How COVID-19 Regular School Closures Could Impact DC Student Proficiency in 2020-21

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EmpowerK12

How COVID-19 could Impact DC Student Achievement

The last regular day of in-person schooling in the District occurred on March 13th. Starting the week of March 23rd, schools embarked on an unprecedented distance learning regimen until at least April 27. While we hope this new venture will be successful for all students, it is prudent for school leaders and policymakers to prepare as though distance learning will not generate similar academic outcomes as the typical school day.

To estimate the influence of extended time off outside the traditional school schedule, EmpowerK12 reviewed relevant research and analyzed DC student data to triangulate possible future student achievement outcomes due to school day cancellations related to COVID-19. We surveyed the literature for research on summer learning loss as well as other recent natural disasters such as Hurricane Harvey and Hurricane Katrina. Then, we compared the similarity of those outcomes with DC-specific data points, including some DC-specific summer learning loss data and differentiated growth for students by attendance rate. Finally, we apply a model based on national research and local data to determine how PARCC achievement rates in 2021-2023 may be impacted.

## What we can learn from national studies on summer learning loss?

As of April 3rd, at least twelve states, including Virginia, have already ordered or recommended the cancellation of the remaining academic year, essentially lengthening the traditional approximately 10 week summer break by an additional two and a half months. While some students receive instruction through camps, summer classes, and family activities during a typical summer break, the rigor and connection to the school curriculum often lack confluence leading to academic regression when school is out. Many schools across the nation are attempting distance learning initiatives of varying degrees during COVID-19 closures. Literature on these types of initiatives is non-existent for now, leaving summer learning loss as one of the best ways we can assess possible achievement impact.

The traditional summer break is essentially a relinquishment of approximately 45 additional instructional days for students during the summer months, June through August, or roughly 25% of the typical 180 instructional days in the school year. Researchers found that students who took the NWEA Measures of Academic Progress (MAP) assessment in the spring and again the following fall at the start of a new school year earned fall scores that were, on average, 25 percent lower in the fall than the spring for math and 13 percent lower in reading. This means students in elementary or middle school grades lose nearly one-fifth of the skillsets they learned the prior school year.

The line charts on the following page show the national average scale score on NWEA MAP in the fall and spring across grade levels.

Subject	Spring Grade	Summer Loss	N-Size
Math	1	-21%	132,062
Math	2	-11%	133,623
Math	3	-11%	135,458
Math	4	-18%	130,077
Math	5	-38%	148,818
Math	6	-35%	165,541
Math	7	-39%	190,705
Reading	1	-17%	131,136
Reading	2	-3%	128,742
Reading	3	-4%	134,519
Reading	4	-3%	134,361
Reading	5	-13%	148,564
Reading	6	-27%	162,887
Reading	7	-25%	194,033

National 2015 Norms on the NWEA MAP by Grade
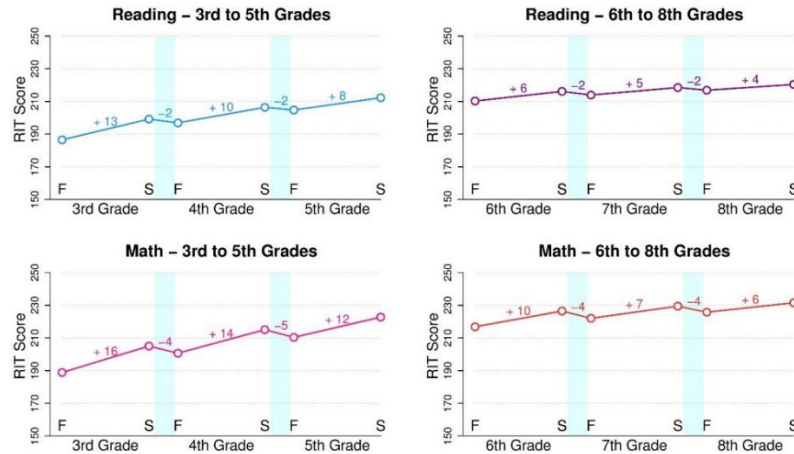
Nationally and within the District, there is some evidence of differential summer learning loss across socioeconomic student groups. Atteberry & McEaching used NWEA MAP scores to look at learning trajectories. In general, students grow during the school year and then regress over the summer with differential summer regression accounting for about 35% of the racial achievement gap. However, there is substantial variation of summer loss – some students gain ground over the summer, while some students lose nearly as much ground as they gained during the school year.

Cooper et al. (1996) reviewed 39 studies and performed a meta-analysis on 13 of the most rigorous studies to determine that typical "summer loss was equivalent to about 1 month on a grade-equivalent scale or about one-tenth of a standard deviation relative to spring test scores." Achievement losses were greater in math and greater for economically disadvantaged students.

Kim & Quinn (2013) also conducted a meta-analysis on 41 studies looking at summer reading interventions. They found significant benefits for low-income children vs middle-income children. This study is a good motivation for the necessity of quality resources for learning at home.

Rambo (2015) looked at differences in reading loss over the summer between higher and lower achieving students. "Average students grew steeply during the school year and gained nothing over the summer. By contrast, initially high-achieving students grew more slowly than average students during school but maintained that same slower growth rate in the summer."

What we can learn from the impact of hurricanes Katrina and Harvey?

Hurricane Katrina and Hurricane Harvey both generated mass flooding that lead to substantial delays in the start of the school year in affected areas. For Katrina, we know how New Orleans was devastated by the flooding, but Mississippi residents were also affected by displacement and school delays. A 2008 Ward et al. study examined the outcomes of displaced Mississippi students who missed an additional 8% of the 2005-06 school year had lower math growth and no statistically different reading growth compared to Mississippi students who were not displaced. Displaced students were also more likely to have behavioral issues and dropout of school.

In 2017, flooding from Hurricane Harvey lead to 3-5 week delays in the start of the school year across many Texas gulf coast districts, including the city of Houston. Students at affected districts attended 8.3% fewer school days that year. Compared to districts with similar demographics and prior achievement levels, students at affected school districts demonstrated 2018 scale score gains that were 7.8% lower in reading and 21.6% lower in math.

What is the impact of summer loss and instruction loss due to lower in-seat attendance in the District?

To address this question, we analyzed summer learning loss and impact of attendance on NWEA MAP and PARCC results from a representative sample of schools that partner with EmpowerK12. The sample of six elementary and middle schools across four wards have achievement and growth data that closely reflects the statewide averages.

Characteristics of DC Sample Schools Compared to the State

	All DC	Sample
Number of Tested Students	37,307	869
Percent At-Risk	45%	38%
Percent Students with Disabilities	18%	14%
Average Growth (GtP and MGP combined)	52.6	53.8
PARCC 4+ Combined	35.4	35.2
PARCC 3+ Combined	59.8	63.7
In-seat Attendance	93.7	96.1
Re-enrollment	81.3	83.4

Summer Learning Loss in Sample DC Schools

Summer learning loss across the sample set of DC schools is generally in line with national norms. However, we do see higher rates of loss for at-risk students and students with disabilities in math than their counterparts. There is a difference between subjects likely due, in part, to the many summer reading initiatives and programs across the District. English Learners do not have different summer learning loss rates than their peers.

Student Group	Math Loss	Reading Loss
All Students	-29%	-15%
At-Risk	-33%	-13%
Not At-Risk	-26%	-16%
SwD	-46%	-10%
Not SwD	-26%	-16%
National Norm	-25%	-13%

Instructional Loss Due to Student Absences

Attendance Rate Group	Avg Days Lost	Math Growth	Reading Growth
98%-100%	1.8	92%	83%
95%-97%	6.1	82%	83%
90%-94%	12.8	68%	73%
< 90%	25.7	65%	69%

We find statistically significant differences in annual growth based on student attendance rates at the sample schools. The amount of growth is generally inversely proportional to the number of days missed. The chart at left is sorted by attendance rate groups and shows the average percent of expected annual MAP growth achieved.

Based on the research and DC instructional loss data, how might COVID-19 affect future PARCC achievement rates in the District?

Based on the local and national data which show similar outcomes, we can expect that for every day of lost instruction the probability a student meets annual growth expectations in math drops by about 1%. In reading, every three days of lost instruction reduces a student's chance of meeting annual typical growth by about 2%. At the aggregate state-level, this likely translates to overall PARCC proficiency declines of about 1 percentage point for every week of lost instruction.

As of today, school will return on April 27 having lost 23 days of typical instruction in the 2019-20 school year. Given the current trajectory of new novel coronavirus cases, it feels likely school will be further delayed. Based on EmpowerK12 projections, here are the likely changes to 2021 PARCC proficiency rates (the next time students take the test) based on this year's loss of instruction days by future student return date as compared to DC's likely trajectory without coronavirus disruption:

2021 DC PARCC Proficiency Rates by Student Return Date to Regular Schooling

Return Date	Math PARCC 4+	ELA PARCC 4+
April 27, 2020	29.6%	34.9%
May 26, 2020	26.6%	31.1%
August 30, 2020	23.6%	27.5%
Prediction No COVID	**34.0%**	**44.0%**

Assumptions and caveats related to the model estimates above:

1) Achievement projections only include grades 3-8. High school is moving to testing in grades 9 and 10, and we do not have complete historical results for all DC students in 9th grade. Also, we did not have access to enough 10th grade testing data to be confident in the model's applicability to high school.

2) The model assumes that distance learning initiatives will have limited effect on average. Even under the best circumstances with ample time to prepare, virtual schooling has shown little evidence of success, especially for low-income and students with disabilities (Woodworth et al., 2015). Equitable access to devices and strong broadband internet is still a challenge in the city's least affluent neighborhoods of Wards 5, 7, and 8. Also, the fidelity of implementation as compared to the typical 6-hour instructional day is likely to be highly uneven.

3) Schools do not add any extra regular school days to the end of the current academic year or to beginning of the 2020-21 school year. The EmpowerK12 online achievement impact calculator tool allows users to adjust school calendar start and end dates to see how achievement rates are likely to change by lengthening the school year to make up for lost time during COVID-19.

4) Also, the model assumes no other major changes in the quality of education in the District and that prior incremental achievement gains will continue when students return full-time.

With the data available to us through our partners, we did not have a sample size large enough to estimate effect sizes specifically for at-risk students and students with disabilities for the state. However, we expect the achievement gap to grow between 2019 and 2021, after experiencing consecutive within-jurisdiction declines the last couple years, given the differential summer loss and virtual schooling research data for those student groups.

What recommendations does EmpowerK12 have for the education policymaking community?

1) Lengthen the school year in 2020-21 and 2021-22 by at least 5% to make up for lost quality instructional time for all students. Another option might be to lengthen the school day. DC schools that already offer extended school year and extended school day have statistically significantly higher academic growth and achievement outcomes for at-risk students.

2) During the remote learning period, ensure teachers prioritize math skills in addition to reading skills as math regression is more acute due to instructional time loss, especially for at-risk students and students with disabilities.

3) We also encourage educators to target social-emotional skills and mental health. Social isolation is likely to be just as tough on children, especially those more frequently exposed to trauma at home. Leading brain science research tells us that we must address these concerns before effective learning can take place, including distance learning.

4) Prioritize virtual site visits for students with disabilities during mandated COVID-19 social distancing, moving virtual visits to in-person when the CDC declares it safe. Disabled students are particularly vulnerable to academic regression while away from school, so the goal is to ensure they receive additional attention and their home environment is setup for success.

5) High school student disengagement tracking during the next several months will be critical to avoid substantial increases in dropouts as has happened after other natural disasters.

6) If distance learning continues beyond April 24 and into May, we suggest LEAs identify ways to monitor distance learning success and utilize April 27-28 as professional development days to step back, analyze engagement and learning data from the last month, intentionally plan for May by breaking the month into two manageable 2-week sprints of content, and utilize improvement science to continuously improve the effectiveness of chosen strategies.

How to utilize the COVID-19 achievement impact calculator tool

EmpowerK12 created a tool to help school decisionmakers better understand the possible academic impact of COVID-19 school closures on statewide PARCC achievement rates. The proficiency projections will adjust based on selected school year start and end times utilizing our robust modeling techniques. It is important to note that the error in the estimates at +/- 4.6% starting in 2021 is decently large and increases a little bit each year.

To make the most out of the tool, use the sliders at the top to adjust the student school year start and end dates for every year. As changes to the calendar are made, the data and statistics in the lower left box will change.
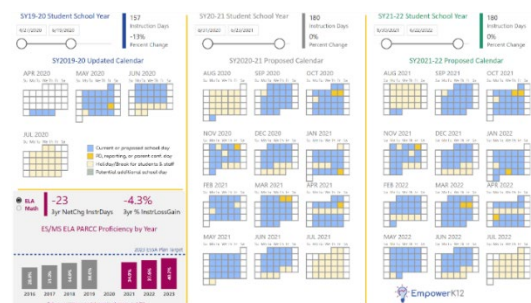
Note: We believe it is likely that adding many extra days to the beginning and end of the school year may have diminished return as students and teachers could experience a burnout effect. As mentioned prior, we expect distance learning to have limited impact based on technological inequities, fidelity of implementation as compared to the typical school day, and national research on virtual schools. Given the likelihood of both effects, we adjusted the linear model by adding a shrinkage estimator to attempt to control for some of the expected variability.

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