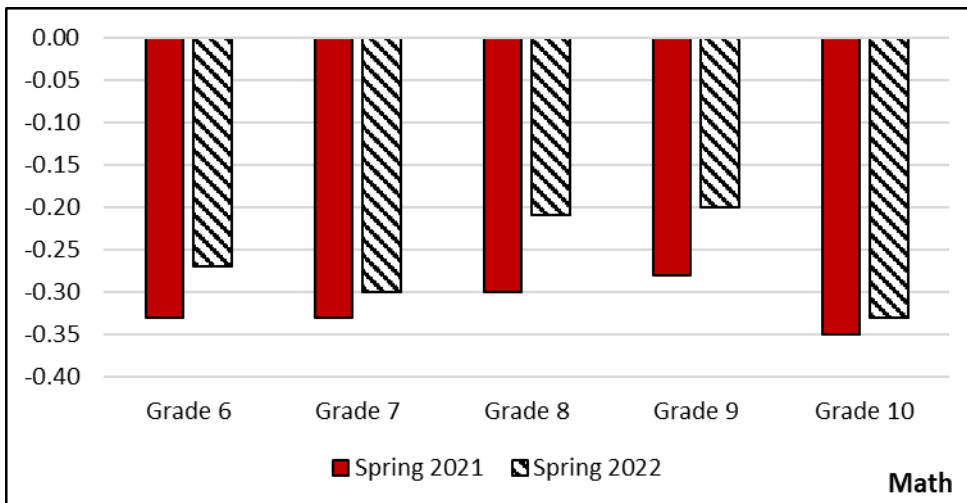
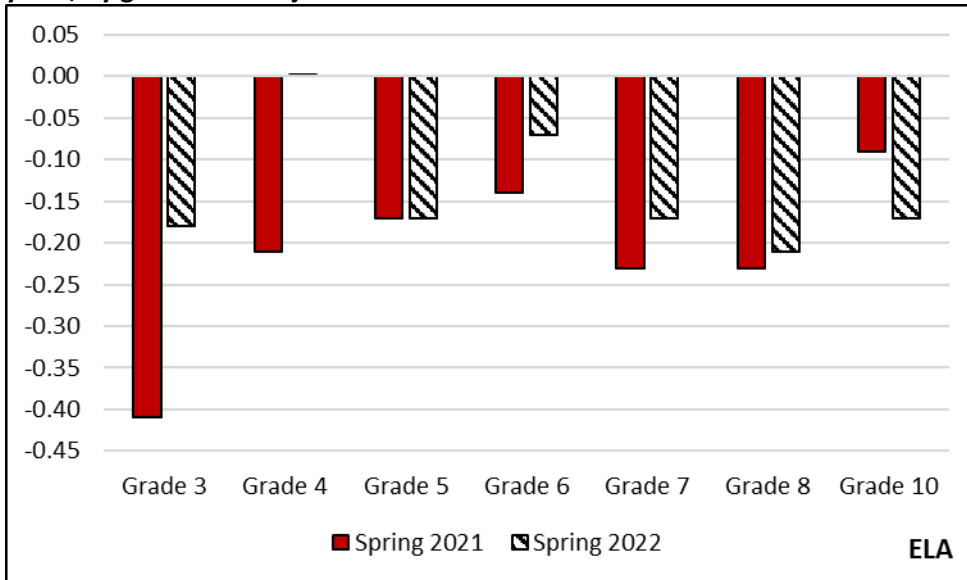
**Table 6. Fall-to-spring standardized test score growth on third-grade ELA OST compared to pre-pandemic years**

	Pre-Covid Growth	2020-21 SY Diff.	2021-22 SY Diff.
<i>Statewide Average</i>	0.54	-0.12	-0.09
<b><i>Race/ethnicity</i></b>			
White	0.55	-0.09	-0.08
Black	0.50	-0.21	-0.08
Hispanic	0.55	-0.19	-0.11
Asian	0.60	-0.17	-0.11
<b><i>Economic disadvantage</i></b>			
Not Disadvantaged	0.57	-0.09	-0.09
Economically Disadvantaged	0.52	-0.15	-0.08
<b><i>Disability</i></b>			
Not Disabled	0.55	-0.11	-0.08
Disabled	0.48	-0.14	-0.09
<b><i>English Learner</i></b>			
Not English Learner	0.54	-0.11	-0.08
English Learner	0.56	-0.28	-0.12
<b><i>Homelessness</i></b>			
Not Homeless	0.54	-0.12	-0.09
Homeless	0.47	-0.15	-0.06
<b><i>District mode of learning in 2020-21</i></b>			
In-person	0.55	-0.09	-0.08
Hybrid/mixed	0.55	-0.12	-0.08
Remote	0.52	-0.20	-0.10
<b><i>District type</i></b>			
Rural	0.54	-0.09	-0.07
Town	0.55	-0.09	-0.08
Suburban	0.56	-0.11	-0.09
Urban	0.52	-0.18	-0.09
<b><i>Fall achievement quartile</i></b>			
1st Quartile	0.77	-0.16	-0.09
2nd Quartile	0.53	-0.14	-0.06
3rd Quartile	0.49	-0.14	-0.10
4th Quartile	0.30	-0.04	-0.10
<b><i>School type</i></b>			
Traditional Public School	0.55	-0.11	-0.09
Site-Based Community School	0.52	-0.21	-0.08
Virtual Community School	0.39	-0.12	-0.05

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.

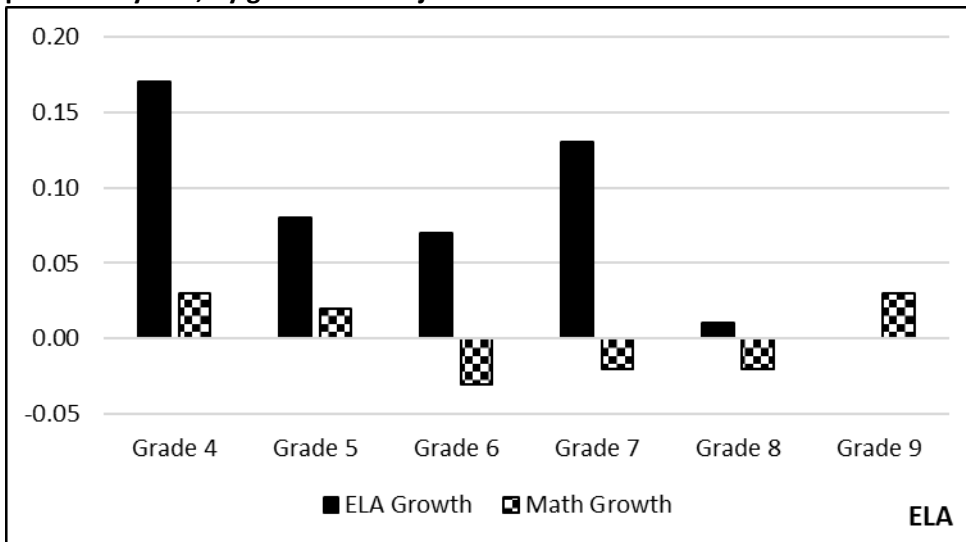
Figures of select results:

**Figure 1. Changes in standardized scaled scores compared to pre-pandemic years, by grade and subject**



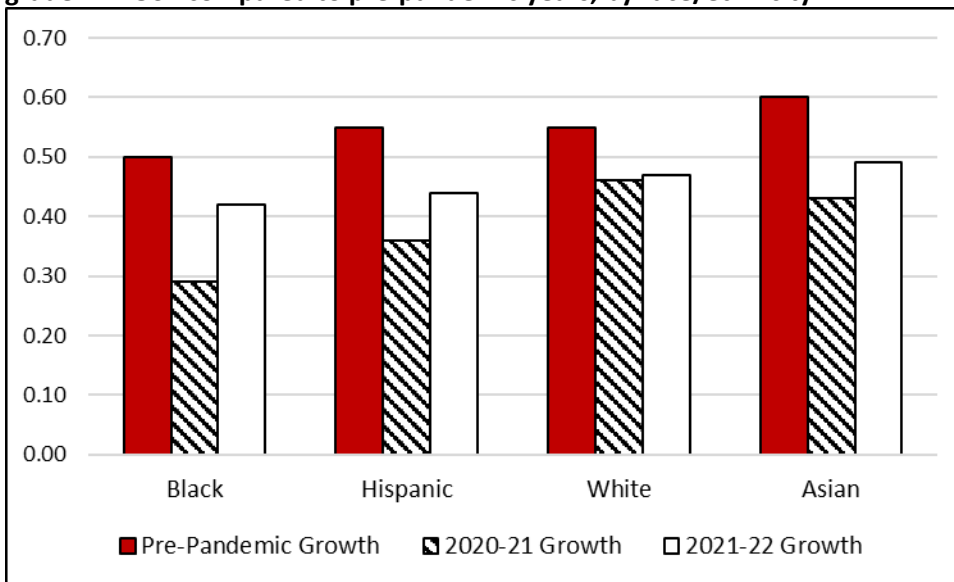
Note: The figure presents the average differences in normalized test scores in standard deviation units compared to the pre-pandemic period (spring 2019). “Adjusted” test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students’ demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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. Only the first test scores are used for students flagged as repeat test-takers in the vendor file. Scores from students who took these exams in other grades are also excluded.

**Figure 2. Changes in one-year growth rates in 2021-22 compared to pre-pandemic years, by grade and subject**



Note: The figure presents the relative one-year growth in normalized test scores (Z-scores) in standard deviation units compared to pre-pandemic years (2018 and 2019). Positive bars indicate greater growth in 2021-22, relative to the pre-pandemic period, and negative numbers indicate less growth.

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



Note: The figure presents 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.

## II. Methodological Appendix

The main analysis estimates the impact of the COVID-19 pandemic on student achievement by examining changes in student participation and performance on the spring administration of the Ohio State Tests (OSTs). Specifically, it compares test participation and scores in spring 2021 and 2022 (holding constant student demographic characteristics and test scores from three years prior) to participation and scores in 2019 (again, holding constant student demographic characteristics and test scores from three years prior). Because state testing begins only in the third grade, local diagnostic assessments are used to provide a pre-pandemic baseline measure of ELA achievement for students who were enrolled in grades three through five in spring 2022.<sup>7</sup> For third-grade ELA, the analysis also compares November-to-April changes in student test scores during the 2020-21 and 2021-22 schools year to fall-to-spring changes in student test scores during the 2017-18 and 2018-19 school years.

We present two sets of estimates: “unadjusted” and “adjusted.” The “unadjusted” estimates capture raw differences in test participation rates and student test scores for each assessed grade and subject. The “adjusted” estimates are based on statistical models that account for changes in the characteristics of students tested across years—to estimate what changes in test scores would have looked like if the composition of test-takers in 2021 and 2022 looked similar to prior years. For most grades and subjects, our “adjusted” estimates impute scores for students who did not participate in the exams. As we show above, aggregate decreases in test participation in spring 2021 came disproportionately from lower-achieving student subgroups, resulting in compositional changes among tested students that mask some of the pandemic-related learning disruptions in the raw data. We do not impute test scores when examining the one-year achievement gains, limiting the analysis only to the subset of students for whom both spring 2021 and 2022 scores are observed.

### *Unadjusted Estimates*

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 are able to take the same exam multiple times, we use only the first reported score among students flagged as repeat test-takers in the vendor file. Test scores for pre-pandemic years also come from the EMIS database, whereas scores from the pandemic period are from ODE test vendor files. We pre-processed the data to remove potentially problematic values (e.g., recoding scores as missing if they are below the minimum reported in the OST Annual Technical Reports). The participation rates we report above represent the proportion of students in each grade attendance file who are identified as being required to take each test and who have a valid test score in the EMIS records or vendor file, depending on the school year. For earlier years, the EMIS records indicate the accountable district for each student. For spring 2021 and 2022, we use the “attending” district as recorded in the vendor file.

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<sup>7</sup> For fifth graders, the model also controls for fall third-grade ELA test scores, which current fifth graders took several months before the start of the pandemic.

## Adjusted Estimates

Based on each grade’s respective attendance file, we estimate that the statewide participation rate on spring assessments declined from over 99 percent in pre-pandemic years to approximately 82-94 percent in spring 2021. It increased back to about 98 percent by spring 2022. The initial drop in test participation was largest for economically disadvantaged, homeless, and minority students and in districts that relied primarily on fully remote instruction. These patterns strongly suggest that the 2020-21 test score declines of students who did not participate in the examination would have been greater than the statewide average. Thus, raw differences in observed test scores likely understate actual changes in student achievement between 2019 and spring 2021.

To address this sample selection bias, we first impute missing test scores and use a statistical model to adjust the raw estimates for differences in student composition over time. Our imputation model includes student demographic characteristics (measured during the of each exam), a third-order polynomial of prior math and ELA test scores, and district of attendance. We then substituted these estimated scores for students who did not take the exam, creating a complete dataset for each grade, subject, and year.

In the final analysis, we combine scores (including imputations) from 2019, 2021, and 2022 into a separate pooled dataset for each grade and subject and estimate the following Ordinary Least Squares (OLS) model:

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

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 and a third-order polynomial of lagged test scores in both ELA and math from three years prior ( $X_{idt}$ ). The control variables also include indicators for students with missing demographic and prior test score data.<sup>8</sup> For third- and fourth-grade ELA, we do not observe prior test scores. Instead, we include an indicator variable for whether each student was assessed to be “on track” to attain proficiency in reading based on district-administered diagnostic assessments completed in fall of first grade. For fifth grade, we include both the “on track” indicator as well as scores from the fall third-grade OST as our measures of pre-pandemic performance.

The variables  $2021_{it}$  and  $2022_{it}$  indicate whether the test score is from the last two testing cycles or from the pre-pandemic year. 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 and pre-pandemic achievement levels. Similarly, the parameter  $\beta_2$  captures the difference spring 2022 and 2019 scores. Standard errors are clustered by school district of attendance, though this does not affect our inferences given the large sample sizes we use in our analyses. 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>9</sup>

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<sup>8</sup> For students with missing prior scores, we fill in the missing values with zero, corresponding to the statewide average. Note, however, that we estimate a separate missing test score effect.

<sup>9</sup> To make the estimates as comparable as possible to last year’s report, the analysis still uses the same normalization sample for converting raw test scores into standard deviation units, including the additional pre-pandemic cohort included in last year’s report.

The one-year gain models follow a similar specification, except the lagged test scores (and associated polynomials) come from the previous academic year, not three year’s prior.

For third-grade ELA, we observe both 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:

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

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 and 2022, respectively, compared to the pre-pandemic years.<sup>10</sup> We again use standard errors clustered by school district of attendance when assessing the statistical significance of the estimates.

### III. Additional Tables

**Table A1. Average annual growth in national standardized test scores, by grade and subject**

	Reading	Math
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.

<sup>10</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.



**Table A2. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by race**

	ELA 2021				ELA 2022			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
<b>Grade 3</b>								
Participation	-5.1%	-12.1%	-7.5%	-10.5%	-2.4%	-3.7%	-2.9%	-4.0%
Test score (SDs, adjusted)	-0.35	-0.61	-0.52	-0.40	-0.16	-0.24	-0.20	-0.11
Proficient (adjusted)	-16.1%	-26.0%	-21.3%	-14.3%	-7.5%	-11.8%	-9.4%	-3.8%
<b>Grade 4</b>								
Participation	-3.4%	-11.0%	-6.1%	-7.9%	-0.4%	-1.4%	-0.8%	-0.6%
Test score (SDs, adjusted)	-0.16	-0.37	-0.28	-0.24	+0.05	-0.18	-0.06	+0.05
Proficient (adjusted)	-3.8%	-9.9%	-8.1%	-4.8%	+3.0%	-1.8%	+1.9%	+0.9%
<b>Grade 5</b>								
Participation	-3.6%	-11.1%	-6.4%	-9.4%	-0.3%	-1.7%	-0.9%	-0.2%
Test score (SDs, adjusted)	-0.15	-0.29	-0.19	-0.02	-0.17	-0.22	-0.17	-0.07
Proficient (adjusted)	-6.0%	-12.1%	-6.9%	-0.3%	-6.0%	-11.5%	-8.1%	-1.2%
<b>Grade 6</b>								
Participation	-4.1%	-11.6%	-7.0%	-7.6%	-0.5%	-1.8%	-1.3%	-0.7%
Test score (SDs, adjusted)	-0.11	-0.27	-0.16	-0.02	-0.07	-0.13	-0.05	+0.06
Proficient (adjusted)	-7.1%	-10.3%	-8.2%	-4.1%	-3.7%	-4.8%	-3.7%	-1.2%
<b>Grade 7</b>								
Participation	-4.4%	-12.7%	-7.7%	-8.0%	-0.6%	-2.3%	-1.2%	-0.3%
Test score (SDs, adjusted)	-0.24	-0.21	-0.20	-0.19	-0.17	-0.17	-0.13	-0.10
Proficient (adjusted)	-11.5%	-13.2%	-12.7%	-6.8%	-9.4%	-11.4%	-10.7%	-5.1%
<b>Grade 8</b>								
Participation	-4.6%	-12.5%	-8.6%	-8.4%	-0.7%	-2.5%	-1.3%	-0.5%
Test score (SDs, adjusted)	-0.23	-0.27	-0.25	-0.15	-0.20	-0.27	-0.26	-0.07
Proficient (adjusted)	-8.8%	-11.4%	-11.0%	-4.1%	-8.1%	-8.4%	-9.3%	-3.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A3. Change in math OST participation rates and standardized scaled scores, grades six through eight by race**

	Math 2021				Math 2022			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
<b>Grade 6</b>								
Participation	-4.4%	-12.4%	-7.2%	-8.3%	-0.6%	-1.9%	-1.5%	-0.6%
Test score (SDs, adjusted)	-0.33	-0.31	-0.30	-0.40	-0.26	-0.31	-0.27	-0.22
Proficient (adjusted)	-15.6%	-17.6%	-17.5%	-11.9%	-11.6%	-13.6%	-13.1%	-8.3%
<b>Grade 7</b>								
Participation	-4.9%	-13.1%	-8.1%	-9.9%	-0.6%	-2.4%	-1.6%	-0.7%
Test score (SDs, adjusted)	-0.36	-0.21	-0.29	-0.43	-0.31	-0.26	-0.29	-0.34
Proficient (adjusted)	-17.4%	-14.7%	-17.5%	-14.4%	-14.2%	-12.6%	-15.2%	-11.2%
<b>Grade 8</b>								
Participation	-6.2%	-13.2%	-9.4%	-10.7%	-1.0%	-2.6%	-1.1%	-1.2%
Test score (SDs, adjusted)	-0.32	-0.21	-0.28	-0.40	-0.24	-0.12	-0.18	-0.22
Proficient (adjusted)	-16.6%	-15.2%	-18.8%	-18.0%	-16.1%	-13.6%	-16.0%	-14.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A4. Change in OST participation rates and standardized scaled scores, high school grades by race**

	White	Black	Hispanic	Asian
<b>Algebra 2021 (Grade 9)</b>				
Participation	-4.9%	-11.9%	-6.9%	-5.7%
Test score (SDs, adjusted)	-0.29	-0.24	-0.22	-0.33
Proficient (adjusted)	-16.4%	-14.2%	-14.6%	-15.1%
<b>Algebra 2022 (Grade 9)</b>				
Participation	-2.5%	-5.0%	-3.1%	-4.9%
Test score (SDs, adjusted)	-0.20	-0.22	-0.19	-0.20
Proficient (adjusted)	-11.4%	-10.1%	-10.8%	-8.8%
<b>Geometry 2021 (Grade 10)</b>				
Participation	-5.1%	-12.3%	-7.1%	-6.4%
Test score (SDs, adjusted)	-0.32	-0.36	-0.34	-0.44
Proficient (adjusted)	-14.8%	-10.9%	-14.1%	-18.1%
<b>Geometry 2022 (Grade 10)</b>				
Participation	-2.9%	-7.2%	-3.8%	-3.1%
Test score (SDs, adjusted)	-0.32	-0.35	-0.32	-0.33
Proficient (adjusted)	-12.1%	-8.8%	-10.7%	-12.9%
<b>English II 2021 (Grade 10)</b>				
Participation	-4.4%	-10.7%	-6.4%	-3.2%
Test score (SDs, adjusted)	-0.08	-0.11	-0.13	0.00
Proficient (adjusted)	-6.1%	-7.5%	-8.2%	-3.8%
<b>English II 2022 (Grade 10)</b>				
Participation	-2.9%	-4.7%	-3.2%	-2.3%
Test score (SDs, adjusted)	-0.18	-0.14	-0.18	-0.18
Proficient (adjusted)	-7.9%	-10.9%	-10.5%	-4.4%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A5. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by economic disadvantage**

	ELA 2021		ELA 2022	
	Not Disadvantaged	Economically Disadvantaged	Not Disadvantaged	Economically Disadvantaged
<b>Grade 3</b>				
Participation	-5.4%	-8.2%	-2.4%	-3.2%
Test score (SDs, adjusted)	-0.33	-0.49	-0.16	-0.18
Proficient (adjusted)	-14.8%	-21.4%	-6.8%	-9.5%
<b>Grade 4</b>				
Participation	-3.7%	-6.8%	-0.3%	-0.9%
Test score (SDs, adjusted)	-0.13	-0.27	+0.07	-0.06
Proficient (adjusted)	-2.8%	-7.8%	+2.2%	+2.0%
<b>Grade 5</b>				
Participation	-3.7%	-7.1%	-0.3%	-1.0%
Test score (SDs, adjusted)	-0.11	-0.24	-0.15	-0.21
Proficient (adjusted)	-3.8%	-10.2%	-4.1%	-10.1%
<b>Grade 6</b>				
Participation	-4.0%	-7.8%	-0.4%	-1.3%
Test score (SDs, adjusted)	-0.06	-0.23	-0.04	-0.11
Proficient (adjusted)	-5.9%	-9.7%	-3.0%	-4.6%
<b>Grade 7</b>				
Participation	-4.1%	-8.6%	-0.4%	-1.6%
Test score (SDs, adjusted)	-0.22	-0.24	-0.16	-0.18
Proficient (adjusted)	-9.5%	-14.3%	-8.1%	-11.5%
<b>Grade 8</b>				
Participation	-4.6%	-8.7%	-0.5%	-1.8%
Test score (SDs, adjusted)	-0.21	-0.27	-0.17	-0.27
Proficient (adjusted)	-7.5%	-11.4%	-7.3%	-9.2%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A6. Change in math OST participation rates and standardized scaled scores, grades six through eight by economic disadvantage**

	<b>Math 2021</b>		<b>Math 2022</b>	
	Not Disadvantaged	Economically Disadvantaged	Not Disadvantaged	Economically Disadvantaged
<b>Grade 6</b>				
Participation	-4.3%	-8.3%	-0.5%	-1.4%
Test score (SDs, adjusted)	-0.35	-0.32	-0.25	-0.29
Proficient (adjusted)	-14.3%	-18.1%	-10.6%	-13.6%
<b>Grade 7</b>				
Participation	-4.7%	-9.0%	-0.5%	-1.7%
Test score (SDs, adjusted)	-0.40	-0.27	-0.33	-0.28
Proficient (adjusted)	-16.7%	-17.3%	-13.1%	-14.8%
<b>Grade 8</b>				
Participation	-6.2%	-9.8%	-0.7%	-2.0%
Test score (SDs, adjusted)	-0.35	-0.26	-0.25	-0.18
Proficient (adjusted)	-16.2%	-17.0%	-15.3%	-15.8%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A7. Change in OST participation rates and standardized scaled scores, high school grades by economic disadvantage**

	Not Disadvantaged	Economically Disadvantaged
<b><i>Algebra 2021 (Grade 9)</i></b>		
Participation	-3.9%	-9.1%
Test score (SDs, adjusted)	-0.31	-0.24
Proficient (adjusted)	-16.7%	-15.2%
<b><i>Algebra 2022 (Grade 9)</i></b>		
Participation	-2.4%	-3.9%
Test score (SDs, adjusted)	-0.20	-0.21
Proficient (adjusted)	-11.5%	-10.9%
<b><i>Geometry 2021 (Grade 10)</i></b>		
Participation	-4.5%	-9.1%
Test score (SDs, adjusted)	-0.34	-0.31
Proficient (adjusted)	-16.2%	-11.6%
<b><i>Geometry 2022 (Grade 10)</i></b>		
Participation	-2.7%	-5.1%
Test score (SDs, adjusted)	-0.33	-0.32
Proficient (adjusted)	-13.2%	-9.5%
<b><i>English II 2021 (Grade 10)</i></b>		
Participation	-3.8%	-8.0%
Test score (SDs, adjusted)	-0.06	-0.12
Proficient (adjusted)	-4.9%	-8.4%
<b><i>English II 2022 (Grade 10)</i></b>		
Participation	-2.8%	-3.9%
Test score (SDs, adjusted)	-0.18	-0.16
Proficient (adjusted)	-6.9%	-10.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A8. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by disability status**

	ELA 2021		ELA 2022	
	Not Disabled	Disabled	Not Disabled	Disabled
<b>Grade 3</b>				
Participation	-6.7%	-7.5%	-2.8%	-2.9%
Test score (SDs, adjusted)	-0.40	-0.46	-0.18	-0.14
Proficient (adjusted)	-18.7%	-15.5%	-8.4%	-7.0%
<b>Grade 4</b>				
Participation	-5.0%	-6.9%	-0.5%	-1.0%
Test score (SDs, adjusted)	-0.20	-0.23	+0.02	-0.11
Proficient (adjusted)	-5.7%	-3.9%	+2.0%	+2.4%
<b>Grade 5</b>				
Participation	-5.1%	-7.0%	-0.5%	-0.9%
Test score (SDs, adjusted)	-0.16	-0.22	-0.18	-0.12
Proficient (adjusted)	-6.9%	-7.0%	-7.0%	-6.1%
<b>Grade 6</b>				
Participation	-5.5%	-8.0%	-0.7%	-1.4%
Test score (SDs, adjusted)	-0.12	-0.22	-0.07	-0.07
Proficient (adjusted)	-8.2%	-4.8%	-4.2%	-0.9%
<b>Grade 7</b>				
Participation	-5.7%	-9.1%	-0.8%	-1.7%
Test score (SDs, adjusted)	-0.24	-0.19	-0.18	-0.09
Proficient (adjusted)	-11.9%	-10.7%	-10.1%	-7.6%
<b>Grade 8</b>				
Participation	-6.1%	-9.2%	-1.0%	-2.0%
Test score (SDs, adjusted)	-0.24	-0.21	-0.19	-0.30
Proficient (adjusted)	-9.9%	-5.1%	-8.6%	-4.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A9. Change in math OST participation rates and standardized scaled scores, grades six through eight by disability status**

	<b>Math 2021</b>		<b>Math 2022</b>	
	Not Disabled	Disabled	Not Disabled	Disabled
<b>Grade 6</b>				
Participation	-6.0%	-8.2%	-0.8%	-1.4%
Test score (SDs, adjusted)	-0.35	-0.16	-0.28	-0.18
Proficient (adjusted)	-17.2%	-10.0%	-13.0%	-6.5%
<b>Grade 7</b>				
Participation	-6.4%	-9.5%	-0.9%	-1.8%
Test score (SDs, adjusted)	-0.36	-0.15	-0.32	-0.19
Proficient (adjusted)	-18.3%	-8.9%	-15.1%	-7.3%
<b>Grade 8</b>				
Participation	-7.8%	-9.6%	-1.2%	-2.2%
Test score (SDs, adjusted)	-0.35	-0.07	-0.26	0.00
Proficient (adjusted)	-18.3%	-8.6%	-17.3%	-7.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.



**Table A10. Change in OST participation rates and standardized scaled scores, high school grades by disability status**

	Not Disabled	Disabled
<b><i>Algebra 2021 (Grade 9)</i></b>		
Participation	-6.1%	-8.6%
Test score (SDs, adjusted)	-0.30	-0.17
Proficient (adjusted)	-17.4%	-7.9%
<b><i>Algebra 2022 (Grade 9)</i></b>		
Participation	-3.1%	-3.4%
Test score (SDs, adjusted)	-0.21	-0.16
Proficient (adjusted)	-12.3%	-4.6%
<b><i>Geometry 2021 (Grade 10)</i></b>		
Participation	-6.2%	-8.9%
Test score (SDs, adjusted)	-0.33	-0.32
Proficient (adjusted)	-15.5%	-5.6%
<b><i>Geometry 2022 (Grade 10)</i></b>		
Participation	-3.5%	-5.0%
Test score (SDs, adjusted)	-0.33	-0.32
Proficient (adjusted)	-12.8%	-4.1%
<b><i>English II 2021 (Grade 10)</i></b>		
Participation	-5.3%	-7.2%
Test score (SDs, adjusted)	-0.08	-0.09
Proficient (adjusted)	-6.4%	-6.0%
<b><i>English II 2022 (Grade 10)</i></b>		
Participation	-3.1%	-3.8%
Test score (SDs, adjusted)	-0.18	-0.08
Proficient (adjusted)	-8.5%	-7.0%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A11. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by English learner status**

	ELA 2021		ELA 2022	
	Not English Learner	English Learner	Not English Learner	English Learner
<b>Grade 3</b>				
Participation	-6.9%	-6.6%	-2.8%	-2.9%
Test score (SDs, adjusted)	-0.40	-0.58	-0.18	-0.15
Proficient (adjusted)	-18.1%	-20.3%	-8.3%	-6.5%
<b>Grade 4</b>				
Participation	-5.3%	-4.6%	-0.6%	-0.6%
Test score (SDs, adjusted)	-0.21	-0.31	0.00	-0.13
Proficient (adjusted)	-5.3%	-7.9%	+2.1%	+0.7%
<b>Grade 5</b>				
Participation	-5.5%	-5.1%	-0.6%	-0.8%
Test score (SDs, adjusted)	-0.17	-0.18	-0.18	-0.05
Proficient (adjusted)	-7.0%	-4.4%	-7.1%	-1.8%
<b>Grade 6</b>				
Participation	-5.9%	-6.4%	-0.8%	-1.4%
Test score (SDs, adjusted)	-0.14	-0.19	-0.08	+0.02
Proficient (adjusted)	-8.0%	-2.0%	-4.0%	-1.8%
<b>Grade 7</b>				
Participation	-6.2%	-6.9%	-1.0%	-1.0%
Test score (SDs, adjusted)	-0.24	-0.08	-0.17	+0.08
Proficient (adjusted)	-12.0%	-5.8%	-9.9%	-3.3%
<b>Grade 8</b>				
Participation	-6.5%	-9.0%	-1.1%	-1.3%
Test score (SDs, adjusted)	-0.24	-0.14	-0.21	-0.26
Proficient (adjusted)	-9.5%	-3.8%	-8.3%	-2.8%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A12. Change in math OST participation rates and standardized scaled scores, grades six through eight by English learner status**

	<b>Math 2021</b>		<b>Math 2022</b>	
	Not English Learner	English Learner	Not English Learner	English Learner
<b>Grade 6</b>				
Participation	-6.3%	-6.4%	-0.9%	-1.7%
Test score (SDs, adjusted)	-0.33	-0.19	-0.27	-0.21
Proficient (adjusted)	-16.4%	-10.6%	-12.3%	-7.5%
<b>Grade 7</b>				
Participation	-6.9%	-7.1%	-1.1%	-1.5%
Test score (SDs, adjusted)	-0.34	-0.14	-0.31	-0.15
Proficient (adjusted)	-17.2%	-8.2%	-14.1%	-6.7%
<b>Grade 8</b>				
Participation	-8.2%	-8.9%	-1.4%	-1.1%
Test score (SDs, adjusted)	-0.31	-0.14	-0.22	-0.07
Proficient (adjusted)	-16.8%	-10.6%	-15.9%	-8.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A13. Change in OST participation rates and standardized scaled scores, high school grades by English learner status**

	Not English Learner	English Learner
<b>Algebra 2021 (Grade 9)</b>		
Participation	-6.5%	-9.4%
Test score (SDs, adjusted)	-0.28	-0.23
Proficient (adjusted)	-16.1%	-11.6%
<b>Algebra 2022 (Grade 9)</b>		
Participation	-3.1%	-4.6%
Test score (SDs, adjusted)	-0.20	-0.21
Proficient (adjusted)	-11.3%	-7.4%
<b>Geometry 2021 (Grade 10)</b>		
Participation	-6.5%	-8.2%
Test score (SDs, adjusted)	-0.33	-0.37
Proficient (adjusted)	-14.3%	-6.6%
<b>Geometry 2022 (Grade 10)</b>		
Participation	-3.7%	-5.2%
Test score (SDs, adjusted)	-0.33	-0.31
Proficient (adjusted)	-11.7%	-5.7%
<b>English II 2021 (Grade 10)</b>		
Participation	-5.5%	-6.6%
Test score (SDs, adjusted)	-0.09	-0.08
Proficient (adjusted)	-6.4%	-6.8%
<b>English II 2022 (Grade 10)</b>		
Participation	-3.3%	-2.6%
Test score (SDs, adjusted)	-0.17	-0.06
Proficient (adjusted)	-8.5%	-6.8%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A14. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by homelessness status**

	ELA 2021		ELA 2022	
	Not Homeless	Homeless	Not Homeless	Homeless
<b>Grade 3</b>				
Participation	-6.8%	-12.7%	-2.7%	-6.8%
Test score (SDs, adjusted)	-0.41	-0.52	-0.18	-0.22
Proficient (adjusted)	-18.2%	-20.8%	-8.2%	-12.5%
<b>Grade 4</b>				
Participation	-5.2%	-9.9%	-0.6%	-2.8%
Test score (SDs, adjusted)	-0.21	-0.37	0.00	-0.19
Proficient (adjusted)	-5.3%	-12.1%	+2.1%	-1.5%
<b>Grade 5</b>				
Participation	-5.4%	-11.3%	-0.6%	-2.6%
Test score (SDs, adjusted)	-0.17	-0.22	-0.17	-0.16
Proficient (adjusted)	-6.9%	-8.7%	-6.9%	-9.5%
<b>Grade 6</b>				
Participation	-5.8%	-11.9%	-0.8%	-3.9%
Test score (SDs, adjusted)	-0.14	-0.24	-0.07	-0.13
Proficient (adjusted)	-7.8%	-8.7%	-3.8%	-4.6%
<b>Grade 7</b>				
Participation	-6.2%	-13.8%	-0.9%	-3.0%
Test score (SDs, adjusted)	-0.23	-0.13	-0.17	-0.08
Proficient (adjusted)	-11.8%	-11.9%	-9.7%	-8.3%
<b>Grade 8</b>				
Participation	-6.5%	-13.5%	-1.1%	-4.1%
Test score (SDs, adjusted)	-0.23	-0.22	-0.21	-0.27
Proficient (adjusted)	-9.3%	-8.0%	-8.1%	-5.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A15. Change in math OST participation rates and standardized scaled scores, grades six through eight by homelessness status**

	Math 2021		Math 2022	
	Not Homeless	Homeless	Not Homeless	Homeless
<b>Grade 6</b>				
Participation	-6.3%	-12.3%	-0.9%	-3.7%
Test score (SDs, adjusted)	-0.33	-0.21	-0.27	-0.23
Proficient (adjusted)	-16.3%	-14.2%	-12.2%	-9.9%
<b>Grade 7</b>				
Participation	-6.8%	-14.1%	-1.1%	-2.4%
Test score (SDs, adjusted)	-0.33	-0.16	-0.30	-0.21
Proficient (adjusted)	-17.0%	-11.6%	-13.9%	-8.3%
<b>Grade 8</b>				
Participation	-8.1%	-12.9%	-1.4%	-3.7%
Test score (SDs, adjusted)	-0.30	-0.10	-0.21	-0.09
Proficient (adjusted)	-16.7%	-9.9%	-15.7%	-9.4%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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. Only the first test scores are used for students flagged as repeat test-takers in the vendor file. See Table A1 in the typical growth benchmark for each grade and subject.

**Table A16. Change in OST participation rates and standardized scaled scores, high school grades by homelessness status**

	Not Homeless	Homeless
<b><i>Algebra 2021 (Grade 9)</i></b>		
Participation	-6.4%	-14.7%
Test score (SDs, adjusted)	-0.28	-0.12
Proficient (adjusted)	-16.0%	-9.9%
<b><i>Algebra 2022 (Grade 9)</i></b>		
Participation	-3.1%	-6.4%
Test score (SDs, adjusted)	-0.21	-0.11
Proficient (adjusted)	-11.2%	-6.3%
<b><i>Geometry 2021 (Grade 10)</i></b>		
Participation	-6.5%	-15.9%
Test score (SDs, adjusted)	-0.33	-0.28
Proficient (adjusted)	-14.2%	-9.1%
<b><i>Geometry 2022 (Grade 10)</i></b>		
Participation	-3.7%	-10.9%
Test score (SDs, adjusted)	-0.33	-0.34
Proficient (adjusted)	-11.6%	-9.0%
<b><i>English II 2021 (Grade 10)</i></b>		
Participation	-5.5%	-13.7%
Test score (SDs, adjusted)	-0.09	-0.09
Proficient (adjusted)	-6.4%	-10.6%
<b><i>English II 2022 (Grade 10)</i></b>		
Participation	-3.2%	-9.3%
Test score (SDs, adjusted)	-0.17	-0.14
Proficient (adjusted)	-8.4%	-12.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were converted to Z-scores, so that effect sizes are comparable to those in other studies. See Table A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A17. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by mode of instruction during 2020-21 school year**

	ELA 2021			ELA 2021		
	In-person	Hybrid/Mixed	Fully Remote	In-person	Hybrid/Mixed	Fully Remote
<b>Grade 3</b>						
Participation	-3.8%	-5.6%	-11.8%	-2.4%	-2.5%	-2.6%
Test score (SDs, adjusted)	-0.33	-0.39	-0.63	-0.15	-0.16	-0.28
Proficient (adjusted)	-15.6%	-17.4%	-25.6%	-7.1%	-7.3%	-13.0%
<b>Grade 4</b>						
Participation	-2.1%	-4.0%	-11.3%	-0.2%	-0.4%	-1.3%
Test score (SDs, adjusted)	-0.12	-0.22	-0.36	+0.06	+0.02	-0.14
Proficient (adjusted)	-2.7%	-5.9%	-10.2%	+4.0%	+1.8%	-0.6%
<b>Grade 5</b>						
Participation	-2.4%	-3.9%	-11.8%	-0.2%	-0.4%	-1.5%
Test score (SDs, adjusted)	-0.12	-0.18	-0.30	-0.15	-0.17	-0.24
Proficient (adjusted)	-4.8%	-6.7%	-12.2%	-5.1%	-6.5%	-11.5%
<b>Grade 6</b>						
Participation	-2.4%	-4.6%	-13.0%	-0.3%	-0.6%	-2.0%
Test score (SDs, adjusted)	-0.08	-0.14	-0.27	-0.06	-0.06	-0.14
Proficient (adjusted)	-6.0%	-8.3%	-10.8%	-3.1%	-3.7%	-5.7%
<b>Grade 7</b>						
Participation	-2.9%	-4.6%	-14.6%	-0.4%	-0.5%	-2.7%
Test score (SDs, adjusted)	-0.23	-0.25	-0.20	-0.16	-0.18	-0.15
Proficient (adjusted)	-11.2%	-12.0%	-12.9%	-9.1%	-9.9%	-10.6%
<b>Grade 8</b>						
Participation	-3.0%	-4.7%	-15.1%	-0.6%	-0.5%	-3.0%
Test score (SDs, adjusted)	-0.22	-0.24	-0.27	-0.20	-0.20	-0.27
Proficient (adjusted)	-8.5%	-9.3%	-11.9%	-8.5%	-7.8%	-8.7%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.



**Table A18. Change in math OST participation rates and standardized scaled scores, grades six through eight by mode of instruction during 2020-21 school year**

	Math 2021			Math 2022		
	In-person	Hybrid/Mixed	Fully Remote	In-person	Hybrid/Mixed	Fully Remote
<b>Grade 6</b>						
Participation	-2.8%	-4.7%	-13.7%	-0.5%	-0.5%	-2.1%
Test score (SDs, adjusted)	-0.31	-0.37	-0.34	-0.24	-0.27	-0.36
Proficient (adjusted)	-14.9%	-17.7%	-18.2%	-11.2%	-12.3%	-15.2%
<b>Grade 7</b>						
Participation	-3.3%	-5.1%	-15.4%	-0.5%	-0.5%	-3.0%
Test score (SDs, adjusted)	-0.33	-0.39	-0.24	-0.29	-0.33	-0.28
Proficient (adjusted)	-16.3%	-18.9%	-16.1%	-13.1%	-14.9%	-14.1%
<b>Grade 8</b>						
Participation	-4.1%	-5.8%	-16.5%	-0.7%	-0.6%	-3.6%
Test score (SDs, adjusted)	-0.29	-0.37	-0.22	-0.23	-0.23	-0.15
Proficient (adjusted)	-14.7%	-19.7%	-17.0%	-15.5%	-16.0%	-15.3%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A19. Change in OST participation rates and standardized scaled scores, high school grades by mode of instruction during 2020-21 school year**

	In-person	Hybrid/Mixed	Fully Remote
<b><i>Algebra 2021 (Grade 9)</i></b>			
Participation	-4.0%	-4.9%	-14.0%
Test score (SDs, adjusted)	-0.28	-0.32	-0.19
Proficient (adjusted)	-16.3%	-18.0%	-11.3%
<b><i>Algebra 2022 (Grade 9)</i></b>			
Participation	-2.3%	-2.1%	-6.2%
Test score (SDs, adjusted)	-0.20	-0.20	-0.22
Proficient (adjusted)	-11.5%	-11.3%	-9.4%
<b><i>Geometry 2021 (Grade 10)</i></b>			
Participation	-4.2%	-4.5%	-15.3%
Test score (SDs, adjusted)	-0.30	-0.37	-0.35
Proficient (adjusted)	-13.5%	-17.2%	-11.0%
<b><i>Geometry 2022 (Grade 10)</i></b>			
Participation	-3.0%	-2.1%	-8.1%
Test score (SDs, adjusted)	-0.31	-0.35	-0.33
Proficient (adjusted)	-11.7%	-12.9%	-8.5%
<b><i>English II 2021 (Grade 10)</i></b>			
Participation	-4.1%	-3.6%	-12.7%
Test score (SDs, adjusted)	-0.08	-0.08	-0.14
Proficient (adjusted)	-5.9%	-6.6%	-8.1%
<b><i>English II 2022 (Grade 10)</i></b>			
Participation	-3.3%	-2.0%	-5.4%
Test score (SDs, adjusted)	-0.19	-0.17	-0.15
Proficient (adjusted)	-8.1%	-8.0%	-10.2%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A20. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by baseline district achievement**

	ELA 2021				ELA 2022			
	1 <sup>st</sup> (Bottom) Quartile	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> (Top) Quartile	1 <sup>st</sup> (Bottom) Quartile	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> (Top) Quartile
<b>Grade 3</b>								
Participation	-8.4%	-4.0%	-4.1%	-5.6%	-3.0%	-1.6%	-2.0%	-2.9%
Test score (SDs, adjusted)	-0.52	-0.37	-0.35	-0.34	-0.20	-0.13	-0.17	-0.17
Proficient (adjusted)	-21.3%	-17.8%	-17.3%	-14.7%	-10.0%	-7.3%	-8.0%	-6.8%
<b>Grade 4</b>								
Participation	-7.1%	-2.7%	-2.9%	-3.6%	-0.9%	-0.2%	-0.3%	-0.3%
Test score (SDs, adjusted)	-0.28	-0.19	-0.15	-0.16	-0.06	+0.03	+0.07	+0.03
Proficient (adjusted)	-7.5%	-5.1%	-3.3%	-3.9%	+2.4%	+3.5%	+3.7%	+0.8%
<b>Grade 5</b>								
Participation	-7.6%	-2.7%	-2.4%	-4.0%	-1.0%	-0.2%	-0.2%	-0.2%
Test score (SDs, adjusted)	-0.25	-0.17	-0.15	-0.10	-0.20	-0.17	-0.17	-0.15
Proficient (adjusted)	-10.0%	-6.9%	-6.1%	-3.5%	-9.9%	-6.5%	-5.9%	-3.9%
<b>Grade 6</b>								
Participation	-8.5%	-3.4%	-2.5%	-4.0%	-1.2%	-0.7%	-0.4%	-0.3%
Test score (SDs, adjusted)	-0.22	-0.13	-0.12	-0.05	-0.10	-0.07	-0.08	-0.03
Proficient (adjusted)	-9.5%	-7.2%	-7.6%	-5.9%	-4.7%	-3.2%	-4.2%	-2.7%
<b>Grade 7</b>								
Participation	-8.7%	-3.7%	-4.0%	-3.8%	-1.6%	-0.5%	-0.4%	-0.3%
Test score (SDs, adjusted)	-0.21	-0.24	-0.25	-0.25	-0.15	-0.18	-0.18	-0.18
Proficient (adjusted)	-12.9%	-13.2%	-12.1%	-9.5%	-10.6%	-10.5%	-9.7%	-7.9%
<b>Grade 8</b>								
Participation	-9.4%	-3.0%	-4.6%	-3.8%	-1.8%	-0.7%	-0.6%	-0.3%
Test score (SDs, adjusted)	-0.25	-0.23	-0.25	-0.22	-0.25	-0.21	-0.20	-0.17
Proficient (adjusted)	-10.6%	-9.1%	-10.4%	-7.7%	-8.7%	-8.4%	-9.1%	-7.3%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Districts are grouped into quartiles based on pre-pandemic test scores in each subject, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table A21. Change in math OST participation rates and standardized scaled scores, grades six through eight by baseline district achievement**

	Math 2021				Math 2022			
	1 <sup>st</sup> (Bottom) Quartile	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> (Top) Quartile	1 <sup>st</sup> (Bottom) Quartile	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> (Top) Quartile
<b>Grade 6</b>								
Participation	-8.9%	-3.1%	-4.0%	-4.0%	-1.3%	-0.7%	-0.5%	-0.5%
Test score (SDs, adjusted)	-0.29	-0.35	-0.37	-0.38	-0.29	-0.28	-0.27	-0.26
Proficient (adjusted)	-16.5%	-18.6%	-17.4%	-13.7%	-13.2%	-13.8%	-12.5%	-9.3%
<b>Grade 7</b>								
Participation	-9.7%	-3.5%	-4.8%	-4.0%	-1.9%	-0.4%	-0.5%	-0.4%
Test score (SDs, adjusted)	-0.26	-0.32	-0.39	-0.43	-0.28	-0.31	-0.31	-0.34
Proficient (adjusted)	-16.7%	-18.2%	-19.2%	-15.4%	-14.7%	-15.0%	-14.1%	-12.0%
<b>Grade 8</b>								
Participation	-11.8%	-4.3%	-5.1%	-4.5%	-2.4%	-0.9%	-0.6%	-0.3%
Test score (SDs, adjusted)	-0.21	-0.29	-0.36	-0.44	-0.14	-0.21	-0.25	-0.31
Proficient (adjusted)	-15.9%	-17.9%	-18.2%	-16.4%	-14.9%	-17.3%	-16.5%	-14.4%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Districts are grouped into quartiles based on pre-pandemic test scores in each subject, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table A22. Change in OST participation rates and standardized scaled scores, high school grades by baseline district achievement**

	1 <sup>st</sup> (Bottom) Quartile	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> (Top) Quartile
<b>Algebra 2021 (Grade 9)</b>				
Participation	-10.8%	-4.1%	-4.3%	-3.4%
Test score (SDs, adjusted)	-0.17	-0.25	-0.32	-0.41
Proficient (adjusted)	-11.7%	-16.9%	-19.5%	-17.3%
<b>Algebra 2022 (Grade 9)</b>				
Participation	-4.8%	-1.9%	-1.0%	-3.3%
Test score (SDs, adjusted)	-0.17	-0.17	-0.20	-0.27
Proficient (adjusted)	-8.6%	-12.0%	-12.4%	-12.1%
<b>Geometry 2021 (Grade 10)</b>				
Participation	-10.5%	-3.6%	-5.2%	-3.5%
Test score (SDs, adjusted)	-0.28	-0.30	-0.35	-0.42
Proficient (adjusted)	-9.1%	-13.7%	-16.8%	-18.9%
<b>Geometry 2022 (Grade 10)</b>				
Participation	-6.5%	-1.0%	-2.5%	-3.0%
Test score (SDs, adjusted)	-0.29	-0.33	-0.35	-0.35
Proficient (adjusted)	-6.4%	-12.4%	-14.2%	-14.0%
<b>English II 2021 (Grade 10)</b>				
Participation	-9.2%	-4.2%	-3.2%	-3.3%
Test score (SDs, adjusted)	-0.11	-0.09	-0.08	-0.07
Proficient (adjusted)	-7.9%	-7.1%	-6.0%	-5.0%
<b>English II 2022 (Grade 10)</b>				
Participation	-4.2%	-4.5%	-2.3%	-1.7%
Test score (SDs, adjusted)	-0.15	-0.17	-0.18	-0.19
Proficient (adjusted)	-9.9%	-9.2%	-8.3%	-6.2%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file. Districts are grouped into quartiles based on pre-pandemic test scores in each subject, from lower (quartile 1) to higher (quartile 4) baseline test scores.

**Table A23. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by district type**

	ELA 2021				ELA 2022			
	Rural	Town	Suburban	Urban	Rural	Town	Suburban	Urban
<b>Grade 3</b>								
Participation	-3.2%	-3.1%	-6.0%	-10.0%	-2.4%	-2.6%	-1.9%	-3.3%
Test score (SDs, adjusted)	-0.36	-0.33	-0.35	-0.59	-0.19	-0.15	-0.14	-0.24
Proficient (adjusted)	-18.0%	-15.7%	-15.8%	-23.7%	-9.4%	-7.0%	-6.1%	-11.5%
<b>Grade 4</b>								
Participation	-1.3%	-1.5%	-4.7%	-8.7%	-0.3%	-0.2%	-0.3%	-1.1%
Test score (SDs, adjusted)	-0.14	-0.15	-0.18	-0.32	+0.02	+0.06	+0.05	-0.10
Proficient (adjusted)	-3.9%	-3.7%	-4.2%	-8.8%	+3.3%	+4.0%	+2.1%	+1.1%
<b>Grade 5</b>								
Participation	-1.1%	-1.9%	-4.8%	-9.3%	-0.1%	-0.2%	-0.3%	-1.2%
Test score (SDs, adjusted)	-0.16	-0.17	-0.11	-0.28	-0.19	-0.18	-0.13	-0.22
Proficient (adjusted)	-6.7%	-6.8%	-3.9%	-11.3%	-7.5%	-6.7%	-3.9%	-10.6%
<b>Grade 6</b>								
Participation	-1.1%	-2.1%	-5.4%	-10.0%	-0.4%	-0.4%	-0.4%	-1.6%
Test score (SDs, adjusted)	-0.09	-0.13	-0.08	-0.26	-0.07	-0.09	-0.02	-0.13
Proficient (adjusted)	-6.1%	-7.9%	-6.4%	-10.5%	-3.8%	-4.5%	-2.3%	-5.3%
<b>Grade 7</b>								
Participation	-1.4%	-2.5%	-5.7%	-10.8%	-0.3%	-0.5%	-0.4%	-2.1%
Test score (SDs, adjusted)	-0.25	-0.25	-0.22	-0.23	-0.18	-0.19	-0.14	-0.17
Proficient (adjusted)	-12.8%	-12.5%	-9.8%	-13.7%	-9.9%	-10.7%	-7.7%	-11.4%
<b>Grade 8</b>								
Participation	-1.3%	-2.4%	-6.2%	-11.1%	-0.3%	-0.6%	-0.6%	-2.4%
Test score (SDs, adjusted)	-0.22	-0.24	-0.22	-0.27	-0.23	-0.20	-0.16	-0.28
Proficient (adjusted)	-8.3%	-9.7%	-8.5%	-11.3%	-9.4%	-8.2%	-7.1%	-9.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A24. Change in math OST participation rates and standardized scaled scores, grades six through eight by district type**

	Math 2021				Math 2022			
	Rural	Town	Suburban	Urban	Rural	Town	Suburban	Urban
<b>Grade 6</b>								
Participation	-1.3%	-2.4%	-5.8%	-10.5%	-0.4%	-0.7%	-0.4%	-1.8%
Test score (SDs, adjusted)	-0.32	-0.36	-0.36	-0.31	-0.27	-0.31	-0.23	-0.31
Proficient (adjusted)	-16.3%	-18.0%	-15.2%	-17.1%	-12.9%	-13.9%	-9.9%	-13.6%
<b>Grade 7</b>								
Participation	-1.5%	-2.9%	-6.6%	-11.2%	-0.3%	-0.5%	-0.5%	-2.3%
Test score (SDs, adjusted)	-0.34	-0.34	-0.40	-0.26	-0.29	-0.29	-0.33	-0.30
Proficient (adjusted)	-17.5%	-17.5%	-17.5%	-16.5%	-13.9%	-13.5%	-13.4%	-15.1%
<b>Grade 8</b>								
Participation	-1.8%	-3.7%	-7.7%	-12.7%	-0.3%	-0.8%	-0.8%	-2.7%
Test score (SDs, adjusted)	-0.28	-0.32	-0.38	-0.23	-0.23	-0.23	-0.25	-0.16
Proficient (adjusted)	-15.1%	-16.3%	-18.6%	-16.7%	-16.4%	-15.7%	-15.6%	-15.3%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A25. Change in OST participation rates and standardized scaled scores, high school grades by district type**

	Rural	Town	Suburban	Urban
<b>Algebra 2021 (Grade 9)</b>				
Participation	-3.0%	-3.9%	-5.0%	-11.7%
Test score (SDs, adjusted)	-0.24	-0.29	-0.35	-0.21
Proficient (adjusted)	-15.3%	-17.7%	-17.6%	-13.0%
<b>Algebra 2022 (Grade 9)</b>				
Participation	-2.0%	-1.6%	-2.7%	-5.2%
Test score (SDs, adjusted)	-0.17	-0.20	-0.22	-0.20
Proficient (adjusted)	-11.0%	-12.4%	-11.3%	-9.7%
<b>Geometry 2021 (Grade 10)</b>				
Participation	-3.2%	-3.9%	-5.0%	-11.6%
Test score (SDs, adjusted)	-0.25	-0.31	-0.41	-0.32
Proficient (adjusted)	-11.0%	-14.8%	-18.3%	-11.1%
<b>Geometry 2022 (Grade 10)</b>				
Participation	-2.1%	-2.1%	-3.0%	-6.5%
Test score (SDs, adjusted)	-0.31	-0.31	-0.35	-0.33
Proficient (adjusted)	-10.9%	-12.0%	-13.4%	-9.2%
<b>English II 2021 (Grade 10)</b>				
Participation	-3.4%	-3.2%	-4.3%	-10.3%
Test score (SDs, adjusted)	-0.10	-0.07	-0.06	-0.14
Proficient (adjusted)	-7.4%	-6.4%	-5.0%	-8.7%
<b>English II 2022 (Grade 10)</b>				
Participation	-2.4%	-2.8%	-2.9%	-4.5%
Test score (SDs, adjusted)	-0.20	-0.17	-0.16	-0.16
Proficient (adjusted)	-9.7%	-8.7%	-6.3%	-10.6%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.



**Table A26. Change in ELA OST participation rates and standardized scaled scores, grades three through eight by school type**

	ELA 2021			ELA 2021		
	Traditional Public Schools	Site-Based Community Schools	Online Community Schools	Traditional Public Schools	Site-Based Community Schools	Online Community Schools
<b>Grade 3</b>						
Participation	-5.9%	-12.2%	-38.7%	-2.5%	-6.7%	-7.7%
Test score (SDs, adjusted)	-0.41	-0.55	-0.13	-0.18	-0.22	+0.02
Proficient (adjusted)	-18.1%	-23.7%	-5.6%	-8.2%	-10.5%	-1.4%
<b>Grade 4</b>						
Participation	-4.4%	-10.2%	-33.9%	-0.5%	-1.9%	-4.2%
Test score (SDs, adjusted)	-0.20	-0.38	+0.03	+0.01	-0.19	-0.02
Proficient (adjusted)	-5.3%	-11.2%	+5.2%	+2.4%	-4.0%	+3.6%
<b>Grade 5</b>						
Participation	-4.6%	-10.2%	-32.4%	-0.5%	-2.6%	-3.3%
Test score (SDs, adjusted)	-0.17	-0.30	-0.05	-0.17	-0.25	-0.19
Proficient (adjusted)	-6.7%	-12.5%	-2.5%	-6.7%	-12.9%	-8.4%
<b>Grade 6</b>						
Participation	-5.0%	-9.4%	-35.7%	-0.7%	-2.3%	-3.9%
Test score (SDs, adjusted)	-0.14	-0.30	-0.02	-0.07	-0.14	-0.08
Proficient (adjusted)	-7.6%	-12.0%	-4.6%	-3.7%	-5.7%	-5.1%
<b>Grade 7</b>						
Participation	-5.4%	-10.4%	-32.7%	-0.8%	-2.9%	-2.9%
Test score (SDs, adjusted)	-0.23	-0.27	-0.06	-0.16	-0.20	-0.10
Proficient (adjusted)	-11.8%	-15.5%	-6.0%	-9.6%	-13.2%	-8.3%
<b>Grade 8</b>						
Participation	-5.7%	-9.5%	-35.7%	-1.0%	-3.1%	-4.7%
Test score (SDs, adjusted)	-0.24	-0.30	+0.01	-0.21	-0.30	-0.17
Proficient (adjusted)	-9.3%	-12.4%	-2.7%	-8.1%	-9.9%	-3.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A27. Change in math OST participation rates and standardized scaled scores, grades six through eight by school type**

	<b>Math 2021</b>			<b>Math 2022</b>		
	Traditional Public Schools	Site-Based Community Schools	Online Community Schools	Traditional Public Schools	Site-Based Community Schools	Online Community Schools
<b>Grade 6</b>						
Participation	-5.4%	-10.5%	-36.5%	-0.8%	-2.2%	-4.5%
Test score (SDs, adjusted)	-0.34	-0.31	+0.21	-0.27	-0.31	+0.01
Proficient (adjusted)	-16.5%	-16.6%	+0.6%	-12.2%	-13.4%	-3.6%
<b>Grade 7</b>						
Participation	-5.9%	-11.4%	-33.5%	-0.9%	-2.5%	-4.1%
Test score (SDs, adjusted)	-0.34	-0.30	+0.05	-0.30	-0.32	-0.11
Proficient (adjusted)	-17.1%	-17.7%	-4.2%	-13.8%	-16.6%	-7.0%
<b>Grade 8</b>						
Participation	-7.1%	-10.8%	-36.9%	-1.2%	-2.7%	-6.5%
Test score (SDs, adjusted)	-0.31	-0.28	+0.10	-0.22	-0.23	0.00
Proficient (adjusted)	-16.9%	-16.7%	-3.9%	-15.6%	-17.6%	-9.5%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject.

**Table A28. Change in OST participation rates and standardized scaled scores, high school grades by school type**

	Traditional Public Schools	Site-Based Community Schools	Online Community Schools
<b>Algebra 2021 (Grade 9)</b>			
Participation	-6.1%	-6.1%	-23.7%
Test score (SDs, adjusted)	-0.28	-0.36	+0.13
Proficient (adjusted)	-16.1%	-19.3%	-0.6%
<b>Algebra 2022 (Grade 9)</b>			
Participation	-3.1%	-3.8%	-3.4%
Test score (SDs, adjusted)	-0.20	-0.29	-0.06
Proficient (adjusted)	-11.2%	-15.3%	-5.1%
<b>Geometry 2021 (Grade 10)</b>			
Participation	-6.0%	-5.0%	-25.0%
Test score (SDs, adjusted)	-0.34	-0.35	+0.07
Proficient (adjusted)	-14.5%	-13.6%	+0.3%
<b>Geometry 2022 (Grade 10)</b>			
Participation	-3.5%	-5.3%	-2.4%
Test score (SDs, adjusted)	-0.33	-0.40	-0.15
Proficient (adjusted)	-11.7%	-14.3%	-5.2%
<b>English II 2021 (Grade 10)</b>			
Participation	-5.3%	-5.1%	-13.6%
Test score (SDs, adjusted)	-0.09	-0.18	+0.06
Proficient (adjusted)	-6.5%	-8.7%	-0.2%
<b>English II 2022 (Grade 10)</b>			
Participation	-3.1%	-4.6%	-4.7%
Test score (SDs, adjusted)	-0.17	-0.16	-0.11
Proficient (adjusted)	-8.4%	-10.7%	-7.9%

Note: Pre-pandemic data are from 2018-19. "Adjusted" test scores and proficiency rates are estimated using statistical models that impute missing scores and control for students' demographic characteristics and pre-pandemic test scores, as per the methodology in the appendix. The scaled scores were 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 A1 in the typical growth benchmark for each grade and subject. Only the first test scores are used for students flagged as repeat test-takers in the vendor file.

**Table A29. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, fourth grade**

	Relative ELA Growth	Relative Math Growth
<i>Statewide Average</i>	+0.17	+0.03
<b><i>Race/ethnicity</i></b>		
White	+0.18	+0.04
Black	+0.11	+0.02
Hispanic	+0.14	+0.02
Asian	+0.24	+0.02
<b><i>Economic disadvantage</i></b>		
Not Disadvantaged	+0.20	+0.04
Economically Disadvantaged	+0.14	+0.03
<b><i>Disability</i></b>		
Not Disabled	+0.20	+0.04
Disabled	+0.04	+0.03
<b><i>English Learner</i></b>		
Not English Learner	+0.17	+0.03
English Learner	+0.05	-0.02
<b><i>Homelessness</i></b>		
Not Homeless	+0.17	+0.03
Homeless	+0.05	+0.00
<b><i>District mode of learning in 2020-21</i></b>		
In-person	+0.17	+0.04
Hybrid/mixed	+0.19	+0.04
Remote	+0.16	+0.05
<b><i>District type</i></b>		
Rural	+0.14	+0.04
Town	+0.17	+0.03
Suburban	+0.22	+0.05
Urban	+0.15	+0.05
<b><i>District achievement quartile</i></b>		
1st Quartile	+0.16	+0.06
2nd Quartile	+0.17	+0.05
3rd Quartile	+0.20	+0.04
4th Quartile	+0.19	+0.02
<b><i>School type</i></b>		
Traditional Public School	+0.18	+0.04
Site-Based Community School	+0.08	-0.06
Online Community School	-0.02	-0.04

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 in 2021-22, 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 A30. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, fifth grade**

	Relative ELA Growth	Relative Math Growth
<i>Statewide Average</i>	+0.08	+0.02
<b><i>Race/ethnicity</i></b>		
White	+0.07	+0.03
Black	+0.14	+0.03
Hispanic	+0.09	+0.01
Asian	+0.09	+0.04
<b><i>Economic disadvantage</i></b>		
Not Disadvantaged	+0.06	+0.02
Economically Disadvantaged	+0.12	+0.04
<b><i>Disability</i></b>		
Not Disabled	+0.08	+0.03
Disabled	+0.12	+0.01
<b><i>English Learner</i></b>		
Not English Learner	+0.08	+0.03
English Learner	+0.12	-0.06
<b><i>Homelessness</i></b>		
Not Homeless	+0.08	+0.02
Homeless	+0.14	+0.01
<b><i>District mode of learning in 2020-21</i></b>		
In-person	+0.05	+0.00
Hybrid/mixed	+0.10	+0.05
Remote	+0.15	+0.05
<b><i>District type</i></b>		
Rural	+0.05	+0.02
Town	+0.06	+0.01
Suburban	+0.09	+0.04
Urban	+0.14	+0.03
<b><i>District achievement quartile</i></b>		
1st Quartile	+0.13	+0.05
2nd Quartile	+0.09	+0.01
3rd Quartile	+0.07	+0.05
4th Quartile	+0.04	+0.00
<b><i>School type</i></b>		
Traditional Public School	+0.08	+0.02
Site-Based Community School	+0.10	+0.01
Online Community School	+0.04	+0.19

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 in 2021-22, 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 A31. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, sixth grade**

	Relative ELA Growth	Relative Math Growth
<i>Statewide Average</i>	+0.07	-0.03
<b><i>Race/ethnicity</i></b>		
White	+0.07	-0.01
Black	+0.09	-0.07
Hispanic	+0.09	-0.04
Asian	+0.11	+0.02
<b><i>Economic disadvantage</i></b>		
Not Disadvantaged	+0.07	-0.01
Economically Disadvantaged	+0.09	-0.03
<b><i>Disability</i></b>		
Not Disabled	+0.08	-0.01
Disabled	+0.05	-0.06
<b><i>English Learner</i></b>		
Not English Learner	+0.07	-0.03
English Learner	+0.11	-0.08
<b><i>Homelessness</i></b>		
Not Homeless	+0.07	-0.02
Homeless	+0.02	-0.07
<b><i>District mode of learning in 2020-21</i></b>		
In-person	+0.07	-0.02
Hybrid/mixed	+0.09	+0.01
Remote	+0.10	-0.06
<b><i>District type</i></b>		
Rural	+0.08	-0.02
Town	+0.08	-0.03
Suburban	+0.08	0.00
Urban	+0.09	-0.03
<b><i>District achievement quartile</i></b>		
1st Quartile	+0.10	-0.03
2nd Quartile	+0.10	+0.02
3rd Quartile	+0.08	-0.02
4th Quartile	+0.04	-0.03
<b><i>School type</i></b>		
Traditional Public School	+0.08	-0.02
Site-Based Community School	+0.06	-0.09
Online Community School	+0.02	0.02

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 in 2021-22, 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 A32. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, seventh grade**

	Relative ELA Growth	Relative Math Growth
<i>Statewide Average</i>	+0.13	-0.02
<b><i>Race/ethnicity</i></b>		
White	+0.12	-0.03
Black	+0.18	+0.05
Hispanic	+0.16	+0.02
Asian	+0.15	-0.05
<b><i>Economic disadvantage</i></b>		
Not Disadvantaged	+0.12	-0.05
Economically Disadvantaged	+0.15	+0.03
<b><i>Disability</i></b>		
Not Disabled	+0.13	-0.03
Disabled	+0.15	+0.09
<b><i>English Learner</i></b>		
Not English Learner	+0.13	-0.02
English Learner	+0.25	+0.05
<b><i>Homelessness</i></b>		
Not Homeless	+0.13	-0.02
Homeless	+0.18	+0.03
<b><i>District mode of learning in 2020-21</i></b>		
In-person	+0.12	-0.03
Hybrid/mixed	+0.15	0.00
Remote	+0.16	+0.01
<b><i>District type</i></b>		
Rural	+0.12	-0.01
Town	+0.10	-0.02
Suburban	+0.15	-0.03
Urban	+0.17	+0.02
<b><i>District achievement quartile</i></b>		
1st Quartile	+0.17	+0.03
2nd Quartile	+0.10	-0.03
3rd Quartile	+0.13	0.00
4th Quartile	+0.12	-0.06
<b><i>School type</i></b>		
Traditional Public School	+0.13	-0.02
Site-Based Community School	+0.15	+0.01
Online Community School	+0.07	+0.00

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 in 2021-22, 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 A33. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, eighth grade**

	Relative ELA Growth	Relative Math Growth
<i>Statewide Average</i>	<i>+0.01</i>	<i>-0.02</i>
<b><i>Race/ethnicity</i></b>		
White	+0.02	-0.03
Black	+0.00	+0.05
Hispanic	-0.03	+0.01
Asian	+0.02	-0.02
<b><i>Economic disadvantage</i></b>		
Not Disadvantaged	+0.03	-0.04
Economically Disadvantaged	-0.01	+0.01
<b><i>Disability</i></b>		
Not Disabled	+0.03	-0.04
Disabled	-0.09	+0.10
<b><i>English Learner</i></b>		
Not English Learner	+0.01	-0.02
English Learner	-0.12	+0.04
<b><i>Homelessness</i></b>		
Not Homeless	+0.01	-0.02
Homeless	-0.05	+0.03
<b><i>District mode of learning in 2020-21</i></b>		
In-person	0.00	-0.05
Hybrid/mixed	+0.03	0.00
Remote	+0.02	+0.06
<b><i>District type</i></b>		
Rural	-0.01	-0.05
Town	+0.01	-0.03
Suburban	+0.02	-0.04
Urban	+0.00	+0.05
<b><i>District achievement quartile</i></b>		
1st Quartile	+0.01	+0.03
2nd Quartile	+0.02	-0.01
3rd Quartile	+0.01	-0.03
4th Quartile	+0.02	-0.07
<b><i>School type</i></b>		
Traditional Public School	+0.01	-0.02
Site-Based Community School	-0.01	-0.03
Online Community School	-0.09	+0.06

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 in 2021-22, 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 A34. Change in one-year standardized test score growth in 2021-22 relative to pre-pandemic years, ninth grade**

		Relative Math Growth
<i>Statewide Average</i>		+0.03
<b><i>Race/ethnicity</i></b>		
	White	+0.06
	Black	-0.05
	Hispanic	+0.01
	Asian	+0.10
<b><i>Economic disadvantage</i></b>		
	Not Disadvantaged	+0.07
	Economically Disadvantaged	0.00
<b><i>Disability</i></b>		
	Not Disabled	+0.06
	Disabled	-0.07
<b><i>English Learner</i></b>		
	Not English Learner	+0.03
	English Learner	-0.10
<b><i>Homelessness</i></b>		
	Not Homeless	+0.03
	Homeless	-0.07
<b><i>District mode of learning in 2020-21</i></b>		
	In-person	+0.04
	Hybrid/mixed	+0.08
	Remote	-0.07
<b><i>District type</i></b>		
	Rural	+0.04
	Town	+0.06
	Suburban	+0.09
	Urban	-0.06
<b><i>District achievement quartile</i></b>		
	1st Quartile	-0.03
	2nd Quartile	+0.03
	3rd Quartile	+0.07
	4th Quartile	+0.09
<b><i>School type</i></b>		
	Traditional Public School	+0.04
	Site-Based Community School	-0.06
	Online Community School	+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 in 2021-22, 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.