

How Much Have Students Missed Academically Because of the Pandemic? A Review of the Evidence to Date

Panel of Experts

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About this Series

This report is part of a series that aims to provide a definitive account of the best available evidence on how the COVID-19 pandemic has affected America's students. The series is part of a broader effort, the [Evidence Project](#), which brings together researchers and policymakers to advance solutions-oriented analysis of the K-12 response to the COVID-19 pandemic.

The Center on Reinventing Public Education compiled hundreds of studies and convened panels of experts to interpret what the data show. Three initial reports assess what we know to date about the pandemic's effects on students' **academic progress**, its effects on their **mental health and social-emotional well-being**, and its impact on **students with disabilities**. We will update these assessments and add more topics over the coming year as new data become available.

We aim to present a coherent baseline of what we know, don't know, and need to know at this stage of the pandemic. These reports are designed to help system leaders, community leaders, policymakers, researchers, philanthropies, the media, and others to define ambitious goals and clear metrics that ensure our education system meets every student's needs over the coming years.

The series of papers will culminate in the release of CRPE's first annual *Profile of the American Student*. The report will provide a rigorous and nuanced assessment of 1) how extensive student needs and inequities are across a variety of dimensions, 2) how student needs vary across different dimensions and what that implies for policy and practice, and 3) what promising solutions and innovations are emerging to meet students' needs.

In future years, these reports will track progress toward repaying every student the educational opportunities they are owed after this traumatic and disruptive period. Our goal is to provide an ongoing assessment of student needs and a look forward toward restitution and recovery.

I. Overview

The COVID-19 pandemic has disrupted every aspect of U.S. society over the past 18 months, but perhaps none more fundamentally than its K-12 schools. Virtually every school nationwide closed its doors in March 2020 for the remainder of the 2019–2020 academic year, replacing in-person instruction with hastily constructed online programming. Only a [small fraction](#) of U.S. students returned to fully operational schools last fall. The remainder experienced either partially or fully remote instruction for much of 2020–2021.

Determining how the pandemic and associated disruptions to schooling have affected the development of students' foundational academic skills is critical. Measures of literacy and numeracy while students are enrolled in K-12 schools are strong predictors of their [future educational and labor-market success](#). Studies of past disruptions to schooling—for example, from [prolonged teacher strikes](#)—reveal adverse effects on students' educational attainment and economic outcomes as adults.¹ The economic and social consequences of the pandemic—employment loss, stress due to sick or dying relatives, the need to assume additional family responsibilities—may also have affected students' academic progress independent of disruptions to schooling. Designing effective strategies to support students who have experienced setbacks brought on by the pandemic will require that educators and policymakers have a clear understanding of where students are.

Yet gauging the academic impacts of the pandemic is hard: its disruptions to schooling also disrupted the assessment systems used to monitor students' progress. Annual state tests were cancelled in spring 2020 in all states. Many school districts stopped administering interim assessments that are routinely used to determine whether students have mastered grade-level standards. Even where interim assessments continued, many students did not participate—and those who did not participate are likely to be the same students who experienced the greatest impact from the pandemic. Finally, changes in the mode of administration (e.g., more students taking tests from their homes) raise questions about the [validity of the data](#) and their comparability to prior years.

Despite these challenges, a body of evidence is emerging that sheds partial light on what has happened to student achievement overall and for demographic subgroups. In June 2021, the Center on Reinventing Public Education (CRPE) gathered a panel of 10 experts in education policy and assessment to review the available evidence on the pandemic's impact on students' academic skills. In this report, we summarize this evidence on how the pandemic and the converging social events of 2020 and 2021 affected K-12 students' academic progress. Given important limitations of the evidence currently available, we also highlight what we don't yet know; suggest what journalists, educators, and policymakers should be looking for as additional sources of data emerge; and offer an agenda that these experts feel should drive research in coming years.

¹ For a review of the evidence on the educational and economic consequences of lost learning and past school closures, see Eric A. Hanushek and Ludger Woessmann, *The Economic Impacts of Learning Losses* (Washington, DC: OECD, 2020).

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The panel reviewed studies that were gleaned from CRPE's COVID-19 K-12 research database of more than 300 studies on the pandemic's academic impacts. In particular, we sought to identify all studies that present data from standardized assessments of student achievement meeting three criteria:

- The assessments were administered before and after the onset of the pandemic in March 2020.
- The assessments are designed to be comparable over time (setting aside potential concerns about changes in administration conditions).
- The assessments cover either a representative sample or a large share of the students enrolled in a school system (e.g., state or school district(s) in the U.S).

We limited our analysis to studies meeting these standards in order to ensure some level of comparability before and during the pandemic and to make sure our inferences were based on broad populations, rather than a small number of students in potentially unique circumstances. We identified 12 studies that met our criteria. We provide details about these studies in the appendix.

The studies we reviewed relied on the achievement measures of state test scores (in one case) or interim assessments many school districts use to track student progress. The post-pandemic data were gathered in fall 2020 or winter 2021. We did not include studies of course grades and other more subjective indicators of academic progress in our review because many school systems modified their grading practices amid the pandemic. We nonetheless draw on the results of those studies to inform our interpretation of the evidence included in the review.

We emphasize that standardized test scores are only partial indicators of students' educational progress. Separate CRPE panels are examining the pandemic's effects on social-emotional development and well-being, and on students with disabilities. CRPE and the expert panels plan to update these papers and add others in coming months and years as new studies are published. The studies we reviewed were generally not peer-reviewed but rather were shared by researchers as white papers in an effort to provide timely information. In the aggregate, however, the consistency of findings across studies paints a clear picture.

II. Overview of Findings

What We Know

1. Test scores show that the average student mastered less academic content because of the pandemic and associated disruptions to schooling.

- On average, elementary and middle school students tested in fall 2020 performed at lower levels than (i) prior grade-level cohorts, and (ii) predictions based on pre-pandemic growth data. This does not literally mean that students know less than they did before the pandemic but does imply slower than typical progress.
- On average, students tested in winter 2021 showed larger gaps relative to predictions based on pre-pandemic growth data than did students tested in fall 2020, implying that slower than typical progress continued well into the 2020–21 school year.
- The precise magnitude of that slowdown is difficult to estimate nationally, due to increased rates of non-participation in testing and varying methods and units of measurement across studies. However, the weight of the evidence suggests students tested in the 2020–21 school year lagged pre-pandemic expectations by an amount roughly equivalent to several months of learning in a typical year.

2. Other measures of instructional time, engagement, and academic progress strengthen the credibility of these findings and demonstrate further reason for concern.

- Students had far less in-person instruction than usual over the past 18 months—in some cases, none at all. Remote instruction did not always include “live,” or “synchronous,” student-teacher interactions. Teachers report they covered much less material than usual. The extent of reduced learning time related to where students lived, local health conditions, and the politics of the area.
- Many school districts reported sharp increases in course failure rates, especially for students from low-income households and students of color—in some cases despite explicit reductions in grading standards.

- Overall enrollment in public schools **dropped** by 3 percent nationally and by 13 percent among preschool and kindergarten students. Among students who remained enrolled in school, reported rates of **absenteeism** increased, and data from one state show a **substantial increase** in the number of students reported chronically absent (absent for more than one out of every three days).²

3. The pandemic’s average impacts on academic achievement, while significant, mask substantial variation in impacts across subjects, grades, demographic groups, and geography.

- Impacts were generally greater in math than in reading, consistent with evidence indicating that schools play a larger role in the development of students’ math skills. Even so, the limited available evidence on oral reading fluency and literacy skills in the early elementary grades suggests substantial negative impacts in this domain.
- Impacts are consistently greater for economically disadvantaged students than those who are not.
- Impacts are consistently greater impacts for Black and Hispanic students than for white students. Relative impacts for Asian-American students, when reported, vary across studies.
- Impacts are substantial across all grade levels for which data is available (K–8). Although impacts in elementary school (K–5) appear to be larger than in middle school (6–8) when they are measured relative to the variation in grade-level achievement, this apparent difference is less clear when measured relative to typical rates of achievement growth.
- Impacts on learning varied geographically, with some school districts experiencing little or no effect. For example, a study of Ohio found that, despite a substantial drop in average third-grade reading scores statewide, 10 percent of districts experienced no decline. A second study of a set of California school districts documented an increase in the variation in achievement growth rates across districts.
- Impacts are greater where students had less access to in-person instruction, according to the two studies that examine this question. In theory, this could reflect the relative effectiveness of remote instruction or the fact that communities relying more on remote instruction were hardest hit by the pandemic in other ways. However, **studies** have shown that districts with higher infection rates were actually *more* likely to offer in-person instruction. There is little doubt that, on average, more in-person instruction produced more learning.

4. The evidence to date likely understates both the average academic impacts of the pandemic and the opportunity and achievement gaps it produced.

- Even setting aside the cancellation of state tests in spring 2020, far fewer students participated in standardized assessments in the 2020–21 school year than is typically the case.

² Increased absenteeism may not be surprising given widespread fears of the pandemic, actual COVID cases, and other pandemic-related hardships, but it does provide a credible mechanism to explain slower-than-typical learning.

- Economically disadvantaged students and students of color—groups that were hardest hit by the pandemic’s health and economic consequences—were less likely to participate in tests in the 2020–21 school year compared to their more advantaged peers.
- These patterns imply that the data currently available to researchers may not reflect the pandemic’s full impact, and that these data may be particularly misleading when it comes to economically disadvantaged students and students of color.

What We Don’t Know

The sparse data available to date provide only the barest insight into the scope and magnitude of academic impacts brought on by the pandemic and associated school closures. The studies included in our review are understandably opportunistic, relying on available state or local assessments that typically cover only a few subject areas and grade levels. In particular, we lack almost any systematic data on the achievement of high school students and on the progress of students in subject areas beyond math and reading. In the early elementary grades, we have some evidence based on measures of oral reading fluency, but nothing that speaks to students’ math skills. The pandemic’s true impact will continue to reveal itself over the next year or two as we accumulate more studies based on interim assessments, state math and reading tests, and end-of-course exams in other subjects. It will be critical to continue monitoring that evidence—watching for whether students who suffered as a result of the pandemic are catching up, and for possible compounding effects for those who are not.

We also have limited evidence on differences in the pandemic’s impact across different subgroups of students. For example, none of the available studies reports data separately by gender, despite the possibility that disruptions to in-person instruction could affect boys and girls differently. We have limited information on the achievement of English language learners and students with disabilities—and none at all on other special populations, including foster children and children experiencing homelessness. While several studies look at students separately by race and economic disadvantage, none look at the intersection of these characteristics.

More generally, it remains unclear whether the average impacts documented to date conceal wide variation across individual students, with some students continuing to thrive and others experiencing larger setbacks. The available studies generally do not report whether the variation in achievement has increased in assessments conducted after the pandemic’s outbreak.

Finally, it’s notable that we cannot really say at this point precisely how much learning the typical U.S. student missed—even in the grades and subjects where the most students have been assessed. The available studies that are national in scope are not necessarily representative in their coverage; others examine patterns in specific geographies. Despite efforts by some studies to examine the validity of tests given outside of school settings, uncertainty remains about whether they are truly comparable to tests given before the pandemic. Perhaps the most fundamental challenge is uneven test participation at the student- and school-level. Current

studies can and do observe the characteristics of students not participating in assessments, including in some cases prior achievement levels. However, they cannot rule out the possibility that students not participating have suffered more from the pandemic and become more disengaged from their schooling than those who do.

What We Need to Know

At the top of the priority list for researchers going forward should be understanding how students who have become most disengaged from schooling as a result of the pandemic fare over the next five to ten years. Addressing the needs of students who are not included in any of the evidence to date may be the most urgent challenge facing educators and policymakers. Increasing the coverage of assessments in the 2021–22 school year is therefore critical, as is tracking the progress of individual students, be it through diagnostic assessment, state exams, IEP meetings, etc. A useful first step toward this goal would be an “educational census” where the first and foremost question is: Who is here and who are we missing?

A second key question is why more in-person instruction is associated with more positive learning outcomes—a pattern of evidence in both of the studies that examine this question. Is this due primarily to the mode of instruction? Or does it reflect other factors? The current evidence is likely sufficient to justify prioritizing a return to full-time in-person instruction for all students in the coming school year. Even so, better evidence on this question has clear implications for instructional design going forward.

While the pandemic created crises for many students, it presented opportunities for others. [Surveys](#) and [media reports](#) show [some students were able to manage well](#) during remote learning and social isolation, and [even thrive](#). Understanding which family supports, personal attributes, and educational circumstances contributed to that success will help ensure any future disruptions in learning have less deleterious effects on students. Those clues to success may even help inform how schools can work better for all students.

Equally critical is understanding whether the lags in achievement documented for most students are transitory, persistent, or—in the worst case scenario—compounding. Compounding effects are possible given the cumulative nature of academic development, in which gaps in previously gained skills can affect the rate of achievement growth going forward. It is even possible that some students have lost the ability to “do school” and will continue to experience slower than typical growth for an extended period if they receive conventional instruction. Yet it is also likely that many students have been learning in other ways that are not reflected in assessments, and these students’ academic skills may recover quickly as schools return to normal. Our lack of prior experience with disruptions to schooling at the scale of those produced by the pandemic makes future trajectories difficult to predict. Ongoing monitoring is therefore essential.

Of course, the future achievement growth of students impacted by the pandemic will hinge on the success of educators’ work going forward. Whatever learning time has been lost can likely be recovered for most children, but only with intensive effort, strategic use of time, and evidence-based intervention. This implies an urgent need to document and study the success of various approaches.

III. Implications for Post-Pandemic Recovery

The body of evidence to date leaves little doubt that the average student is academically behind past peers as a result of the pandemic, the ensuing school closures, and the move to remote learning. This statement is not an indictment of teachers, parents, or any others who tried to make the best of a chaotic situation, but the situation must be addressed quickly. Educators and policymakers should be especially focused on ensuring students have intensive support, as soon as possible, in math and early literacy. Studies show significant drops in average achievement in these areas. Leaving them unaddressed could cause many students long-term academic harm.

What is most cause for concern, however, is the highly varied nature of results and the large numbers of students who appear to have fared very poorly. The studies we reviewed reveal that a large portion (though likely not the majority) of U.S. students seems to have learned very little in core subjects this year, failed classes at high rates, and been absent or missing from their schools. We are only beginning to understand the scope of the problems and the long-term consequences for those students, but their situations should compel urgent action to find those students and help them re-engage productively in school and in learning.

Also troubling is the fact that the students who appeared to suffer the most academically were often those who were already not sufficiently supported in the prior educational environment: [students of color](#) and [students from lower-income households](#). Critical action is required for these students.

While the available studies do not help us understand the precise impact on students with disabilities, English language learners, and other vulnerable groups, these students require attention and data-informed intervention. Determining which students experienced the most adverse academic impacts may be a particularly good use of federal COVID-relief funding so that additional resources can be allocated to addressing their needs.

Given the general dearth of data, it should be incumbent on school districts and states to be transparent about how they are measuring academic impacts, how they know students are or are not catching up, and how they are assessing and acting on the efficacy of various interventions. In the coming months and years, state exam results and widely used interim assessments will be important to watch but difficult to interpret given the holes in data and inconsistencies in test administration. CRPE and this panel will continue to update these findings and will provide guidance to reporters and policymakers on interpreting the latest results and body of research.

The answer then, to the question, “How much have students missed academically as a result of the pandemic?” is only beginning to be understood but is clearly different for each student. Diverse impacts require diverse solutions. Returning to the status quo without addressing lost learning will do little to ameliorate learning loss. The answer to the question, “How much will they suffer long term?” depends on adult action. This baseline research review provides a roadmap for educators and policymakers to start from and will be critical to assess for the coming years. What we do from here matters.

Appendix A. Characteristics of the Studies Included in this Review

As noted in the report text, we sought to include in this review all studies presenting data from standardized assessments of student achievement that met three criteria:

- The assessments were administered before and after the onset of the pandemic in March 2020.
- The assessments are comparable over time (setting aside potential concerns about changes in administration conditions).
- The assessments cover either a representative sample or a large share of the students enrolled in a school system (e.g., state or school district(s) in the U.S.

The 12 studies we identified as meeting these criteria nonetheless varied along multiple dimensions, which are summarized in tables 1-4 below.

Time Period: Eight of the twelve studies used assessments administered in fall 2020 (table 1). These studies are therefore best understood as capturing the impact of the pandemic and resulting school closures in spring 2020 as of the start of the 2020–21 school year. Four studies used data gathered in the winter of that school year, typically just before or after the end of the calendar year, and therefore additionally capture the impact of pandemic-induced alterations in school practices in fall 2020. None of the studies reviewed speaks to the pandemic’s full impact at the end of the 2020–21 school year.

Geography: The geographies focused on in each study ranged widely. Two focused on a single school district (Washington, D.C., and the School District of Philadelphia). Two focused on a set of school districts within the same state (California and Georgia). One covered the entire state of Ohio. The remainder are more national in scope, in some cases including data on students in all 50 states and the District of Columbia. None of these nationwide studies is truly nationally representative, however, as each relies on a sample of schools that participate in a particular interim assessment program (table 1).

Subjects: The studies draw primarily on interim assessments of reading and math skills and therefore do not provide information on the pandemic’s effects on achievement in other subject areas. The study of Ohio focuses exclusively on English Language Arts, taking advantage of the fact that the third-grade state test was administered in that subject as scheduled in fall 2020. One study of early elementary students focuses on Oral Reading Fluency, an important precursor skill in the reading domain (table 1).

Grades: The studies as a set focus almost exclusively on students in elementary and middle school, with only a single study (of Philadelphia) providing any information on the achievement of high school students. Among younger students, more studies provide information on students in grades 3–8, as some studies excluded students tested in earlier grades due to concerns about the comparability of remote and in-school assessments in those grades (table 1).

Sample Definition: Each of the studies sought to include as many students as possible while also attempting to ensure that the students tested after the pandemic were comparable to those tested before the pandemic. Some studies accomplished this at the level of the individual student, taking advantage of longitudinal data to include only those students tested both before and after the pandemic. The two studies by Curriculum Associates defined their sample based on schools administering their diagnostic assessments both before and after the pandemic but established criteria for the percentage of students participating in testing at each point in time. Finally, the studies of Ohio, Philadelphia, and Washington, D.C., included all students who were tested at either point in time (table 2).

Test Mode: Only the study of the state of Ohio was able to rely on tests that were administered entirely in schools; all of the others had to rely on a mix of tests administered in schools and at home. Some studies simply combined results across modes, in some cases despite signs that students were performing better or spending more time on the tests when they were administered remotely. Other studies were forced to do so because of a lack of data on test mode for individual students. In some cases, researchers conducted validity studies designed to shed light on the comparability of in-school and remote testing to inform their analytic decisions. For example, NWEA found that students tested in grades K–2 (but not in higher grades) performed better than expected when tested at home, and therefore excluded those grades from their analysis (table 2).

Method: Each of the studies reviewed sought to estimate the pandemic’s effect on students’ achievement relative to what they would have achieved had the pandemic not occurred, but they took various approaches to accomplishing this goal. Some simply compared the achievement levels of students tested in the 2020–21 school year to the achievement levels of prior cohorts of students tested in earlier years. For example, the study of Ohio third-graders compared the scores of students tested in fall 2021 to students tested in fall 2020. In making this comparison, the researchers at Ohio State University adjusted the 2021 test scores to account for demographic differences between students tested in each cohort. A larger number of studies used longitudinal data to compare individual students’ achievement in fall 2020 or winter 2021 to predictions of where they would have been absent the pandemic based on historical growth data. Neither approach is able to provide information on the pandemic’s effects on students not participating in assessments in the 2020–21 school year (table 3).

Reporting Metrics: The metrics used to report impacts on achievement also varied widely and included changes in the percentage of students meeting various achievement thresholds (e.g., at or above grade level, substantially below grade level); changes in national percentile ranks; percentage of expected growth; and standard deviations (i.e., relative to the variation in student achievement levels). Several studies converted estimates of achievement impacts into units of time (e.g., months or weeks of typical learning), though the methods for making these conversions also varied across studies (table 3).

Subgroup Comparisons: In addition to reporting estimates of average achievement impacts for all students, most of the studies produced estimates of impacts on specific student groups. The most common breakdowns were by economic disadvantage (11 studies) and race/ethnicity (9 studies), though in some cases where researchers lacked individual data these subgroups were defined based on aggregate school characteristics. Only four of the twelve studies

produced separate estimates for students with disabilities and English language learners, while (surprisingly) none looked separately by student gender. Only two studies, those of Ohio and of three metro-Atlanta school districts, were able to relate estimates of the pandemic’s achievement impacts to measures of the amount of in-person (vs. remote) instruction students received. Both of these studies found that impacts were greatest where less in-person instruction was available (table 4).

Table 1. Geography, Grades, and Subjects Covered by Reviewed Studies

Time Period	Organization (with link to study)	Geography	Grades	Subject
Fall 2020	Renaissance	Nationwide (50 states and DC)	1st–8th	Reading/Math
	Curriculum Associates	8 states (reading) & 12 states (math)	1st–8th	Reading/Math
	NWEA	Nationwide	3rd–8th	Reading/Math
	PACE	111 school districts in 22 states	1st–4th	Oral Reading Fluency
	The Ohio State University	Statewide (Ohio)	3rd	English Language Arts
	PACE	18 California school districts	4th–8th	Reading/Math
	EmpowerK12	DCPS & DC public charters	K–8th	Reading/Math
	School District of Philadelphia	School District of Philadelphia	K–12th	Reading/Math
Winter 2021	Renaissance	Nationwide (50 states and DC)	1st–8th	Reading/Math
	Curriculum Associates	Nationwide (49 states and DC)	1st–8th	Reading/Math
	Georgia State University	3 Metro-Atlanta school districts	4th–8th	Reading/Math
	PACE	19 California school districts	4th–8th	Reading/Math

Table 2. Sample Definition and Mode of Test Administration of Reviewed Studies

Organization (with link to study)	Sample	Test Mode
Renaissance	Students tested in fall 2019 and fall 2020.	In-school and remote (combined despite performance differences)
Curriculum Associates	Inclusion criteria: (1) Enrolled in districts/grades where at least 200 students tested in school in fall 2020; (2) Enrolled in districts/grades where at least 70% of students tested in fall 2019; (3) Enrolled in schools where number of students tested in fall 2020 was >50% of number of students tested in fall 2019.	In-school only (self-reported remote test-takers excluded)
NWEA	Levels: Schools that tested at least 10 students in fall 2019 and fall 2020. Growth: Students tested in fall 2019, winter2020, and fall 2020.	In-school and remote (K-2 excluded after comparability study)
PACE	Only students tested before and after closures.	Remote only
The Ohio State University	Students tested in fall 2020 (81% vs. ~95% in a typical year); estimates adjusted for demographic differences.	In-school only
PACE	Students tested in fall 2019 and fall 2020.	In-school and remote (mode data not available)
EmpowerK12	Students tested in fall 2020 and in fall 2019 or winter 2020.	In-school and remote (students with atypical testing times/behavior)
School District of Philadelphia	Students tested in winter 2020 and fall 2020.	In-school and remote (combined despite longer remote test time)

Organization (with link to study)	Sample	Test Mode
Renaissance	Students tested in fall 2019, fall 2020, and winter 2021.	In-school and remote (combined despite testing differences)
Curriculum Associates	Tested in winter 2020 and enrolled in school that tested 50-200% of the number of students tested in prior years.	In-school only (self-reported remote test-takers excluded)
Georgia State University	Tested in winter 2020 and enrolled in school that tested 50-200% of the number of students tested in prior years.	In-school only (self-reported remote test-takers excluded)
PACE	Students tested in fall 2019 and winter 2021.	In-school and remote (mode data not available)

Table 3. Methods and Primary Reporting Metrics Used in Reviewed Studies

Organization (with link to study)	Method	Reporting metrics
Renaissance	Compare to predictions based on historical growth data.	Percentiles, weeks of learning
Curriculum Associates	Compare levels to students in the same grades/grades in prior years.	% two+ grade levels below
NWEA	Levels: Compare to prior year. Growth: Compare to predictions based on historical growth data.	Percentiles, scale scores, growth
PACE	Longitudinal growth model with data before and after closures.	Growth in Oral Reading Fluency (words per minute)
The Ohio State University	Compare 2020 achievement to 2019 achievement with demographic adjustments.	Standard deviations; months of learning
PACE	Compare to predictions based on historical growth data.	Scale scores
EmpowerK12	Growth: Compare to national growth norms. Levels: Compare to prior years.	% of typical fall-to-fall growth; % on-track for proficiency; % two+ grade levels behind
School District of Philadelphia	Compare NPR in winter 2021 to fall 2020.	Changes in National Percentile Rank
Renaissance	Compare to predictions based on historical growth data.	Student Growth Percentile, percentile ranks
Curriculum Associates	Compare winter 2020 achievement to average of prior years.	% of students on/ below grade level
Georgia State University	Compare to predictions based on historical growth data.	Months of learning
PACE	Compare to predictions based on historical growth data.	Months of learning

Table 4. Subgroup Comparisons Included in Reviewed Studies

Organization	Economic disadvantage	Race/ethnicity	Gender	English language learners	In-person vs. Remote instruction	Students with disabilities
Renaissance	Y*	Y	N	Y	Y	N
Curriculum Associates	Y*	Y*	N	N	N	N
NWEA	Y*	Y	N	N	N	N
PACE	N	N	N	N	N	N
The Ohio State University	Y*	Y	N	Y	Y	N
PACE	Y	N	N	Y	N	N
Empower K12	Y	Y	N	Y	N	N
School District of Philadelphia	Y	Y	N	N	N	N
Renaissance	Y*	Y	N	Y	Y	N
Curriculum Associates	Y*	Y*	N	N	N	N
Georgia State University	Y	N	N	N	N	Y
PACE	Y	Y	N	Y	Y	N

* Indicates that the subgroup comparison was defined based on aggregate school characteristics.

About the Center on Reinventing Public Education

CRPE is a nonpartisan research and policy analysis center at the University of Washington Bothell. We develop, test, and support bold, evidence-based, systemwide solutions to address the most urgent problems in K-12 public education across the country. Our mission is to reinvent the education delivery model, in partnership with education leaders, to prepare all American students to solve tomorrow's challenges. Since 1993 CRPE's research, analysis, and insights have informed public debates and innovative policies that enable schools to thrive. Our work is supported by multiple foundations, contracts, and the U.S. Department of Education.