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COVID-19 and student learning in the United States: The hurt could last a lifetime

New evidence shows that the shutdowns caused by COVID-19 could exacerbate existing achievement gaps.

by Emma Dorn, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg

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The US education system was not built to deal with extended shutdowns like those imposed by the COVID-19 pandemic. Teachers, administrators, and parents have worked hard to keep learning alive; nevertheless, these efforts are not likely to provide the quality of education that's delivered in the classroom.

Even more troubling is the context: the persistent achievement disparities across income levels and between white students and students of black and Hispanic heritage. School shutdowns could not only cause disproportionate learning losses for these students—compounding existing gaps—but also lead more of them to drop out. This could have long-term effects on these children's long-term economic well-being and on the US economy as a whole.

Despite the enormous attention devoted to the achievement gap, it has remained a stubborn feature of the US education system. In 2009, we estimated that the gap between white students and black and Hispanic ones deprived the US economy of $310 billion to $525 billion a year in productivity, equivalent to 2 to 4 percent of GDP.[1] The achievement gap between high- and low-income students was even larger, at $400 billion to $670 billion, 3 to 5 percent of GDP. Although we calculate these two gaps separately, we recognize that black and Hispanic students are also more likely to live in poverty. Yet poverty alone cannot account for the gaps in educational performance.[2] Together, they were the equivalent of a permanent economic recession.

Unfortunately, the past decade has seen little progress in narrowing these disparities. The average black or Hispanic student remains roughly two years behind the average white one, and low-income students continue to be underrepresented among top performers.[3] We estimate that if the black and Hispanic student-achievement gap had been closed in 2009, today's US GDP would have been $426 billion to $705 billion higher.[4] If the income-achievement gap had been closed, we estimate that US GDP would have been $332 billion to $550 billion higher (Exhibit 1).

These estimates were made before schools closed and the transition to remote learning began, sometimes chaotically. In this article, we explore the possible long-term damage of COVID-19–related school closures on low-income, black, and Hispanic Americans, and on the US economy.

Learning loss and school closures

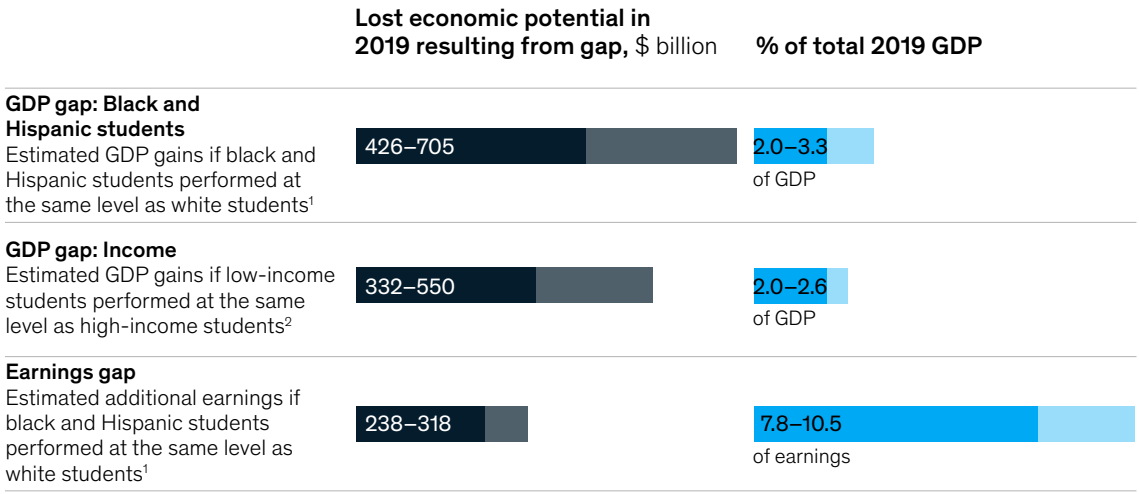
To that end, we created statistical models to estimate the potential impact of school closures on learning. The models were based on academic studies of the effectiveness of remote learning relative to traditional classroom instruction for three different kinds of students. We then evaluated this information in the context of three different epidemiological scenarios.

How much learning students lose during school closures varies significantly by access to remote learning, the quality of remote instruction, home support, and the degree of engagement. For simplicity's sake, we have grouped high-school students into three archetypes. First, there are students who experience average-quality remote learning; this group continues to progress, but at a slower pace than if they had remained in school.[5] Second, some students are getting lower-quality

[1] For both 2009 and 2019, we use $25,000 in annual income (in 2009 constant dollars) as the cutoff between low and high income.
[2] For an analysis of the interaction between the racial and ethnic achievement gap and the income achievement gap, see Byron G. Auguste, Bryan Hancock, and Martha Laboissiere, "The economic cost of the US education gap," June 2009, McKinsey.com.
[3] Erik Hanushek, Paul E. Peterson, Laura M. Talpey, and Ludger Woessmann. *Long-run Trends in the U.S. SES-Achievement Gap*, NBER National Bureau of Economic Research, working paper number 26764, February 2020; S. F. Reardon, "The widening academic achievement gap between the rich and the poor: New evidence and possible explanations," in Greg Duncan and Richard Murnane (Eds.), *Whither Opportunity? Rising Inequality and the Uncertain Life Chances of Low-Income Children*, New York: Russell Sage Foundation, 2011.
[4] The learning gap has remained almost the same between 2007 (the year of the latest data when we published our 2009 report) and 2019. Black students scored, on average, 31 points lower than white students did on eighth-grade National Assessment of Education Progress (NAEP) math assessments in 2007; in 2019 they scored 32 points lower. Hispanic students scored, on average, 26 points lower than white students did on eighth-grade NAEP math assessments in 2007; in 2019 they scored 24 points lower. The increase in dollar values is the result of an increase in proportion of black and Hispanic people in the workforce and higher GDP base value in 2019.
[5] High-quality remote-learning programs are typically the result careful planning and deliberate approaches—which were not typical of the COVID-19 transition.

Exhibit 1

The US economy would be significantly larger in 2019 if it had closed achievement gaps in 2009.



[1] NAEP 8th-grade math score: comparison of average scores of black and Hispanic students with white students.
[2] NAEP 8th-grade math score: comparison between low-income (eligible for free lunch) students and high-income students.

remote learning; they are generally stagnating at their current grade levels. Then there are students who are not getting any instruction at all; they are probably losing significant ground. Finally, some students drop out of high school altogether.

We also modeled three epidemiological scenarios. In the first—"virus contained"—in-class instruction resumes in fall 2020. In the second—"virus resurgence"— school closures and part-time schedules continue intermittently through the 2020–21 school year, and in-school instruction does not fully resume before January 2021.[6] In the third scenario—"pandemic escalation"—the virus is not controlled until vaccines are available, and schools operate remotely for the entire 2020–21 school year.

In our second scenario (in-class instruction does not resume until January 2021), we estimate that students who remain enrolled could lose three to four months of learning if they receive average remote instruction, seven to 11 months with lower-quality remote instruction, and 12 to 14 months if they do not receive any instruction at all (Exhibit 2).

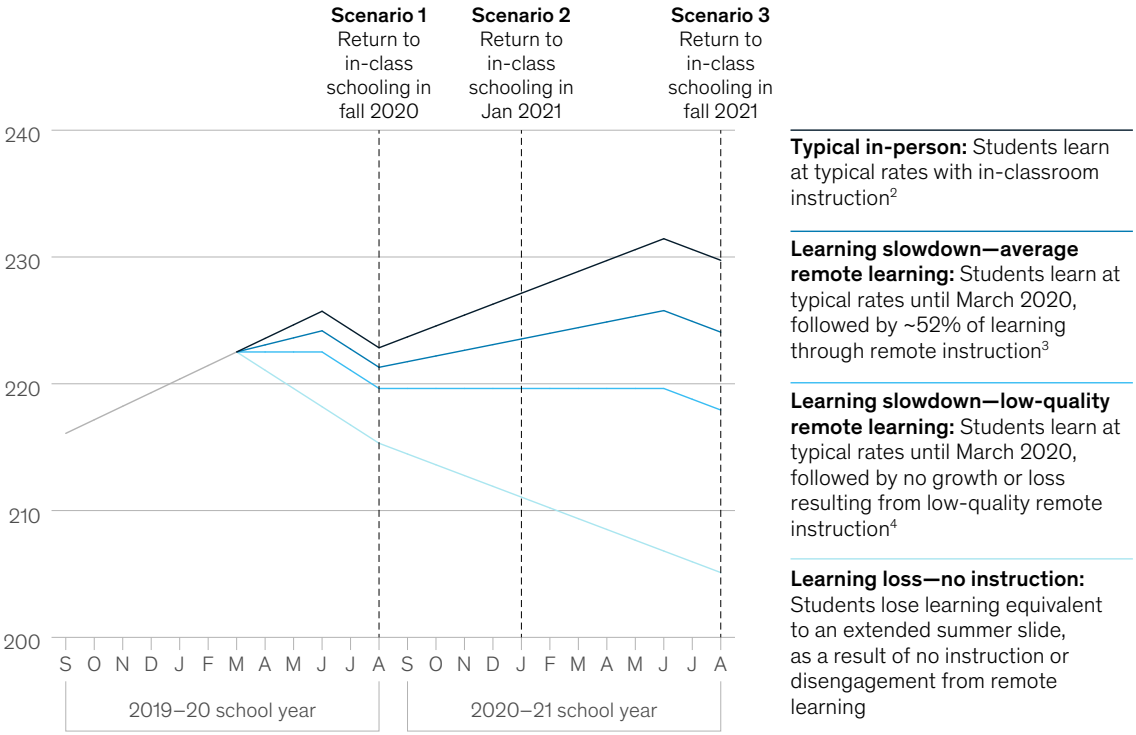
Although students at the best full-time virtual schools can do as well as or better than those at traditional ones,[7] most studies have found that full-time online learning does not deliver the academic results of in-class instruction.[8] Moreover, in 28 states,[9] with around 48 percent of K–12 students, distance learning has not been mandated.[10] As a result, many students may not receive any instruction until schools reopen. Even in places

[6] For simplicity's sake, we have equated this with schools restarting as normal in January 2021, even though the reality is more likely to be a patchwork of different actions.
[7] There is evidence from online-learning providers' internal, peer-reviewed research that some virtual-learning experiences can achieve parity with brick-and-mortar experiences for students, especially those who were struggling academically.
[8] See, for example the 2015 Online Charter School Study of the Center for Research on Education Outcomes (CREDO), credo.stanford.edu.
[9] Alaska, Arkansas, Colorado, Connecticut, Georgia, Hawaii, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Missouri, Montana, New Jersey, New York, North Carolina, Ohio, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, West Virginia, and Wisconsin.
[10] *Politics K–12*, "Coronavirus and learnings: What's happening in each state," blog entry by *Education Week* staff, April 3, 2020, blogs.edweek.org.

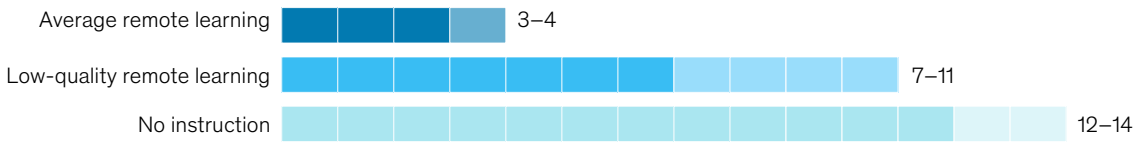
Exhibit 2

In all three scenarios, students are at risk for significant learning loss.

Projected 6th-grade math performance, example, NWEA[1] RIT Scores



Average months of learning lost in scenario 2 compared with typical in-classroom learning



[1] NWEA is a K–12 assessment provider serving over 9,500 schools across the US; their RIT scores are a standardized scaled score that measures student performance and progress.
[2] Normal school year growth rates estimated using NWEA data.
[3] 52% assumed growth for high-quality instruction.
[4] 0% assumed average growth for low-quality instruction. Rates of learning loss may differ by student groups.

Source: Megan Kuhfeld, Dennis Condron, and Doug Downey, *When does inequality grow?*, 2019; Center for Research on Education Outcomes, Online Charter Schools Study, 2015

where distance learning is compulsory, significant numbers of students appear to be unaccounted for.[11] In short, the hastily assembled online education currently available is likely to be both less effective, in general, than traditional schooling and to reach fewer students as well.

Likely effects on low-income, black, and Hispanic students

Learning loss will probably be greatest among low-income, black, and Hispanic students. Lower-income students are less likely to have access to high-quality remote learning or to a conducive

[11] The Curriculum Associates analysis of anonymized data on usage from March to May 2020 of i-Ready software (a personalized learning system typically used as supplemental instruction by classroom teachers), curriculumassociates.com.

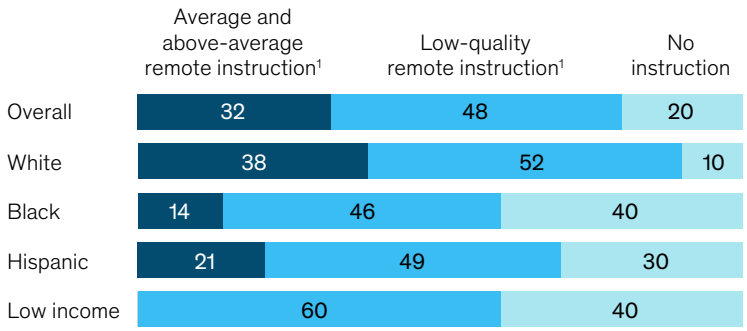
learning environment, such as a quiet space with minimal distractions, devices they do not need to share, high-speed internet, and parental academic supervision.[12] Data from Curriculum Associates, creators of the i-Ready digital-instruction and -assessment software, suggest that only 60 percent of low-income students are regularly logging into online instruction; 90 percent of high-income students do. Engagement rates are also lagging behind in schools serving predominantly black and Hispanic students; just 60 to 70 percent are logging in regularly (Exhibit 3).[13]

These variations translate directly into greater learning loss.[14] The average loss in our middle epidemiological scenario is seven months. But

Exhibit 3

Learning loss will probably be greater for low-income, black, and Hispanic students.

Quality level of remote instruction, % of K–12 students



Black, Hispanic, and low-income students are at higher risk of not receiving remote instruction of average or above-average quality ...

Average months of learning lost in scenario 2 compared with typical in-classroom learning[2]

... and the result is learning loss from student disengagement and/or lack of access

[1] Estimates based on income quintiles, with assumption that top 2 income quintiles receive high-quality instruction.
[2] Includes 0.05 standard deviation reduction for black, Hispanic, and low-income students to account for recession impacts (~1 month of additional lost learning).

Source: US Census 2018

[12] Many parents continue to work full-time outside their homes, so their children may not have an adult at home to supervise their learning; Brooke Auxier and Monica Anderson, "As schools close due to the coronavirus, some U.S. students face a digital 'homework gap,'" Fact Tank, March 16, 2020, pewreasearch.org. Many white-collar workers, however, are able to work remotely and thus provide at least some supervision. Dana Goldstein, Adam Popescu, and Nikole Hannah-Jones, "As school moves online, many students stay logged out, *New York Times*, April 6, 2020, nytimes.com. Also, one in ten public school students in New York City lives in shelter housing, which can mean several children sharing a single room; Anna North, "The shift to online learning could worsen educational inequality," Vox, April 9, 2020, vox.com.

[13] The Curriculum Associates analysis of anonymized data on usage from March to May 2020 of i-Ready software (a personalized learning system typically used as supplemental instruction by classroom teachers), percentage of log-ins as a portion of pre-closure rates on a weekly basis, curriculumassociates.com.

[14] To gauge the proportion of students that may fall into our three learning archetypes by race or ethnicity and by income level, we integrated multiple sources of information, including national surveys of teachers and data on student log-in patterns by race or ethnicity and income estimates to generate the plausibility of the type of instruction that students may receive given the income quintiles of their families. Specifically, "No instruction" estimates based on Curriculum Associates data and press reporting, including Mark Lieberman, "Taking attendance during Coronavirus closures: Is it even worth it?", *Education Week*, May 27, 2020, edweek.org; and Howard Blume and Sonali Kohli, "15,000 LA high-school students are AWOL online, 40,000 fail to check in daily amid coronavirus closures," *Los Angeles Times*, March 30, 2020, latimes.com. High- and low-quality instruction estimates are based on US Census income quintiles (Income Data Tables, US Census Bureau, 2019, census.gov) with the assumption that top two income quintiles receive higher-quality instruction.

These effects—learning loss and higher dropout rates—are not likely to be temporary shocks easily erased in the next academic year.

black students may fall behind by 10.3 months, Hispanic students by 9.2 months, and low-income students by more than a year. We estimate that this would exacerbate existing achievement gaps by 15 to 20 percent.

In addition to learning loss, COVID-19 closures will probably increase high-school drop-out rates (currently 6.5 percent for Hispanic, 5.5 percent for black , and 3.9 percent for white students, respectively). The virus is disrupting many of the supports that can help vulnerable kids stay in school: academic engagement and achievement, strong relationships with caring adults, and supportive home environments. In normal circumstances, students who miss more than ten days of school are 36 percent more likely to drop out.[15] In the wake of school closures following natural disasters, such as Hurricane Katrina (2005) and Hurricane Maria (2017), 14 to 20 percent of students never returned to school.[16] We estimate that an additional 2 to 9 percent of high-school students could drop out as a result of the coronavirus and associated school closures—232,000 ninth-to-11th graders (in the mildest scenario) to 1.1 million (in the worst one).[17]

In addition to the negative effects of learning loss and drop-out rates, other, harder to quantify factors could exacerbate the situation: for example, the crisis is likely to cause social and emotional disruption by increasing social isolation and creating anxiety over the possibility that parents may lose jobs and loved ones could fall ill. Milestones such as graduation ceremonies have been canceled, along with sports and other extracurricular events. These challenges can reduce academic motivation and hurt academic performance and general levels of engagement.[18]

The loss of learning may also extend beyond the pandemic. Given the economic damage, state budgets are already stressed. Cuts to K–12 education are likely to hit low-income and racial- and ethnic-minority students disproportionately, and that could further widen the achievement gap.[19]

The economic impact of learning loss and dropping out

These effects—learning loss and higher dropout rates—are not likely to be temporary shocks easily erased in the next academic year. On the contrary, we believe that they may translate into long-term harm for individuals and society.

Using the middle (virus resurgence) epidemiological scenario, in which large-scale in-class instruction does not resume until January 2021, we estimated the economic impact of the learning disruption. (The results would, of course, be worse in the third scenario and better in the first.) All told, we estimate that the average K–12 student in the United States

[15] *Research brief: Chronic absenteeism*, Utah Education Policy Center, University of Utah, 2012, uepc.utah.edu.
[16] "Declining Enrollment, Shuttered Schools," *Education Week*, September 19, 2018, edweek.org; "Legacy of Katrina: The Impact of a Flawed Recovery on Vulnerable Children of the Gulf Coast," National Center for Disaster Preparedness, Children's Health Fund, 2010.
[17] To create these estimates, we compared data on the effects on drop-out rates resulting from extended school absences, online-only instruction (which can disrupt engagement and student–teacher relationships), and natural disasters. We focus on grades 9 to 11, as many school districts have relaxed testing and other graduation requirements for current 12th-grade students.
[18] Leah Lessard and Hannah Schacter, "Why the coronavirus crisis hits teenagers particularly hard: Developmental scientists explain," *Education Week*, April 15, 2020, edweek.org.
[19] During the 2008 recession, annual academic gains in US counties that suffered the largest shocks to employment fell 25 percent from prerecession levels. These districts disproportionately served poor and black Americans. K. Shores, K and M. P. Steinberg, *Schooling During the Great Recession: Patterns of School Spending and Student Achievement Using Population Data*, 2019.

could lose $61,000 to $82,000 in lifetime earnings (in constant 2020 dollars), or the equivalent of a year of full-time work, solely as a result of COVID-19–related learning losses. These costs are significant—and worse for black and Hispanic Americans. While we estimate that white students would earn $1,348 a year less (a 1.6 percent reduction) over a 40-year working life, the figure is $2,186 a year (a 3.3 percent reduction) for black students and $1,809 (3.0 percent) for Hispanic ones.

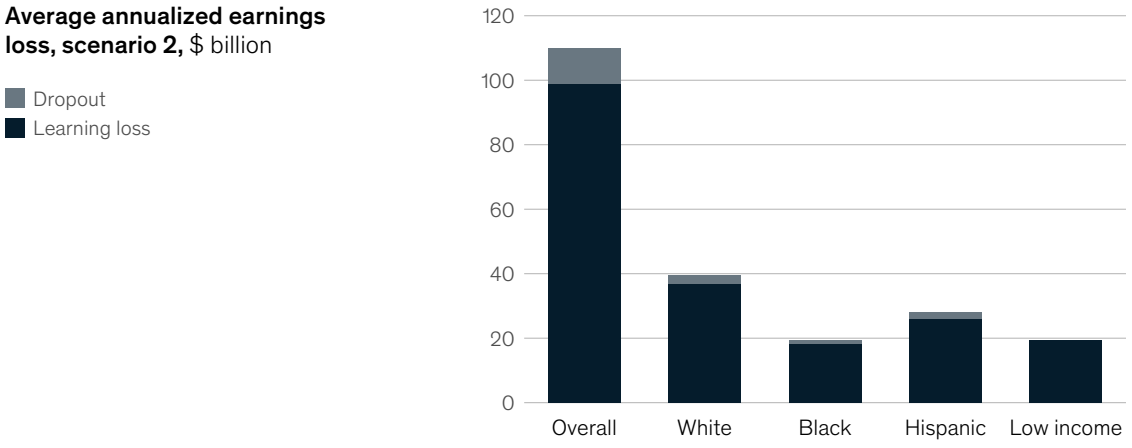
This translates into an estimated impact of $110 billion annual earnings across the entire current K–12 cohort[20] (Exhibit 4). Of that sum, $98.8 billion would be associated with loss of learning and the rest ($11.2 billion) with the increase in the number of high-school dropouts. This is not just an economic issue. Multiple studies have linked greater educational attainment to improved health, reduced crime and incarceration levels, and increased political participation.

The damage to individuals is consequential, but the consequences could go deeper: the United States as a whole could suffer measurable harm. With lower levels of learning and higher numbers of drop-outs, students affected by COVID-19 will probably be less skilled and therefore less productive than students from generations that did not experience a similar gap in learning.[21] Furthermore, if other countries

Exhibit 4

Loss of learning leads to loss of earning.

Average annualized earnings loss, scenario 2, $ billion



	Overall	White	Black	Hispanic	Low income
Estimated effect of learning loss					
Number of students affected, million	55.3	27.1	8.3	14.3	11.8
Average annual earnings lost, $	1,785	1,348	2,186	1,809	1,642
Average lifetime earnings lost, %[1]	2.2	1.6	3.3	3.0	4.0
Estimated effect of higher number of dropouts					
Average number of high-school dropouts, thousand	648	263	114	233	NA
Average annual earnings lost, $[2]	17,218	10,951	11,879	9,280	NA
Average lifetime earnings lost, %[1]	21.2	13.2	18.1	15.2	NA

[1] Assumes 40-year work life with average salary in 2020 dollars, using 2% inflation and 4.4% wage growth rate, average estimate.
[2] Individual earnings on average over a career of 40 years., average estimate.

Source: Bureau of Labor Statistics; Brookings Institute; National Center for Education Statistics; National Center for Children in Poverty

[20] Using projected learning loss onto the National Assessment of Education Progress and its relationship with the country's GDP and earnings. In addition, in all calculations below, we have accounted for the effects of an economic recession on academic outcomes.

mitigate the impact of lost learning and the United States does not, this will harm US competitiveness. By 2040, most of the current K–12 cohort will be in the workforce. We estimate a GDP loss of $173 billion to $271 billion a year—a 0.8 to 1.3 percent hit (Exhibit 5).[22]

A call to action

These numbers are sobering—but they are not inevitable. If the United States acts quickly and effectively, it may avoid the worst possible outcomes. But if there is a delay or a lack of commitment, COVID-19 could end up worsening existing inequities.

It is therefore urgent to intervene immediately to support vulnerable students. Many students will continue to take advantage of free learning resources, but school systems must also think creatively about how to encourage ongoing learning over the summer. Initiatives might include expanding existing summer-school programs, working with agencies that run summer camps and youth programs so that they add academics to their activities, and enlisting corporations to identify and train volunteer tutors. Tennessee, for example, is recruiting 1,000 college students to tutor kids falling behind. New York will be conducting remote summer school for 177,700 students (compared with 44,000 in 2019). Some districts are making digital summer learning available (though optional) to all students.

The necessity of continued remote learning cannot be an excuse for inaction or indifference. There are examples of high-quality online education, and reaching this level should be the general expectation. While no one knows exactly what level of in-class learning will be possible for the 2020–21 school year, many students will probably need to stay home for at least part of it. Educators need to use the summer to learn how to make instruction more effective, whatever the scenario.

Achieving this goal will make it necessary to provide teachers with resources that show them how they can make virtual engagement and instruction effective and to train them in remote-learning best practices. It will also be necessary to work with parents to help create a good learning environment at home, to call upon social and mental-health services so that students can cope with the pandemic's stresses, and to ensure that all students

Exhibit 5

The educational losses caused by COVID-19 could hurt long-term GDP growth.

Estimated impact, by scenario

	Learning loss, months	**Number of additional high-school dropouts,** thousand	**GDP loss by 2040,** $ billion	**Annual earnings loss,** $ billion
Scenario 1: In-classroom instruction[1] resumes by fall 2020	3.1	232	80–125	44–57
Scenario 2: In-classroom instruction[1] resumes by Jan 2021	6.8	648	173–271	96–124
Scenario 3: In-classroom instruction[1] resumes by fall 2021	12.4	1,100	306–483	169–221

[1] Or instruction as effective as in-classroom instruction.

[21] Similar effects have been noted for other generations that experienced major learning disruptions. For example, several studies have shown long-term earnings implications for students whose learning was disrupted during World War II.

[22] Using Hanushek and Woessman 2008 methodology to map national per capita growth associated with decrease in academic achievement, then adding additional impact of COVID drop-outs on GDP.

have the infrastructure (such as laptops, tablets, and good broadband) needed for remote learning.

As a blend of remote and in-classroom learning becomes possible, more flexible staffing models will be required, along with a clear understanding of which activities to prioritize for in-classroom instruction, identification of the students who most need it, and the flexibility to switch between different teaching methods. And all this must be done while school systems keep the most vulnerable students top of mind. That may require investment—something that cannot be taken for granted if state and local government budgets are cut.

The US academic-achievement gap was first identified in 1966. Its persistence is troubling. The possibility that COVID-19 could make it worse deserves focused attention. The achievement gap costs the United States hundreds of billions of dollars—and also exacts a long-term cost in social cohesion. This is a moment—and a challenge—that calls for urgency and energy.

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