

# Estimates of Learning Loss in the 2019-2020 School Year

The Center for Research on Education Outcomes

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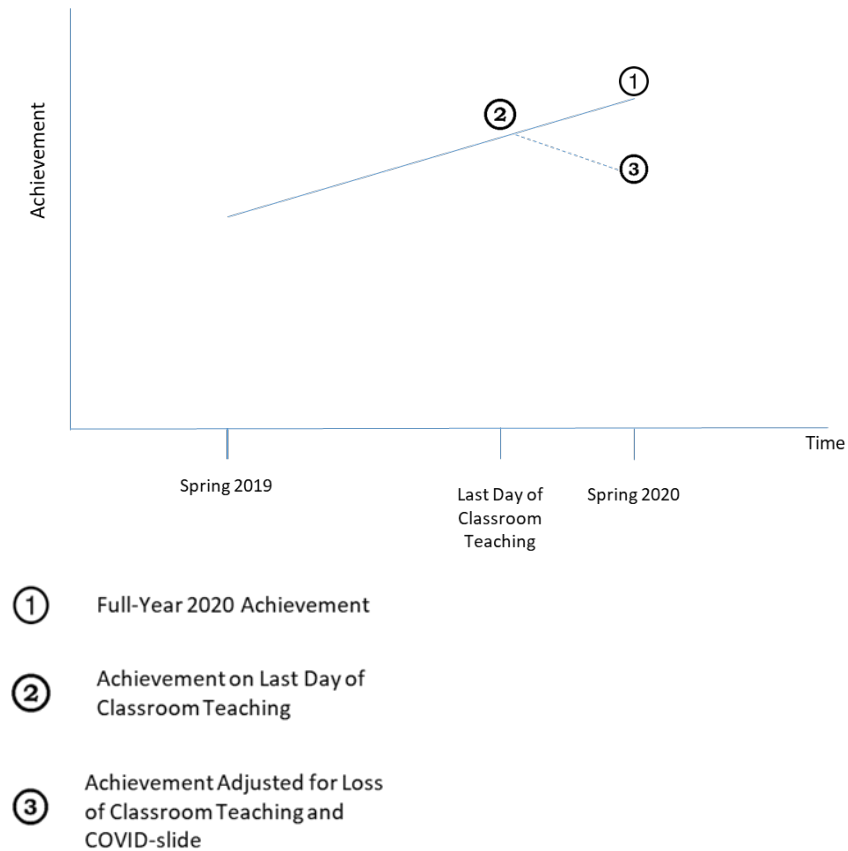
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**Introduction** Since March 2020, a common scene has played out in millions of homes in the United States: parents have looked over the shoulders of their children as they pursue remote learning and have been flabbergasted by what they see. There is no dispute that the coronavirus pandemic slammed educators and policy makers with a herculean task of pivoting from classroom-based instruction to other modalities. At the same time, there is no dispute that the amount and quality of learning that has occurred since school buildings were closed has been deeply inferior. The only open question has been: how bad is it?

This briefing presents estimates of the impact of the coronavirus pandemic on student learning loss for the 2019-2020 school year. The Center for Research on Education Outcomes (CREDO) at the Hoover Institution at Stanford University calculated the magnitude of student-level learning losses on behalf of nineteen our state education agency research partners. They are presented here at the state level to offer a comparative view of not only the size of the losses but the range of losses within each state.

CREDO created estimates of the amount of learning students lost by the end of the 2019-2020 school year due to the coronavirus pandemic. We developed a three-stage simulation of Spring 2020 achievement assessment scores. As shown in Figure 1, we first developed estimates of what achievement scores would have been in Spring 2020 if the pandemic had not occurred, shown as ①. The second series, shown as ②, estimates students' achievement at the point in mid-March 2020 when school buildings were ordered closed. The third set of proxies begins from the mid-March point and adjusts for further learning loss until the end of the school year. CREDO partnered with the Northwest Evaluation Association (NWEA) to jointly develop detailed state-specific estimates of learning losses since March 2020. The third set of estimates, shown as ③, incorporate school-specific factors developed collaboratively with NWEA and based on the summer learning loss students have historically experienced in the past and applies the same pace of loss to the remainder of the 2019-2020 school year.

Figure 1 Schematic of CREDO Simulations of Student Achievement Scores



**Methods** To build estimates of the loss from March 2020 until the end of the school year, NWEA used historical sets of student-level records of assessments using their Measuring Academic Progress (MAP) interim assessment instruments which they aggregated to detailed student groups. CREDO supplemented NWEA’s data with student profile information classified at the school level. This approach assumes that the learning decay that students experienced between the closure of school buildings and the end of the school year would occur at the same pace as the learning loss NWEA has observed for students over the summer months. It also assumes that schooling effectively stopped for the year in mid-March. The pace of decay differs across student groups; for each state, there are 504 possible combinations of student characteristics based on academic grade, subject, percent of students in poverty, and concentrations of English learners or Special Education students. In a few detailed groups, there may be additional growth, as was seen in a small handful of schools that managed the pivot to remote learning smoothly and effectively.

Using the school-level student profiles, NWEA estimated what the loss in learning would be from ② to ③. Where NWEA had sufficient data, state-specific estimates were produced; otherwise, they produced a set of estimates from a national sample of students to use in the remainder of the participating states. CREDO then applied each school-level value to the individual student achievement proxies at the point of school building closure. These resulting proxies are the estimates of 2019-2020 student achievement adjusted fully for the impacts of the coronavirus pandemic, which combines loss of classroom instruction and learning loss over the rest of the school year. This series is the third set of estimates, shown in Figure 1 as ③. A full explanation of the COVID learning loss adjustments is available in Appendix 2.

**Results** For this brief, we present the average learning loss by state. Tables 1 and 2 present these estimates for Reading and Math, respectively. The values reflect the difference in achievement that would have occurred absent the pandemic and the estimated measure of student learning at the conclusion of the school year with the disruptions that did occur. Part of the loss,  $-.1$  std, can be attributed to the lost class-based days of instruction and applies across the board. The remainder of the loss comes from the decay of learning or “slide” associated with out-of-school time.

Since the learning loss estimates are grounded in the projections of missing 2020 achievement scores, the individual student level estimates inevitably carry a higher degree of “noise” than if real assessment scores were used. When the estimates are aggregated, the noise is reduced, but may not be entirely eliminated. Accordingly, these values should be viewed as approximations, not precise point-estimates.

We can provide clearer insight into these values by considering how many school days of learning were lost. CREDO has routinely converted standard deviation units to [Days of Learning](#) based on progress on the National Assessment of Education Progress (NAEP). One standard deviation of achievement equates to 3.22 years of school, or about 580 days. For a typical 180-day school year a  $.1$  std reflects 58 days of learning.

In Table 1, South Carolina is identified as having the largest average learning loss at  $-.316$  std in Reading. North Carolina had the smallest learning loss with  $-.097$  std. Converted to lost school days of learning, North Carolina lost 57 days of learning while South Carolina lost 183 (or a complete school year) in Reading. States and schools differ in estimated learning losses based on the variations in both historical school performance and the degree of achievement slide related to differences in student profiles across schools.

As seen in Table 2, average learning losses in Math were greatest in Illinois, where students lost  $.4$  std in achievement from their full-year estimated values. Wisconsin posted the smallest average loss with  $-.235$  std. Translated into days of learning lost, students in Illinois decline about 232 days (or more than a year) and Wisconsin students lost about 136 days.

The variations within states are also noteworthy. Tables 1 and 2 include columns that display the largest estimate of learning loss and the smallest in each state as well as the range between the two. Recall that these estimates are computed at the school-grade level and applied to every student’s achievement proxy, so the offset is constant for all students in the same grade in a school even though the individual achievement proxies in ③ will vary.

Looking at the learning losses for Reading presented in Table 1, the states showed sharp differences in their within-state variation in learning loss. The largest estimated loss was located in Tennessee where

<b>Table 1: Estimated 2019-20 Pandemic-Related Learning Loss in Reading</b>				
	<b>Overall</b>			
<b>State</b>	<b>Mean</b>	<b>Largest</b>	<b>Smallest</b>	<b>Range</b>
Arizona	-0.146	-0.393	-0.004	0.389
Arkansas	-0.107	-0.493	0.534	1.027
District of Columbia	-0.218	-0.278	-0.096	0.182
Illinois	-0.217	-0.408	-0.111	0.297
Indiana	-0.223	-0.574	-0.007	0.567
Kentucky	-0.209	-0.510	-0.055	0.455
Louisiana	-0.171	-0.278	-0.079	0.199
Michigan	-0.211	-0.615	-0.091	0.524
Missouri	-0.173	-0.459	0.163	0.623
New Jersey	-0.121	-0.291	0.059	0.351
New Mexico	-0.169	-0.278	-0.076	0.202
New York - Upstate	-0.180	-0.269	-0.073	0.196
New York City	-0.215	-0.278	-0.099	0.179
North Carolina	-0.097	-0.715	0.209	0.924
Rhode Island	-0.191	-0.267	-0.099	0.168
South Carolina	-0.316	-0.535	-0.123	0.412
Tennessee	-0.151	-0.734	0.183	0.917
Utah	-0.155	-0.278	-0.073	0.205
Wisconsin	-0.165	-0.478	0.225	0.703
<b>Minimum</b>	-0.316	-0.734	-0.123	0.168
<b>Maximum</b>	-0.097	-0.267	0.534	1.027

Notes:

(1) Columns titled *Mean*, *Largest*, and *Smallest* show the average, minimum value, and maximum value, respectively, of the estimated total learning loss in 2019-20 student achievement in standard deviation units in each State.

(2) Column titled *Range* shows the difference between the smallest and largest (smallest–largest). estimated total learning loss in 2019-20 student achievement in each State.

(3) Row titled *Minimum (Maximum)* shows the minimum (maximum) of the total learning loss statistic represented in each column.

(4) Estimated learning loss at the end of the school year includes both the effect of school building closures and the learning slide.

**Table 2: Estimated 2019-20 Pandemic-Related Learning Loss in Math**

State	Overall			
	Mean	Largest	Smallest	Range
Arizona	-0.299	-0.658	-0.175	0.483
Arkansas	-0.238	-0.482	0.095	0.577
District of Columbia	-0.375	-0.657	-0.198	0.459
Illinois	-0.402	-0.720	-0.212	0.507
Indiana	-0.360	-0.700	-0.193	0.507
Kentucky	-0.297	-0.749	-0.024	0.725
Louisiana	-0.347	-0.631	-0.175	0.455
Michigan	-0.336	-0.772	-0.154	0.618
Missouri	-0.283	-0.783	-0.110	0.674
New Jersey	-0.343	-0.794	-0.022	0.771
New Mexico	-0.359	-0.657	-0.175	0.482
New York - Upstate	-0.386	-0.804	-0.175	0.629
New York City	-0.365	-0.657	-0.175	0.482
North Carolina	-0.335	-0.788	0.035	0.823
Rhode Island	-0.355	-0.657	-0.175	0.482
South Carolina	-0.391	-0.961	-0.116	0.845
Tennessee	-0.273	-0.580	0.028	0.608
Utah	-0.307	-0.657	-0.130	0.527
Wisconsin	-0.235	-0.597	0.124	0.722
<b>Minimum</b>	-0.402	-0.961	-0.212	0.455
<b>Maximum</b>	-0.235	-0.482	0.124	0.845

Notes:

(1) Columns titled *Mean*, *Largest*, and *Smallest* show the average, minimum value, and maximum value, respectively, of the estimated total learning loss in 2019-20 student achievement in standard deviation units in each State.

(2) Column titled *Range* shows the difference between the smallest and largest (smallest–largest). estimated total learning loss in 2019-20 student achievement in each State.

(3) Row titled *Minimum (Maximum)* shows the minimum (maximum) of the total learning loss statistic represented in each column.

(4) Estimated learning loss at the end of the school year includes both the effect of school building closures and the learning slide.

at least one school faced a loss of  $-.734$  std. North Carolina has a closely similar estimate of  $-.715$  std. These contrast with Rhode Island or the District of Columbia, where the largest learning loss was  $-.267$  std and  $-.278$ , respectively. The smallest estimates of learning loss also varied across the states.

NWEA's prior experience with learning slide revealed that in some situations, students not only don't lose learning, they actually gain over the period. Arkansas, Missouri, New Jersey, North Carolina, Tennessee and Wisconsin all had schools for which the impact was positive, with Arkansas having the largest at  $.534$  std. These cases, however, were rare and extreme outliers.

In Math, shown in Table 2, South Carolina had the largest estimated learning loss with  $-.961$  std. The state whose worst learning loss was the smallest was Arkansas with  $-.482$  std. When looking at the best-case estimates of learning loss in each state, most positive estimate of learning loss in Illinois was  $-.212$  std. As with Reading, there were states where schools were estimated to make positive achievement gains despite the interruptions of the pandemic. Some Wisconsin schools posted positive gains of  $.124$  std. Similar positive estimates were obtained for some schools in Arkansas ( $.095$  std), North Carolina ( $.035$  std.) and Tennessee ( $.028$  std).

Looking at both the cross state differences in the average learning loss and the differences in dispersion around those averages, it is not surprising that the range of scores is sharply different across the states, shown in the final columns of Tables 1 and 2. For Reading, the largest spread ( $1.027$  std in Arkansas) is more than six times larger than the smallest, seen in Rhode Island with  $.168$  std. For Math, the largest range seen in South Carolina is not quite double the tightest range seen in Louisiana with  $.455$  std.

**Implications** The findings on learning losses support four general inferences. First, the findings are chilling – if  $.31$  std roughly equals a full year of learning, then recovery of the 2019-2020 losses could take years. Additional losses incurred in the current year further impact the timeline. The underlying variations in 2019-2020 learning losses highlight the fact that school closures had highly differentiated impacts, with disadvantaged students generally suffering much more than students from advantaged families.

Second, the wide variation within states (and often within schools) means that conventional models of classroom-based instruction – a one-to-many, fixed pace approach -- will not meet the needs of students. New approaches must be allowed to ensure high quality instruction is available in different settings, recognizing that different skills may be needed for the different channels.

Third, the need for rigorous student-level learning assessments has never been higher. In particular, this crisis needs strong diagnostic assessments and frequent progress checks, both of which must align with historical assessment trends to plot a recovery course.

Fourth, the measures of average loss and the range around it immediately call into question the existing practice of letting communities plot their own path forward. The communities whose schools have the largest estimated loss of learning are far less likely to have the means and capacity to create and implement recovery plans on their own. Insistence on local autonomy in this case will not yield equitable responses.