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COVID-19 and student performance, equity, and U.S. education policy

Lessons from pre-pandemic research to inform relief, recovery, and rebuilding

Report • By Emma García and Elaine Weiss • September 10, 2020

SECTIONS

Pandemic-relevant research offers key lessons as the education system responds to the coronavirus crisis:

❏ **Research regarding online learning and teaching shows that they are effective only if students have consistent access to the internet and computers and if teachers have received targeted training and supports for online instruction.** Because these needed requirements for effectiveness have been largely absent for many, remote education during the pandemic has impeded teaching and learning.

❏ **Research on home schooling shows that it works well for students for whom intentional, personalized, and sufficient resources are available.** The crisis-induced delivery of home schooling without time for planning around children's learning styles and circumstances means that many children home schooled during the pandemic are not replicating such model and thus not reaping the associated benefits.

❏ **Reduced learning time has likely impeded student learning and also affected the development of the whole child.** Once the pandemic allows it, we will need to make up for this time by increasing both the amount and quality of learning time—through extended schedules, summer enrichment and after-school activities, more personalized instruction, and staffing strategies that reduce class sizes and staff schools with sufficient and highly credentialed educators.

❏ **Research on chronic absenteeism and on remote learning reinforces the urgency of providing appropriate support to children who are least prepared and especially to those at risk of becoming disengaged and eventually dropping out.**

❏ **Research on summer learning (loss or gain) points to the importance of personalized instruction.** The research shows that learning styles and outcomes vary greatly, and that the outcomes are a function of the educational resources that families and systems provide to children across the year and of a large number of factors and circumstances that shape children's learning and development.

❏ **Research shows that a lack of contingency planning exacerbates the negative impacts of recessions, natural disasters, and pandemics on learning.** Contingency planning thus needs to be institutionalized and include emergency funding to replenish the resources drained during emergencies.

What we know about the pandemic's consequences for education so far helps us plan next steps:

❏ **Learning and development have been interrupted and disrupted for millions of students.** The only effective response is to use diagnostic tests and other tools to meet each child where he or she is and to devise a plan for making up for the interruptions.

❏ **The pandemic has exacerbated well-documented opportunity gaps that put low-income students at a disadvantage relative to their better-off peers.** Opportunity gaps are gaps in access to the conditions and resources that enhance learning and development, and include access to food and nutrition, housing, health insurance and

care, and financial relief measures.

- ❏ **One of the most critical opportunity gaps is the uneven access to the devices and internet access critical to learning online.** This digital divide has made it virtually impossible for some students to learn during the pandemic.

- ❏ **The pandemic has exacerbated the limitations of standardized tests, which reward a narrow set of skills and more affluent students who have access to specialized instruction.** Such tests could overwhelm or label children when what they need now are diagnostic assessments and needs-based assessments that assess where they are across a range of domains and what they need going forward.

Informed by our learning, here is a three-pronged plan for addressing the adverse impacts of COVID-19 on education and rebuilding stronger:

- ❏ **Relief:** Give schools urgent resources so that they can provide effective remote instruction and supports at scale during the pandemic.

- ❏ **Recovery:** Provide extra investments to help students and schools make up lost ground as they return to in-school operations.

- ❏ **Rebuilding:** Redesign the system to focus on nurturing the whole child, balancing cognitive with socioemotional skills development and ensuring that all children have access to the conditions and resources that enhance learning and development.

Introduction

The COVID-19 pandemic is overwhelming the functioning and outcomes of education systems—some of which were already stressed in many respects. This is true across the world and affects all children, though to differing degrees depending on multiple factors—including the country/region where they live, as well as their ages, family backgrounds, and degree of access to some "substitute" educational opportunities during the pandemic. In early spring as the pandemic was hitting its first peak, the virus consigned nearly all of over 55 million U.S. school children under the age of 18 to staying in their homes, with 1.4 billion out of school or child care across the globe (NCES 2019a; U.S. Census Bureau 2019; Cluver et al. 2020). Not only did these children lack daily access to school and the basic supports schools provide for many students, but they also lost out on group activities, team sports, and recreational options such as pools and playgrounds.

The shutdown of schools, compounded by the associated public health and economic crises, poses major challenges to our students and their teachers. Our public education system was not built, nor prepared, to cope with a situation like this—we lack the structures to sustain effective teaching and learning during the shutdown and to provide the safety net supports that many children receive in school. While we do not know the exact impacts, we do know that children's academic performance is deteriorating during

the pandemic, along with their progress on other developmental skills. We also know that, given the various ways in which the crisis has widened existing socioeconomic disparities and how these disparities affect learning and educational outcomes, educational inequities are growing (Rothstein 2004; Putnam 2015; Reardon 2011; García and Weiss 2017). As a consequence, many of the children who struggle the hardest to learn effectively and thrive in school under normal circumstances are now finding it difficult, even impossible in some cases, to receive effective instruction, and they are experiencing interruptions in their learning that will need to be made up for.

The 2020–2021 school year is now underway, and with many schools remaining physically closed as the 2020–2021 year begins, there is more we need to understand and think through if we are to meet the crisis head-on. If students are to not see their temporary interruptions become sustained and are to regain lost ground, if teachers are to do their jobs effectively during and after the pandemic, and if our education system is to deliver on its excellence and equity goals during the next phases of this pandemic, it will be critical to identify which students are struggling most and how much learning and development they have lost out on, which factors are impeding their learning, what problems are preventing teachers from teaching these children, and, very critically, which investments must be made to address these challenges. For each child, this diagnostic assessment will deliver a unique answer, and the system will have to meet the child where he or she is. A strengthened system based on meeting children where they are and providing them with what they need will be key to lifting up children.

This report briefly reviews the relevant literature on educational settings that have features in common with how education is occurring during the crisis and emerging evidence on opportunity gaps during the COVID-19 pandemic in order to propose a three-pronged plan. The plan covers the three Rs: (immediate) relief for schools, (short-term) recovery, and (long-term) rebuilding for schools and the education system as a whole.

Children are not in their schools: What should we expect the consequences to be?

The current downturn is unique, and in most ways it is much more severe than any we have experienced in recent history. Almost overnight, the pandemic forced the cancellation of the traditional learning that takes place in school settings. It imposed substantial alterations in the "inputs" used to produce education—typically all the individual, family, teacher, school, etc., characteristics or determinants that affect "outcomes" like test scores and graduation rates. The pandemic has affected inputs at home too, as families and communities juggling health and work crises are less able to provide supports for learning at home.[1] Because there are no direct comparisons to past events or trends, we are without fully valid references for assessing the likely impacts of the COVID-19 crisis on children. There are, however, specific aspects of this crisis that have arisen in other contexts and been studied by education researchers, and we can

derive from them some guidance on topics such as the loss of learning time and use of alternative learning modes.

Here we thus summarize research findings on aspects of education that appear most pertinent to the current crisis. We selected this set of studied conditions because they represent situations in which children are out of school in large numbers or using the unusual learning tools that have become typical in recent months. As discussed in the sections below, however, the sudden, severe, and universal nature of this crisis means that the current contexts in which students are currently "absent," engaged in "remote learning," or "homeschooled" are very different during the pandemic. However, while these findings are only partially applicable to the situations arising during this pandemic, if we dig into why various modes of learning worked or did not work well, it can help guide how to improve learning as education continues under the pandemic—and how to lift children up once schools recover their normal mode of operation.[2]

Decreased learning time has likely impeded student learning

The school lockdowns that started in the spring of 2020 reduced instructional and learning time, which are known to impede student performance, with disparate impacts on different groups of students.

Research on time in school anticipates the consequences of having learning interrupted

International and U.S. data provide a benchmark of what can be considered usual educational progress over a given school year. Here we look at data on reading, math, and science test results of 15-year-old students in countries all over the world from the Programme for International Student Assessment (PISA) run by the Organisation for Economic Co-operation and Development (OECD 2009) and data on a cohort of U.S. children who entered kindergarten in 2010 for the 2010–2011 school year from Early Childhood Longitudinal Study, Kindergarten Class of 2010–2011 (ECLS-K-2010–2011), run by the U.S. Department of Education, National Center for Education Statistics (NCES 2010–2011). From these studies, it has been estimated how much children learn over a school year (to make the estimates of how far the group's average score on skills were at the end of the year from their skill levels at the beginning of a year comparable across studies, we use standard deviations). On average, students advance in their academic performance by between about 0.3 standard deviations (SD) and 0.5 SD to 0.7 SD per year, depending on their age and subject/skill (OECD 2009; own analysis based on NCES 2010–2011).[3] The 2019–2020 school year was cut by at least one third relative to its normal length, which, assuming linear increments in growth over the year and no major other obstacles, suggests a loss of at least 0.1 SD across the board, and larger in earlier grades. These benchmarks will be helpful as we look at the various ways that students have seen their learning interrupted and disrupted this year, and they will continue to do so in 2020–2021.

It is useful as well to examine the research on the length of the school day, which has identified a causal relationship between the amount of (high-quality) instructional time and student performance (Figlio, Holden, and Özek 2018; Goodman 2014; Kidronl and Lindsay 2014; Jin Jez and Wassmer 2013; Marcotte and Hansen 2010). Challenges, though, arise in most evaluations because it is difficult to disentangle the effects of the length of the school day from the effects of starting the school day earlier, or switching to a four-day school week, or to year-round instruction.[4]

Figlio, Holden, and Özek (2018) find that extending the school day by an hour to provide literacy instruction increases reading scores by 0.05 SD in elementary schools. Thompson (2019) explains that school days lost due to weather-related cancellations negatively impact performance (citing Marcotte 2007; Marcotte and Hemelt 2008), and that the positive impact of a four-day school week on performance is due to the longer school day, the increased flexibility, and the expanded total learning time over the year. He finds a negative effect (0.03–0.05 SD) of four-day school weeks on performance in Oregon, where weekly instructional time was lower in the districts adopting this model.

Research on summer learning losses and gains show that these vary widely

Another body of research that speaks to potential lost learning time arises from studies of so-called summer learning loss. In earlier research, researchers consistently found that test scores for low-income students would decrease over the summer, while test scores for better-off students would stay constant or increase slightly (Kuhfeld 2019 based on Cooper et al. 1996).[5] (This pattern has also been referred to in some studies as "slide" or "setback"). A limitation of this earlier research, however, was that the samples represented students who were in school in the 1970s and 1980s—and thus were exposed to very different circumstances than their current counterparts.[6]

The findings from more recent evidence on summer learning are less consistent. One study reveals a substantial learning loss over the summer of about one to two months in reading and from one to three months of school-year learning in math (Kufheld 2019). Others find that, on average, the change in scores over the summer is near zero—which von Hippel, Workman, and Downey (2018) have renamed "summer slowdown" or "summer stagnation." Researchers tend to agree, though, on the fact that there is a large variation in summer learning among students, and on the fact that gaps between students of differing socioeconomic status (SES)—specifically high- and low-SES students—widen (Atteberry and McEachin 2020; Kuhfeld 2019; von Hippel, Workman, and Downey 2018).[7]

Multiple factors are used to explain the variation in these findings. In addition to differences in the educational resources that families provide children across the year, there are a large number of factors that appear to affect learning and are of particular relevance in the current context when trying to gauge the level of learning that has taken place during the pandemic: these findings on summer learning (loss or gain) reflect the great range of learning styles that students exhibit during the summer, or when schools are not in session, i.e., learning styles and outcome levels vary greatly because students

have different innate individual characteristics and their learning and development is shaped by multiple factors and circumstances, in and out of school. This fact will be critically important when schools are back in session in the following two ways. First, when educators measure and assess children's learning, they will need to consider that there are many ways that children learn and many types of knowledge that they acquire beyond math and reading. In other words, teaching and assessing children needs to be done within a framework that understands that each child may have learned differently and may have learned different things. Second, when designing how to best lift children up to make up for the extended out-of-school sessions and disruptions, it will be critical to create more personalized instruction and extend learning (see the policy section at the end of the report).

Research on chronic absenteeism reinforces the urgency of tending children at risk of becoming disengaged

The literature on student absenteeism also sheds light on the relationship between learning and instructional time. The evidence indicates that the negative relationship between absenteeism and student outcomes becomes more intense the more school days that a student misses. Using data from public schools in Chicago, Allensworth and Evans (2016) noted that each week of absence per semester in ninth grade is associated with a more than 20% decline in the probability of graduating from high school. With respect to performance, the disadvantage associated with absenteeism grows as the number of days missed increases: students who missed 1–2 school days, 3–4 days, 5–10 days, or more than 10 days scored, respectively, 0.10, 0.29, 0.39, and 0.64 SD below students who missed no school on mathematics performance for eighth graders (García and Weiss 2018; see **Figure A** reproduced below).

As this correlation between days absent and declining test scores indicates, there also seems to be a point after which the disadvantage becomes much larger. Indeed, researchers put a strong emphasis on "chronic absenteeism" as the critical indicator, as students who are chronically absent are at serious risk of falling behind in school, having lower grades and test scores, exhibiting behavioral issues, and, ultimately, dropping out (Balfanz 2017; U.S. Department of Education 2016; Gottfried and Ehrlich 2018).[8] Indeed, the risk of dropping out is of particular concern for students for whom the pandemic may act as the revolving door but one that ushers them away from the school period (IES 2020; Dorn et al. 2020; Stancati, Brody, and Fontdeglòria 2020; Torres 2020). The United Nations has recently defined this as a "generational catastrophe" (United Nations 2020).

A final point to highlight from this body of research is the range of reasons for, and thus strategies needed to reduce, student absenteeism. There are multiple reasons why students miss classes, as well as large differences in the absenteeism rate among both individual students and student subgroups. Those seeking to develop effective policies to reduce absenteeism, especially chronic absenteeism, understand the need to examine the root causes—academic disengagement, socioemotional distress, economic challenges, health problems, and others. Initiatives that have been rigorously evaluated show that it is critical both to identify the specific reason(s) why a student is missing school and to

The more frequently students miss school, the worse their performance

Performance disadvantage experienced by eighth graders who missed school relative to students with perfect attendance in the last month, by number of days missed (standard deviations)
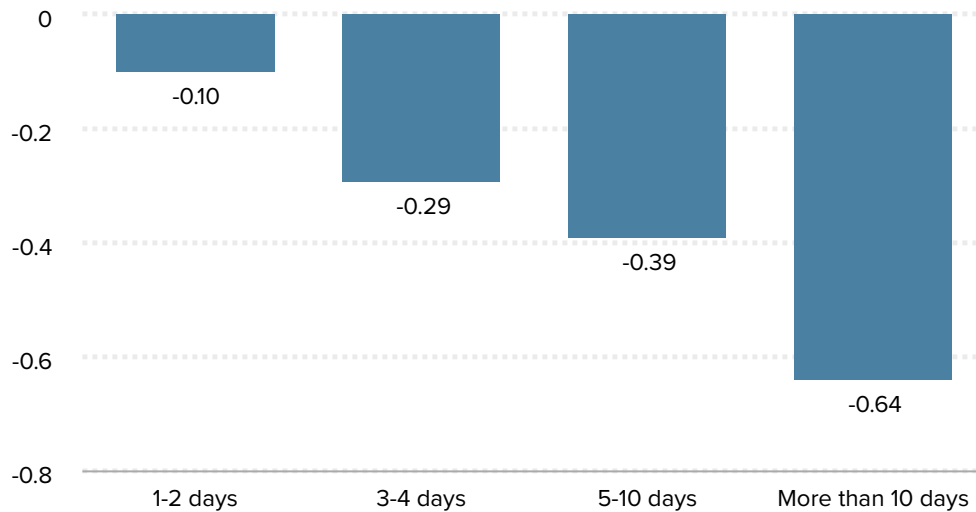
Notes: Data reflect performance in the 2015 NAEP mathematics assessment. Estimates are obtained after controlling for race/ethnicity, poverty status, gender, IEP status, and ELL status; for the racial/ethnic composition of the student's school; and for the share of students in the school who are eligible for FRPL (a proxy for school socioeconomic composition). All estimates are statistically significant at p < 0.01.

Source: EPI analysis of National Assessment of Educational Progress microdata, 2015. Chart adapted from Figure A in García and Weiss 2018.

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respond with targeted, relevant supports.[9] This point is particularly relevant in the current context, in which so many students are frequently absent for a variety of reasons that may be difficult for teachers and schools to know or address.

Of course, the various approaches examined by the research on learning time assume two groups of students: those who are missing some learning time in school and those who are not. (In general, they compare "treatment" versus "nontreatment" groups to estimate impacts.) This comparison does not hold during the lockdown. Instead, *all* students are missing out on in-class instruction, and instead have been attending school remotely via various online arrangements that in some ways resemble homeschooling or online education. As discussed below, the evidence about homeschooling and remote education presents serious limitations, given their very different context, but nonetheless uncovers many issues that we will need to address in post-pandemic education.

Lacking the needed requirements for effectiveness, remote and alternative learning

and online instruction during the pandemic has likely affected teaching and learning

The two main tools for education available to children during the lockdowns have been remote and alternative learning and, at least technically, a homeschooling environment. Evidence on these two modes make clear the conditions that would be needed in order for children to effectively learn under these conditions and for teachers to effectively teach under these conditions. As the following subsections show, most of these conditions have been lacking in recent months.

Research on effective online learning indicates it is critical that students have the tools and the experience

Online learning means, first and fundamentally, the shift from face-to-face learning to the use of devices of various sorts to deliver that learning. Successful online learning thus requires that students (and teachers) be familiar and proficient in their uses of those devices for learning. Of course, even more fundamentally, it requires that the devices exist. Here we discuss the needs of students.

We have limited knowledge about how much and for which purposes students have used devices and technology at home up to this point. An estimated 1.5 million K–12 students participated in some online learning in 2010 (Bettinger and Loeb 2017, based on Wicks 2010).[10] **Figure B** uses PISA data from 2018 for the United States to show that, while students spent extensive time online prior to the pandemic, that time was heavily spent on social activities, browsing or seeking information, playing games, or accessing email. Students spent less time on educational activities, such as school work or communicating with other students or teachers. These findings suggest that over the past few months as children transitioned suddenly to online learning, they did so without necessarily having the practice or experience to learn well online, and that the transition required them to shift their device-use habits from leisure to studying. What we also know is that remote learning demands that children ignore the distractions that are now in front of their faces all the time and to which they, like all of us, are naturally drawn.[11]

In addition to assessing quality and time, the literature on the use of devices assumes that all students have access to appropriate digital devices—i.e., it assumes no digital divide. As has been extensively documented, however, that is not the case. For example, García, Weiss, and Engdahl (2020) show that nearly 16% of eighth graders, or one in six who participated in the National Center for Education Statistics' National Assessment of Educational Progress (NAEP) for 2017, do not have a desktop or laptop computer at home on which to follow their classes. And a small fraction of eighth graders, 4.2%, lack home internet, the other essential instrument for remote study. (It's important to note that the survey questions do not ask about the quality or coverage of the internet access, or the number of computers in the house, and that the information predates the pandemic's arrival. Devices once available for homework may now be shared with siblings or be used by parents for work.[12])

What activities do 15-year-olds use digital devices for out of school and how often do they use them?

Frequency with which 15-year-olds use digital devices out of school for different activities, 2018
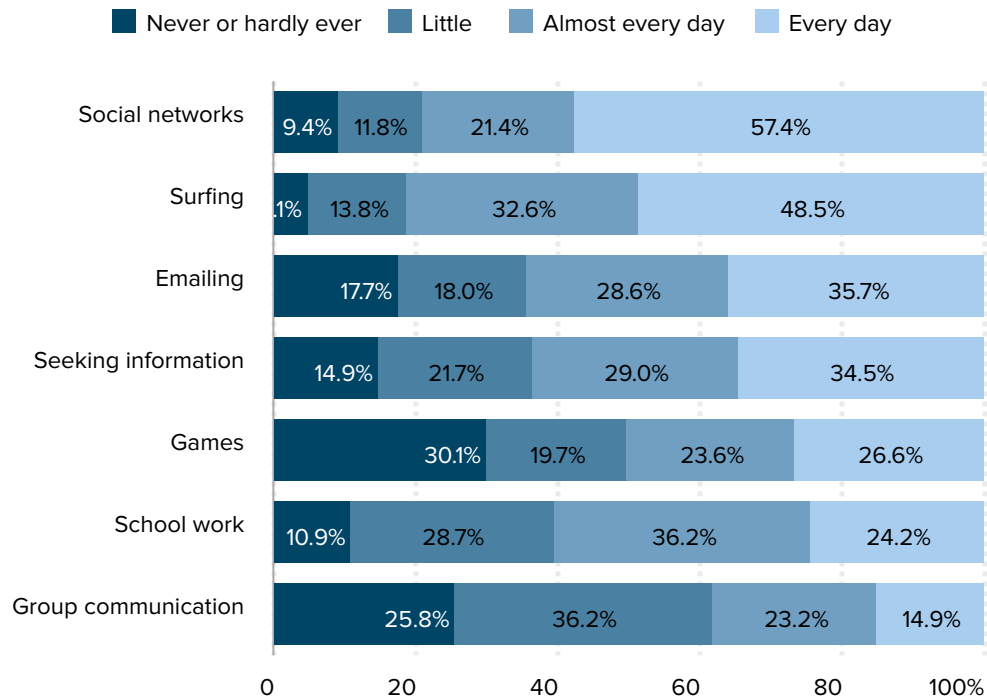
Note: Shares are based on the average use of digital devices out of school for selected activities under each type of activity.

Source: EPI analysis using Program for International Student Assessment (PISA) data for the U.S. (OECD 2018).

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A final caveat is that there is still limited evidence on the effectiveness of online education. A critical aspect highlighted by Bettinger and Loeb (2017) is that online courses are difficult, especially for the students who are least prepared.[13] Research on performance of children attending virtual charter schools confirms the importance of self-engagement and parental supervision for success with this mode of education. Also, selection into these schools (students disengaged with traditional schools enter these schools); worse inputs (teacher-to-student ratios, one-on-one instruction, etc.) than in traditional schools; and other features of these schools translated into negative effects on performance.[14] Later in the report we discuss the requirements for successful online education from the perspective of teachers.

Research on home schooling makes clear that it works well for students under narrow circumstances

According to the NCES, close to 1.7 million students, or about 3.3% of K–12 students, were home-schooled in 2016 (NCES 2018).[15] Parents who home-schooled their children cited the following as the most important reasons for doing so: concerns about the school environment, such as safety, drugs, or negative peer pressure; dissatisfaction with academic instruction at available schools; and a desire to provide religious instruction (Grady 2017).

In terms of its effectiveness, performance of home-schooled students is generally higher than that of their non-home-schooled peers. A review of 14 studies found consistent positive results in 11, mixed results in another study (some positive and some negative results), zero impact in another study, and neutral and negative effects in a final one. The estimate of the effects (based on eight of the 14 studies for which this information was available) ranged from very small (0.05 SD) to extremely large (1.13 SD) (Ray 2017a). Using percentile metrics, home-schooled students scored, on average, at or above the 84th percentile in all subject areas (Ray 2017b).[16]

While these findings may look promising, however, it is important to keep in mind two key considerations when interpreting these results. First, many more resources are devoted to home-schooled children, so they would be expected to perform higher, all else equal. Also, higher performance among home-schooled students may be due more to their selection into the category than the "treatment"/type of education they receive.[17]

Belfield (2004), for example, suggests that the improved outcomes among students who are home-schooled could be due to flexible instruction (without age-tracking), small "class sizes," and dedicated parent-teachers who should make home schooling more effective than other forms of education. He also notes that "educational outcomes may be skewed toward those on which the family has competence, and educational progress may be slow if there is no formative assessment or peer-pressure to learn (although home-school parents may exert more pressure or have higher expectations as a result of their supervision)." More recent studies suggest that parameters such as structured or unstructured instruction may also be important drivers of the results (Neuman and Guterman 2016).

These underlying factors could be particularly relevant in the current crisis. Many of the same stark distinctions between effective and ineffective online education and home schooling would apply to the "emergency remote learning" done at home under a pandemic: students who entered the pandemic better off and those whose parents have been trained in instruction or have a particular ability teach would likely perform better than students whose parents have not been able to develop (or as successful at developing) those skills. In general, parents who were suddenly thrust into the role of home-schoolers had no such preparation; most are taking on that new task while juggling the full range of other home-care responsibilities as well as, in many cases, full-time remote jobs. That said, students whose parents have more formal education likely also have an advantage in this context—as they do in nonpandemic contexts—further

compounding the disparities that low-income students are accruing (see, for example, Dinarski 2020; Rothstein 2020; Belfield 2004; Goldstein 2020a).[18]

Evidence on online instruction emphasizes that teachers also need training and supports

As the discussion of successful versus unsuccessful remote and online learning reveals, there are multiple requirements needed for online education to work as intended and deliver positive results. Just as the requirements for effective student learning have largely not been met during the pandemic, the same is true for effective online instruction.

First, there was little time to design and develop instructional tools for wide deployment.[19] As a recent analysis of research on the subject details,

> Online education, including online teaching and learning, has been studied for decades. Numerous research studies, theories, models, standards, and evaluation criteria focus on quality online learning, online teaching, and online course design. What we know from research is that effective online learning results from careful instructional design and planning, using a systematic model for design and development. The design process and the careful consideration of different design decisions have an impact on the quality of the instruction. And it is this careful design process that will be absent in most cases in these emergency shifts.[20] (Hodges et al. 2020)

Moreover, it is hard to plan and to design effective instruction for the COVID-19 era when teachers and school districts don't have a framework (or even the right language) to accommodate what they are doing. As Hodges et al. (2020) emphasized when exploring how colleges and universities were coping with the sudden and rapid shift to remote learning (in March 2020), understanding the current circumstances required distinguishing between online or remote learning generally. For our current context, they suggested the term "emergency remote teaching," which helps signal the uncertainties and unknowns that could affect teachers' instruction.

Second, weak systems of support, including lack of professional development on how to integrate computers into instruction, have left teachers less than optimally equipped to teach during the pandemic.[21]

Slightly over two in three public school teachers report having participated in professional development activities on the use of computers for instruction in the past 12 months, as shown in **Figure C**, based on García and Weiss 2019 using data from the 2011–2012 Schools and Staffing Survey (SASS).[22] But those who participated in these activities were not broadly satisfied with them. Among these teachers, one in four found the activity very useful, with about one in three finding it either not useful or just somewhat useful. And teachers who participate in such activities have to surmount barriers to do so, as access to work time and supports to participate in professional development are very limited. Among all teachers, only half have released time from teaching to participate in professional development (50.9 percent), and less than a third are reimbursed for
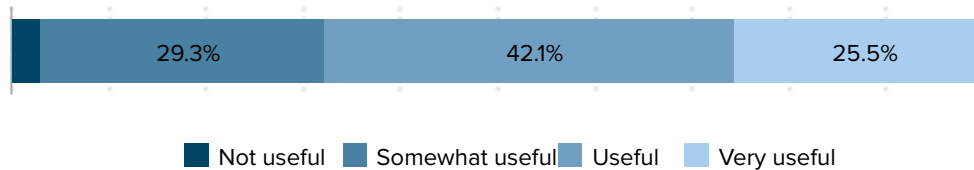
Figure C

Few teachers are well-trained in using computers for instruction

Shares of teachers who said they had training in the past 12 months on the use of computers for instruction

█ Yes   █ No

| 67.7% | 32.3% |
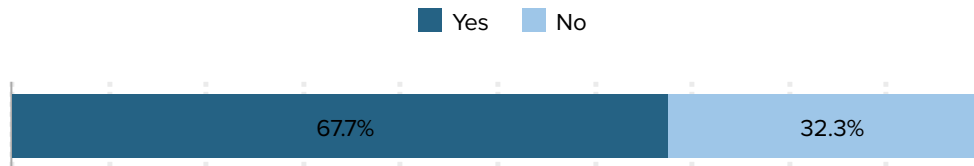
Shares of teachers reporting usefulness of training they received in using computers for instruction

| | 29.3% | 42.1% | 25.5% |

█ Not useful   █ Somewhat useful   █ Useful   █ Very useful

Notes: Data are for teachers in public noncharter schools. The bottom figure shows shares of teachers who answered "very useful," "useful," "somewhat useful," or "not useful" when asked, for the specific professional development activity, "Overall, how useful were these activities to you?"

Source: 2011–2012 Schools and Staffing Survey (SASS) microdata from the U.S. Department of Education's National Center for Education Statistics (NCES). Adapted from García and Weiss 2019.

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conferences or workshop fees (28.2 percent).[23]

The limited training pre-pandemic is compounded by the limited technical support during the pandemic. Most K–12 teachers did not contemplate online instruction until being forced to do so by the pandemic. As a result, teachers have had to come up with a variety of options on the fly, from assigning daily or weekly coursework that students turn in online to full classes conducted via Zoom and a range of approaches in between. We can expect that some of these online strategies launched during the COVID-19 crisis did not lead to optimal outcomes.

Third, inadequate systems for tracking attendance online leave teachers in the dark on a key "input" of education: student learning time. Even the most well-trained teacher when it comes to online instruction won't be effective if his or her students are not online and following instruction. At the most basic level, schools are trying to assess how broadly and consistently students are interacting with teachers and receiving instruction. One ambitious effort has been in Southern Florida, where districts rigorously track attendance and contact parents when students are absent. Quickly recognizing that relying on student log-ins failed to capture much of the activity taking place, districts in Palm Beach County and the Florida Keys ask teachers to log student participation in online forums and completion of assigned work. In general, schools in this system are seeing attendance that

is only modestly lower than normal, with the biggest drop-offs among the youngest and oldest students (who, respectively, need parents' help to get online and are least motivated to take part). However, while the system helps monitor potential race- and class-based disparities in attendance, concerns remain (Bakeman 2020). Attesting the importance of attendance, some school districts that have chosen online instruction for the beginning of the 2020–2021 school year are making registering attendance compulsory through their platforms.[24]

Fourth, the emotional bonds critical to any kind of learning are just as important for remote learning or home schooling but hard to attain in the current crisis. Even more so than college professors, K–12 teachers also need to retain emotional bonds with their students, especially younger ones, that can be extremely difficult to attain remotely. Many of these teachers are also parents and so must juggle their children's activities, such as helping their children with homework, with their own job responsibilities. And teachers working with particularly vulnerable students face additional challenges as some of these students lack access to computers to work or even enough internet bandwidth (see barriers to access described below).

The "whole-child" development that occurs at school was also interrupted during the pandemic

For children, going to school is not just about learning reading and math: it's also about developing the social and emotional skills critical to succeeding in life. School closures eliminated some of these critically important aspects of school beyond academic activity, such as the development that occurs through personal relationships among students and between students and teachers, after-school activities that support children's mental and emotional well-being and skills development, and a sense of routine. In addition to the cessation of their normal activities at school, during the pandemic, children have lost in-person contact with relatives and friends and have witnessed many sobering daily life realities, from parents who may be unsure where the next meal or rent payment will come from or who are working risky jobs in order to make ends meet, to family members fearing that loved ones are in danger of serious illness or even death. Overall, the crisis has helped highlight the importance of other skills that are often overlooked in the school context, but that should be nurtured as part of going to school and that will merit more attention in the aftermath of the pandemic.

A range of skills often referred to as socioemotional or noncognitive skills—including creativity, tolerance, persistence, empathy, resilience, self-control, and time management—have long been neglected in education policy, which has tended to follow the so-called cognitive hypothesis (Tough 2012; Ravitch 2011, 2020; Rothstein, Jacobsen, and Wilder 2008).[25] These noncognitive skills are deemed lower priorities in academic contexts—including skills that children typically lagging behind could have an edge in—and their integration in the usual components of learning and teaching is far from standard. As a result, when decisions about curriculum, standards, and evaluation are

made, socioemotional skills tend to be the last on the priority list and the first on the chopping block, while testing highly on math and reading—skills that tend to be correlated with having more educated parents and higher household incomes—is richly rewarded in school, furthering "deficit" narratives (faulty messages about who can and cannot succeed in school, and about what succeeding in school means).

For sure, parents and teachers have long been attuned to the broad range of life skills that their students need to develop, but this crisis has sharpened that focus. The sudden need for children across the board to adapt to uncertain and rapidly changing circumstances and to cope with new levels of trauma make it all the more urgent to address this disparity between what parents and teachers understand about the breadth of skills critical to child development and systems that focus on testing a narrow set of cognitive skills. For example, resilience—the ability to adapt to and thrive in different situations—along with persistence and self-control have gained new recognition as important life skills during these months of the pandemic. Children transitioned to online learning overnight and have had to follow classes without the direct supervision of the teacher or the interactions with other students, which requires a higher than usual degree of self-control and persistence. Creativity is another skill that likely is serving children well during this crisis: Students who find new ways to keep themselves engaged and to make forced isolation productive are benefiting, while their peers who are easily bored are losing ground.

As we slowly move forward during the pandemic and we return to "normal," it is going to be more important than ever that we do not let this recognition of whole-child development fall away and revert to a narrow focus on academics. Doing so would cause harm on several fronts. First, it would ignore and potentially exacerbate the trauma that many children are experiencing. Second, it would put low-income students even further behind—both by weighing heavily the areas of learning that they have been least able to access and by failing to recognize the natural variation in students' strengths across a broader range of skills, or "patterns of thoughts, feelings, and behavior" (Borghans et al. 2008). And finally it would miss a unique opportunity to better balance what schools can do. Noncognitive skills are demonstrably as important as other cognitive skills when it comes to ensuring that children will thrive both in school and later in life. Moreover, since academic and socioemotional skills develop in tandem, and in recognition of the added challenges during the pandemic, it will be more critical to approach skills development holistically and make teaching and nurturing the whole child central, rather than marginal (see García 2014 and García and Weiss 2016 for a summary of this literature).

Recessions, natural disasters, and pandemics disrupt learning the most when there is no contingency planning

As noted above, prior research on circumstances somewhat similar to the shutdown during the pandemic is important to review—findings from this research may not be directly applicable due to substantial differences in the circumstances, but understanding the mechanisms through which learning occurs under these circumstances, as well as how

to be prepared for the upheaval, is critical to informing our way out of this current crisis and our readiness for future ones. This is particularly the case regarding evidence from the research on "education in emergencies," which examines the provision of education in emergency and post-emergency situations due to pandemics, other natural disasters, and conflicts and wars, generally in poor countries around the world.[26] The practical recommendations from this field have been largely ignored in the education policy arena until now, because they have not seemed to apply in the rich countries.[27] However, there are some exceptions overall and for the United States in particular, including cases of natural disasters such as Hurricanes Katrina and Maria.

The following lessons can be extracted from this research: Emergencies lead to undeniably negative impacts on educational processes and outcomes; the most disadvantaged population subgroups experience the largest, and most lasting, negative consequences; and contingency plans—absent during the ongoing pandemic—are of critical importance. Providing education, often made available because of these plans, leads to positive outcomes to children and societies. Moreover, emergencies tend to strain existing resources, adding additional challenges.

We summarize here a few key findings. For example, by the end of the school year following the devastation that Hurricanes Katrina (August 2005) and Rita (September 2005) brought to New Orleans, the performance of students who were displaced dropped by 0.07 to 0.22 standard deviations relative to what their performance would have been without the hurricanes (this range includes an average across subjects and grades calculated by Pane et al. [2008] and estimates by Sacerdote [2012] on math and reading). Principals reported that students who were displaced were judged more likely than students in the control groups to engage in negative behaviors, such as fighting, violating school rules, arguing, bullying, playing in isolation, and eating in isolation, and more likely to need mental health counseling; they were also judged less likely to engage in positive behaviors, such as participating in before- or after-school clubs or activities, school-sponsored social events outside the school day, or sports teams (Pane et al. 2008). Sacerdote (2012) also found longer-run effects, including rates of college attendance that were one to four percentage points lower relative to trends measured in cohorts not affected by the natural disasters.[28] Importantly, Özek (2020) finds that some of the negative effects of disasters on students mostly vanish after the first year when there is an "adequate compensatory allocation of resources." Among the resources he cites as critical to compensating the negative effects of emergencies on learning are teachers—specifically ensuring that the most effective teachers are working with the most vulnerable students. Although, as noted, Özek (2020) found that first-year effects tend to decline, effects persist in the second year in high-poverty schools and in low-performing schools.

Natural disasters and recessions also create economic shocks. Research exploring the consequences of recessions such as the Great Recession sheds light on ways today's economic crisis is likely affecting children's education. For example, Irons (2009) discusses the ways that "unemployment and income losses can reduce educational achievement by threatening early childhood nutrition; reducing families' abilities to provide a supportive learning environment (including adequate health care, summer activities, and stable

housing); and by forcing a delay or abandonment of college plans." Shafiq (2010) also discusses potential negative effects from economic shocks, such as long hours worked by parents, which "reduces the time that parents can devote to assisting their child with homework, reading, and other educational activities."

Economic shocks in turn lead to cuts in education budgets. Jackson, Wigger, and Xiong (2018) show that spending cuts enacted during the last recession had detrimental effects on education outcomes: the per-pupil spending cuts that states made during the Great Recession (by roughly 7% overall, by over 10% in seven states, and by more than 20% in two states) reduced college enrollment and test scores, particularly for children in poor neighborhoods, and the impacts of these cuts were greater for Black and white students than for Latino students. Jackson, Wigger, and Xiong (2018) estimated that the impacts of such large-scale and persistent education budget cuts are very significant: a $1,000 reduction in per-pupil spending led to a reduction in test scores of about 0.045 standard deviations and a roughly 3 percentage point decline in the share of high school students who go to college. Often, recovery after a shock never fully happens, as explored in more detail later in our report.

The education-in-emergencies research underscores that "contingency plans" are critical to dealing with emergency and post-emergency situations. Specifically during crises arising from war, conflicts, natural disasters, and pandemics, children are displaced often as homes, neighborhoods, and schools are destroyed—and this may threaten survival or inflict some level of trauma upon children.[29] A certain level of preparedness is critical in order to provide an effective response at the onset of a crisis, and to "prepare, cope, and recover" (UN IASC 2007, 2015; Anderson 2020; Azzi-Hucktigran and Shmis 2020).

Although it is expected that countries and their education agencies have a plan to deal with short-run disruptions (i.e., snow days, flu season, etc.), such expectations are uncommon when it comes to contingency plans for larger, longer emergencies. Most information including guidance on planning for education in emergencies comes from several international organizations involved in major, longer-term emergencies. One exception is a reference in a White House publication reviewing assistance provided after Katrina; these words should be heeded in the aftermath of this pandemic:

> Individual local and state plans, as well as relatively new plans created by the federal government since the terrorist attacks on September 11, 2001, failed to adequately account for widespread or simultaneous catastrophes....The President made clear that we must do better in the future. The objective of this report is to identify and establish a roadmap on how to do that, and lay the groundwork for transforming how this Nation—from every level of government to the private sector to individual citizens and communities—pursues a real and lasting vision of preparedness. To get there will require significant change to the status quo, to include adjustments to policy, structure, and mindset. (The White House 2006)

As has been evident in the past few months, there was no national education plan in place to deal with medium-run or long-run emergencies for the scale of COVID-19. Existing plans (as indicated, outlined by international organizations) offer "contingency planning tools" to

ensure appropriate arrangements are made to analyze the impact of potential crises and to respond in a timely and effective way. The strategies suggested are characterized as flexible learning approaches, which reflect the reality that the circumstances and needs vary widely. Continued provision of education is expected to support both learning and the psychosocial well-being of both students and educators (Anderson 2020). Some strategies aim at promoting cognitive, emotional, and social development through structured, meaningful, and creative activities in a school setting or in informal learning spaces that replace the unavailable traditional schools. In other words, these programs are designed to provide support similar to that provided by good school systems on a regular basis.[30]

Clearly, there are potentially relevant aspects of research on emergency education that, where emergency education resembles the COVID-19 situation, could help policymakers identify what needs to be done immediately and going forward to help schools and students recover. Before we discuss these, we devote much of the next section to assessing how this crisis is expected to have worsened impacts on vulnerable subgroups, and to exacerbate inequities overall.

How is COVID-19 exacerbating opportunity gaps (and what steps are schools taking in response)?

The COVID-19 crisis has exacerbated the well-documented opportunity and enrichment gaps that put low-income students at a disadvantage relative to their better-off peers. By opportunity and enrichment gaps, we mean gaps in access to the conditions or resources that enhance learning and development between low-income students and their higher-income peers (with low-income students less likely than their better-off peers to access these conditions and resources). Before we delve into the details, it is important to state that this should not come as a surprise. The baseline operating status of the education system in the United States before the pandemic had severe problems with regard to equity. Put simply, as a nation, we have structured the education system to deliver the disparate outcomes that it delivers, i.e., outcomes that differ by social class, minority status, and other student characteristics: "It's not a coincidence or accident" (ASI 2020).[31] Here we briefly describe a few of the gaps that are most directly relevant to students' abilities to learn during the pandemic: basic needs, economic relief, and support for families and health. We also discuss how the pandemic has exacerbated the limitations of standardized assessments, especially when used to measure performance gaps in education.

There are two important caveats to this discussion. First, any recent statistics are preliminary (and likely quite conservative). Second, there are, of course, other gaps that we are not able include here—for example, in wealth through homeownership or toxic stress linked to structural racism (Lerner 2020; Morsy and Rothstein 2019)—but that are interacting with and compounding those factors that we are able to examine. As leading

education and civil rights organizations summarizing the breadth of the opportunities and enrichment gaps note, "the transition to educating students in their homes or shelters has exposed and exacerbated inequities in education, food security, and housing that have long existed" (AFT, LDF, and Leadership Conference 2020). We add health and mental health to that list, and we emphasize the critical role schools play as part of the social safety net and as the first responders to children's basic needs (Kirk 2019; Weiss and Reville 2019; ASI 2020).

The pandemic has exacerbated opportunity gaps associated with uneven access to food and nutrition, shelter, health insurance, and financial relief measures

The disruption caused by the pandemic and the interruption of the normal operation of schools continue to pose barriers to meeting the most basic of children's needs (access to food and nutrition and shelter). Families' resources also have been largely impacted by the economic downturn that followed the disruption. There is overwhelming evidence that low-income children and their families have much less access to nutrition and shelter, that children of color and children from immigrant families are disproportionately affected, and that this lack of access has palpable consequences for their development. It is no secret that the inequities are built into our economic and policy setups, and that these inequities affect children's development as well. The school shutdowns and economic crisis caused by the pandemic are exposing and exacerbating these challenges.

Evidence on expanded opportunity gaps due to lack of access to food and nutrition

In 2013, as the United States was still recovering from the recession of 2007–2008, half of all public-school students were eligible for free or reduced-price school meals (SEF 2015; Carnoy and García 2017). In other words, years into the economic recovery, a record share of one in two public-school students lived in a household that was unable, absent government support, to consistently feed them. With millions of adults newly out of work due to the economic shock of the coronavirus pandemic—and federal relief insufficient, slow, and difficult to access—many more children are now in food-insecure homes (i.e., they have limited or uncertain access to adequate food, as measured by responses to survey questions about access to food).

Using data from the new Household Pulse Survey (HHPS) from the U.S. Census Bureau, 29.8% of respondents with children were food insecure (Schanzenbach and Tomeh 2020). Bauer (2020) estimates that there were almost 14 million children living in a household characterized by child food insecurity during the week of June 19–23, 2020, "5.6 times as many as in all of 2018 (2.5 million) and 2.7 times as many as during peak of the Great Recession in 2008 (5.1 million)."[32]

The data about food insecurity is backed up by news reports showing record levels of visits to food banks during the early part of the pandemic and the shortage of resources to meet the demand for food. According to Feeding America, one in seven Americans relied on food pantries before the pandemic, with demand doubling or tripling in many places in the first weeks of the crisis. By late April, less than two months into the pandemic, food pantries in Chicago and Houston were almost out of staples, and one third of New York City's food banks had closed due to lack of supplies, donations, and/or volunteers (Conlin, Baertlein, and Walljasper 2020).

Schools continuously tried to fill the void to the extent they could, with buildings that were closed for instruction reopening as places to collect, prepare, and distribute meals. Some schools were serving breakfast or dinner or are giving out weekend meal "packs" for students, and many provide meals for older and younger siblings as well. For example, schools in Anne Arundel County, Maryland, served an average of 8,000 meals—three per day—for the first 39 days of the pandemic, hitting the one million mark on May 12. District Superintendent George Arlotto said of the importance of supporting his students, "We know if we're not serving meals they might not be getting fed, at least certainly not three meals a day" (Streicher 2020).

However, difficulty matching meals to parents' schedules and lack of sufficient transportation to deliver meals limited many districts' ability to serve the students they normally serve. Across the Denver metro region, district capacity during the first month of school closure starting in March spanned a wide range, serving just 12% of students in the largest and lowest-income district, Denver; 16% in Jeffco; 34% in Aurora; and 57% in the Adams 12 Five Star Schools district (Meltzer, Robles, and LaMarr LeMee 2020).

Across the country overall, the networks set up to provide meals left out a large proportion of children. "Only 61.0% of parents whose families received free or reduced-price meals during the school year reported receiving school meal assistance during closures," noted Waxman, Gupta, and Karpman (2020), who also found that 17.2% of parents living with children under age 19 reported receiving charitable food in May 2020.

Evidence on expanded opportunity gaps due to lack of access to shelter

In addition to children who are especially vulnerable during the pandemic because they rely on schools for basic food and nutrition are children who are homeless. Data show that before the pandemic began, large numbers of students in districts across the country were homeless.[33] For this numerous group of students, getting an education remotely is unthinkable. With millions of adults newly out of work due the economic shock of the coronavirus pandemic—and eviction bans expired or expiring in localities around the country—unstable housing is putting the challenges of educating homeless students into starker relief. Some school districts are paying attention to the needs of their homeless students. In San Jose, California, for example, some schools are expected to be open for counseling and in-person instruction for homeless and special needs students (Lambert, Burke, and Tadayon 2020). The United States Interagency Council on Homelessness

(USICH 2020) has issued some general guidelines as to how school districts can work with local public health officials and community partners to identify temporary, safe, and stable shelter options for families or youth experiencing homelessness who must quarantine. The agency also provides guidance on ensuring homeless children's access to remote education while schools are closed.

Evidence on expanded opportunity gaps due to unstable employment and lack of access to financial relief and health insurance

Loss of work has hit families across the board, as initial unemployment shocks in the travel and entertainment industries expanded to shut down restaurants, retail, and even some of the health care sector shortly after the pandemic started. While some of those jobs have returned, we still have extremely elevated rates of unemployment and loss of health insurance. And low-income parents are in particularly tough situations because of the low-paying and unstable nature of their jobs. Those who lost already-precarious non-standard jobs (like "gig" work and other independent contracting work) don't qualify for unemployment insurance (and many had trouble accessing emergency unemployment benefits because of outdated state systems). Further, many workers around the country who had job-related health insurance lost it just when they needed it most (Cooper and Worker 2020; Bivens and Zipperer 2020). While Congress passed relief measures earlier in the pandemic, some key components of relief—such as the extended unemployment benefits—have expired, and further measures are at this writing stalled in Congress (Gould 2020a; Shierholz 2020). Not granting the needed economic relief and not granting more support for families is going to add to the challenges of parents who have dual responsibilities of supervising children's learning and putting food on the table and providing them with health protection.

Evidence on expanded opportunity gaps due to health challenges for families

The pandemic obviously also raises the possibility that children's families and children themselves are grappling with illness and even death. Research shows that the health risks are higher for workers in low-paying professions than for workers in high-paying professions because the former are much less likely to be able to work remotely (Gould and Shierholz 2020). Moreover, essential workers—such as warehouse stockers, home health aides, and delivery and trash truck drivers—now risk contracting COVID-19 while still struggling to survive on low wages.[34]

Thus it is not surprising that this crisis has also resulted in an increase in the number of children who face the serious illness or death of a relative. It seems likely that a large share of low-income students and Black and Hispanic students now resuming schooling have suffered major trauma. With Black students losing family members in disproportionate numbers, the pandemic is exacting a particular toll on these communities (Harper 2020). For example, in Georgia, where African Americans make up just 30% of the

state's population, they represent over 80% of COVID-19-related hospitalizations and more than 50% of deaths (Weiner 2020). When New York City was the epicenter of the pandemic in the United States, the heavily white borough of Manhattan had a hospitalization rate of 3.31% and a death rate of 1.22%—the city's lowest—despite having the oldest residents of any of the city's five boroughs, while the heavily low-income, African American borough of the Bronx had the highest rates, 2.24% and 6.34%, roughly double those of Manhattan (Wadhera et al. 2020).[35]

Evidence on expanded opportunity gaps due to health challenges for students

These same groups of students—Black and Hispanic students, and low-income students—suffer academically due to physical and mental health problems that are less likely to be addressed in a timely and consistent manner (Ghandour et al. 2018; Menas 2019; Morsy and Rothstein 2019). Many rely on school-based health clinics, a critical resource that is no longer available in schools where teaching is not occurring on site. Earlier in the pandemic when access to doctors' offices was severely limited (with many serving only urgent cases) and hospitals were overwhelmed (and perceived as unsafe), problems from toothaches and ear infections to emotional breakdowns went untreated and, in many cases, became much worse. When the state of Florida shut down in late March, for example, it banned all nonemergency medical and dental services, leading to questions as to whether even check-ups conducted prior to procedures were permitted (Boca News Now 2020).[36]

With both physical and mental health on the line for stressed-out students, school districts are trying to leverage newly available resources to compensate. These include additional Medicaid resources provided in the first federal COVID-19 relief legislation, the Families First Coronavirus Response Act. That act temporarily increases the federal Medicaid match to states that agree to maintain current eligibility standards and cost-sharing requirements and limit disenrollment. Relaxed guidelines enable states to use some of that money for telehealth services without additional authorization, so students can see doctors remotely as needed. The federal CARES Act that was enacted in March provides $13.2 billion for K–12 schools as part of Title I funding, and it includes several aspects of student health in allowable uses. The Los Angeles Unified School District has used some of that funding to launch a mental health hotline for students. Superintendent Austi Beutner notes, "Their world has been turned upside down and we need to make sure students have the support they need [during this crisis]" (Jordan 2020a).

All of the above challenges, of course, mean more stress. And for children who were already living in cramped and less-than-ideal situations, having all family members in the house makes the regular challenges of daily life much greater. Increased incidences of abuse due to confinement, stress, and lack of access to outside support further affirm the urgency of addressing the stressors that are affecting families and, in turn, their children's development and ability to learn (Stratford 2020; Greeley 2020; Tolerance Trauma 2020).

The pandemic has exacerbated opportunity

gaps in teaching and learning

It is in these challenging contexts of economic insecurity and housing instability that students (and teachers) were suddenly transitioning to remote learning, adding another class- and race-based disparity in education opportunity: the "digital divide." The "digital divide" refers to the fact that some children do not have access to the devices or internet services needed to operate online—and there is a double digital divide that arises from the fact that low-income children and Black and Hispanic children are more likely to lack this access (García, Weiss, and Engdahl 2020; Tinubu Ali and Herrera 2020). Research on the digital divide counters the idea that all children can access online instruction and the education system shifted to online education. Given the resurgence of COVID-19 cases over the summer and the growing number of school districts announcing plans to begin the 2020–2021 school year totally remotely, the divide would only continue in the imminent future. Some low-income families are struggling to obtain a computer or other device for each child, with a share of families lacking an internet connection enabling children to do assigned work online or a quiet space to do solo work (let alone attend the Zoom calls that classrooms are now conducting; see Hodges et al. 2020).

Our analysis of data from the 2017 National Assessment of Educational Progress shows that digital devices are not universally available or used at home for school-related purposes. Our findings are presented in **Figure D**. Specifically, 84.4% of eighth graders overall, and 76.3% of poor eighth graders have a laptop or computer, which means that about 16% of eighth graders and 25% of poor eighth graders have no desktop or laptop at home. In addition, only about half of eighth graders had experience using the internet at home frequently for homework, with a much larger share of non-poor students (56.1%) than poor students (46.4%) accustomed to using the home internet frequently for homework (a gap of 10 percentage points). (We define poor students as students who are eligible for the federal free or reduced-price lunch programs, and non-poor students as students who are ineligible for those programs.)[37]
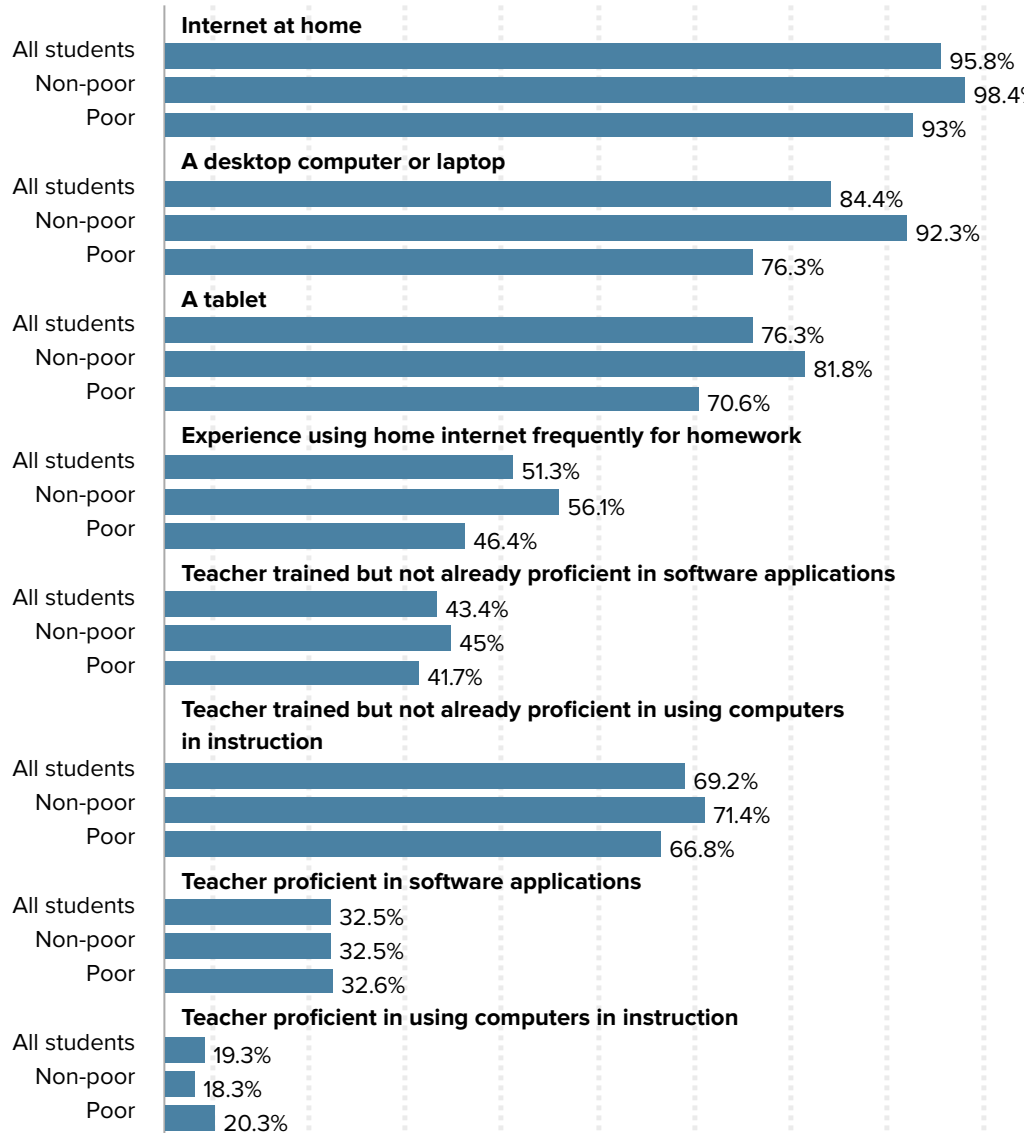
Our analysis of 2017 NAEP data also shows that teachers are not universally prepared to teach online, as also shown in Figure D. Just about a third (32.5%) of eighth graders overall have teachers who consider themselves proficient in using software applications, and only a fifth (19.3%) have teachers who consider themselves proficient in integrating computers into instruction. The shares of students overall with teachers who don't consider themselves proficient but who have received some training in applications and in computer use in instruction are higher (43.4% and 69.2% respectively). Yet that still leaves nearly a quarter (100% minus 43.4% minus 32.5%, or 24.1%) of eighth graders with teachers who are neither proficient in nor trained in software applications, and close to one in eight (100% minus 69.2% minus 19.3%, or 11.5%) with teachers who are neither proficient in nor trained in how to integrate computers into instruction.

A Southern Education Foundation report on class- and race-based disparities during the COVID-19 crisis finds similar disparities in access to the resources needed for online learning. It notes that nearly one in five African American children and a slightly greater share of children in low-income households have no access to the internet at home

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Not all students are set up for online learning, and students who are poor have less access to key tools

Share of eighth-graders with access to online learning, by income level and tool, 2017

Internet at home
| | |
All students — 95.8%
Non-poor — 98.4%
Poor — 93%

A desktop computer or laptop
All students — 84.4%
Non-poor — 92.3%
Poor — 76.3%

A tablet
All students — 76.3%
Non-poor — 81.8%
Poor — 70.6%

Experience using home internet frequently for homework
All students — 51.3%
Non-poor — 56.1%
Poor — 46.4%

Teacher trained but not already proficient in software applications
All students — 43.4%
Non-poor — 45%
Poor — 41.7%

Teacher trained but not already proficient in using computers in instruction
All students — 69.2%
Non-poor — 71.4%
Poor — 66.8%

Teacher proficient in software applications
All students — 32.5%
Non-poor — 32.5%
Poor — 32.6%

Teacher proficient in using computers in instruction
All students — 19.3%
Non-poor — 18.3%
Poor — 20.3%

Notes: Poor students are students eligible for the federal free or reduced-price lunch programs. Non-poor students are students who are ineligible for those programs. Frequent use of internet at home for homework means every day or almost every day. Students' teachers were either "already proficient" in, "have not" received training in, or "had received training" in "software applications" and "integrating computers into instruction" in the last two years.

Source: 2017 National Assessment of Educational Progress (NAEP), eighth-grade reading sample microdata from the U.S. Department of Education's National Center for Education Statistics. Chart adapted from Figure D in García, Weiss, and Engdahl 2020.

Economic Policy Institute

(Tinubu Ali and Herrera 2020). These disparities mirror those reported by superintendents who responded to a survey by AASA, the School Superintendents Association, in late March as schools across the country were closing down (Rogers and Ellerson Ng 2020).[38] Numerous news outlets reporting on the digital divide have also noted these disparities by race and ethnicity (for example, see Kamenetz 2020b). School shutdowns and associated internet- and device-access challenges have been occurring at a time when many of the public libraries that have been a resource for families without computers or home internet access are closed due to the pandemic.

School districts are trying hard to take these challenges into consideration and to make up for the large disparities they know their students face. Some, like Montgomery County, Maryland, are sending home Chromebooks and tablets, prioritizing students who are eligible for free- and reduced-price lunches or are known not to have devices at home (St. George 2020). Others, like New York City, are lending iPads to students who need them (NYC Department of Education 2020). All of this takes time, however, and many districts lack the resources. (Montgomery County provided paper packets to students for the first few weeks of closures, until it could distribute the Chromebooks.) Some districts are making online work optional, as a way to not further disadvantage students who physically cannot do it, but of course that can weaken schools' capacity to continue to instruct.

Tinubu Ali and Herrera (2020) also report on dozens of innovative strategies districts have employed to overcome some of these disparities. These strategies include deploying roving school buses that add Wi-Fi coverage in South Carolina, the purchase of thousands of additional hotspots in Texas, and two months of free internet in Caldo Parish in Louisiana thanks to a partnership between Comcast and the local NAACP. (Comcast is also providing free access in Montgomery County, Maryland.) In Tennessee, Staples is printing and distributing printed materials free of charge to students who cannot afford the cost, and public schools in Jackson, Mississippi, are developing a package of learning materials that are paper-based or online and shared via the state's educational programming television channels. South Carolina's public television network is providing free virtual professional development sessions on home learning and technology best practices. In Miami-Dade, one of the most diverse school districts in the country, instructions for families are provided in English, Spanish, and Creole.

The pandemic has exacerbated the limitations of standardized tests

Digital divides and disparities in parental resources are fueling the growth of opportunity gaps that likely will make it harder for disadvantaged students to engage with their schoolwork and easier for these students to lose interest in school. If so, the pandemic will also widen performance gaps between disadvantaged students and their better-off peers and increase graduation and school dropout rates among disadvantaged students, particularly if districts don't adjust practices to reconnect with these students.

Thus, one practice that may need adjusting or revisiting is testing. During the pandemic, traditional assessments—which have limited value even in normal contexts—are much less

useful in capturing what students know and have learned. These assessments could feel "overwhelming or condemning to children" at a time when it is necessary to create opportunities for students to show what they know and to demonstrate where they are, and for teachers to adjust instruction to students' current development in order to advance their development and potential (RESEARCHED 2020, NPE 2020). As set forth above, students have very uneven access to the online resources they need to take tests, let alone complete them effectively. Similarly, students have uneven access to the special instruction and supervised practice that help students pass these tests—with lower income students and Black and Hispanic students less likely to have access than their higher income and white peers. This means that standardized testing during the pandemic will deliver results that are, by design, going to be even more closely correlated with life circumstances than is true during periods of regular classroom instruction. Compounding all of the barriers to meaningful and equitable monitoring and testing during the pandemic, teachers in remote settings lack the tools that they have when they are in their classrooms to interpret test results. In other words, in a classroom, teachers are more able to distinguish between a low score likely due to the student's lack of understanding of the material versus a low score due to the student's frequent absences, emotional distress, or other factors. As a result, teachers working remotely are hard-pressed to respond to a test score with an appropriate strategy to support the student.

For all of these reasons, traditional standardized tests have limited value in this context and may do more harm than good.[39] Rather, school districts should be using tests that are designed to assess where students are across a range of areas and to help teachers meet students there. These tests include diagnostic tests, formative tests, SEL assessments, and assessments that can be performed remotely such as project-based assessments and capstone projects.[40] These types of tests will be critical to helping students and teachers alike start to dig out of the academic hole dug by the COVID-19 shovel.

Going forward: Translating what we have learned into a plan for the "three Rs" of relief, recovery, and rebuilding

Throughout the coronavirus pandemic, we have made choices about how to sustain, or provide relief to, the education system. We have also had the opportunity to consider how best to proceed as we start to recover, and how to rebuild the system by taking more decisive action on substantial, long-needed changes. Indeed, how well we rebuild the education system will determine how well we address the impacts the pandemic has had on our human capital and how prepared we are for shocks of this nature in the future.

As noted above, students have seen their normal learning and development interrupted and disrupted. Inevitably, this will lead to lost ground during the pandemic, with disadvantaged students particularly vulnerable given the way that the pandemic has compounded large existing opportunity gaps. We propose a set of targeted education interventions and comprehensive services to lift up disadvantaged children and reduce inequities as we move out from this pandemic. This plan tackles today's **three Rs—relief, recovery, and rebuilding**—with a phased three-stage process that must be properly funded at each stage.

Specifically, this three-pronged plan requires making the necessary investments to 1) put school systems on a solid footing to provide effective remote instruction and supports at scale as the crisis continues to play out (the "relief" phase); 2) make new investments to help schools and students compensate for lost time and ground during the period of quarantine (during the "recovery" phase); and 3) lay the foundations for a shift toward an education system that understands the complexity of education production and its multiple components, untaps children's talents, works equally for all students, and reflects the value we place on education as a society (in the "rebuilding" phase). This plan will require substantial amounts of resources and strong collaboration and effort.

If the Great Recession is any indicator, competition for resources will be fierce. In fact, early indicators are that this public health crisis will pose enormous challenges for states and local governments, those responsible for over 90% of the school systems' revenue.[41] Moreover, we entered this crisis in a more difficult position than in the Great Recession (based on a comparison with what we learned from the 2009 federal stimulus, and from the fact that about half of the states as of 2016 had yet to return to the level of per-student spending that they had attained prior to the Great Recession).[42]

With state budgets at historic crisis levels and the economy continuing to struggle,[43] the prevailing narrative will likely be an even more severe version of "we can't afford that" than what we experienced in the aftermath of the Great Recession. It will therefore be more important than ever to meet that assertion with the fact that "we can't afford not to." All of the evidence we have amassed demonstrates that not spending costs far more, and

delivers far less, in the long run, than making the needed investments.[44]

Underlying the fiscal barriers to making the needed investments in education is a lack of leadership at the federal level that makes it very difficult for states to do what is needed. So far, there has been insufficient, scattered attention to education from policymakers, but even that has had a marked political tone that fails to acknowledge challenges or provide required resources.[45]

Relief: Give schools urgent resources so that they can provide effective remote instruction and supports at scale during the pandemic

During the pandemic, schools have been challenged with not only fulfilling their main roles of educating our children but also serving as a key part of the safety net: Specifically, to some degree, schools have provided not just remote education but also supports like meals, health services, counseling, and, in some cases, housing. Given the fact the schools are not universally going to be resuming standard operating procedures in the foreseeable future, policies must be enacted to enable all schools to provide effective remote instruction and supports consistently, and at scale.

While states and school districts are critical players in the relief stage, most of the calls for action involve the federal government because states and school districts are not only overstrained but also facing imminent budget cuts caused by the pandemic, with an inability to incur deficit spending.

Congress must resume consideration of additional relief measures and pay more attention to schools and associated public supports, including child care, social services, food and nutrition supports, and physical and mental health care—devoting substantially larger shares of, and sufficient, funding to these needs. At a minimum:

- Every school must be equipped and have the necessary resources, in conjunction with both public and private community institutions, to feed children (and, as relevant, their families) for as long as the current crisis demands.
- Federal aid that enables schools to provide counseling and other mental health supports should be expanded and extended to meet the large and growing needs of our students.
  - These needed services include the various wraparound supports specific to physical and mental health services, and to countering the various negative impacts of the crisis on the mental and emotional health of both students and educators.
- Every school district must develop a system to monitor what its students need in order to be able to learn while remote education prevails.
  - During the first months of the pandemic, the lack of preparation to cope with the lockdowns meant that many children lost access to the most basic needs. School

districts must coordinate with state and local agencies and partner organizations to assess students' needs so that districts understand their students' situations and can respond accordingly.

- Every school district must be provided with resources and technical support to narrow the digital divide, in terms of both internet access and equipment (computers, tablets, etc.)

  - Unlike during the first months into the pandemic, access to online education must be universal.

  - Schools must be equipped to do needs-based monitoring of students' status in terms of internet access; their access to computers and other technology tools for online learning; and students' capacity to make effective use of the tools they have. This type of diagnostic assessment of technology and access is critical to understanding the degree to which students can engage with instruction on a regular basis and is foundational to their ability to learn.

- The remote instruction students receive needs to be of high-quality, and to attend to unique needs including those of special-needs students and English learners.[46]

  - District and school leaders should provide teachers with the necessary training and preparation to avoid unstructured instruction and the kind of "trial-and-error" instruction many had to employ during the first months of the pandemic.

  - District and school leaders should survey teachers as to the specific professional development and other supports they need to teach effectively in these adapted contexts, and Congress should allocate federal aid to ensure that all teachers obtain the needed support.[47]

  - Given that many teachers, like other "essential workers," must balance instruction with attending to other household realities, including parenting their own children, Congress should ensure that support for child care is included in key relief measures.[48]

In the "relief" phase, schools must also have the resources they need to safely operate with partial on-site instruction if the health protocols allow for doing so.

- Every school district must have established a plan to meet the COVID-19 required safety measures, following the guidance from public health experts and educators.[49]

  - These plans at the very least must include communicating, educating, and reinforcing appropriate hygiene and social distancing practices in ways that are developmentally appropriate for students, teachers, and staff; maintaining healthy environments (e.g., cleaning and disinfecting frequently touched surfaces); repurposing unused or underutilized school (or community) spaces to increase classroom space and facilitate social distancing, including outside spaces, where feasible; developing a proactive plan for when a student or staff member tests positive for COVID-19; conducting case tracing in the event of a positive case; etc.

- Every school district must receive the resources to ensure the safety guidelines are

disseminated, understood, and followed. Ensuring that guidelines are followed includes providing the financial resources and the equipment so that members of the school community are protected, the facilities are cleaned, and staff members have what they need to be safe.[50]

Recovery: Provide extra investments to help students and schools make up lost ground as they return to in-school operations

When schools resume their operations back in the classroom, it will be critical to fully understand which students have been engaged and to what degree, how much they have learned, and where they have fallen behind. But for meaningful teaching and learning to take place, educators must first be able to assess their students' well-being and readiness to learn. Once they achieve that, educators will need sufficient, appropriate resources and tools to enable students to catch up and continue their development.

- School districts and the broader education system must prioritize diagnostic- and curriculum-embedded assessments, pausing or waiving upcoming state and other performance assessments to allow teachers to meet students where they are.[51]
  - Careful use of well-designed diagnostic tests will be critical to preparing and equipping schools and teachers to do their jobs, which will include adjusting instruction as necessary, and thus to helping students make up for disrupted education.
  - These assessments can also provide critical help to teachers who are trying to prevent disengaged students from ending up dropping out of school.
    - Using diagnostic assessments to assess the needs of the pandemic can provide a model for using assessments more appropriately in the future—i.e., as formative and informative tools of teaching and learning, rather than as evaluative tools of judgment.[52]
  - Teachers must receive training in interpreting diagnostic assessments and using them to enhance instruction.
    - Educators must receive training not just on diagnostic testing but also on benchmark testing, project-based learning, capstone projects, and performance assessments, with a focus on remote instruction and trauma-based instruction.[53]
- School districts must implement strategies to retain highly credentialed teachers, especially those at high risk of not returning because of the coronavirus.
  - COVID-19 is expected to boost early retirements, especially among teachers who are closer to retirement and among those in the highest-risk groups, and voluntary attrition, especially among those teachers who faced major obstacles in their work during the first months of the pandemic. These risks could also affect other staff at schools (e.g., nurses, paraprofessionals, principals) and come at a

time when more personnel are needed. Budget constraints could further deplete the teaching and education workforces.[54]

- Schools and teachers must anticipate the need for more personalized learning, especially in 2020–2021, with a particular emphasis on the students who experienced the most interrupted learning time and the greatest challenges during the coronavirus crisis.

  - Flexible approaches will be necessary: Children learn differently, and they underwent different challenges during the pandemic. Remote learning is less effective for children who are less prepared (i.e., without full access to computers and other equipment, without experience using devices for school work, with fewer supports, and with less likelihood of being engaged).

  - More intensive interventions and strategies will be needed for students identified as at heightened risk of dropping out altogether.

  - Providing more flexible and personalized interventions for students will require more, better, and targeted investments in professional development for teachers so that they are equipped to deliver personalized learning.

- Systems must be redesigned to support students' and teachers' social and emotional learning.

  - The coronavirus crisis created serious challenges to students' well-being and development that require a response focusing on their social and emotional learning, health, and well-being.[55]

  - Through their positive relationships with students, and through more specialized knowledge about social and emotional learning (SEL), teachers can contribute to the social and emotional learning of students. Therefore, improving training and support for teachers, teachers' aides, and other school staff members in SEL will be critical to helping students regain their footing after the coronavirus crisis.

  - Supporting students' social and emotional development will also require increasing the number of school nurses (clinics), counselors, social workers, paraprofessionals, etc., with a focus on both students' social and emotional learning and their mental and physical health. Other practices at school (curriculums, etc.) can be enhanced to support social and emotional learning.

- The education system must explore other strategies that will allow children to make up for their interrupted education, drawing on the literature review presented earlier in this report. For the 2020–2021 school year and summer:

  - Schools should consider increasing both the amount and quality of learning time through a number of options, including extended schedules (in particular for those students lagging behind), summer enrichment programs that support the whole child, and staffing strategies that reduce class sizes and staff schools with sufficient and highly credentialed educators,[56] including teachers' aides and tutors, whether in person or online.

  - Schools should also consider ensuring access to and quality of online instruction, if online education is going to be used on its own or in conjunction with

traditional instruction. In keeping with the recommendations in the "relief" section above, online instruction needs to be better tailored (especially for those who are least prepared), of high-quality, and accessible to all students. Similarly, schools need to provide supports for teachers who had not been prepared on how to use technology for instruction. Teachers should be enlisted in helping to create online instructional tools and policies.[57] Finally, districts and teachers must apply "an equity lens," to target tools and resources to students who experience the biggest opportunity gaps (i.e., students who lack digital access or who suffer more from nutrition challenges or housing instability).

Rebuilding: Redesign the system to focus on nurturing the whole child and on equal provision of opportunities

Major crises provide unique opportunities to rethink the status quo. In the aftermath of the coronavirus crisis, policymakers must seize the opportunity to address structural problems in the educational system and invest new and different approaches. This should be a pathway toward establishing a system that ensures we meet the student, teacher, and school needs that we have been neglecting and make delivering excellence and equity in education the norm. Delivering equity in education requires addressing the major disparities in student outcomes by race and social class that arise in a system designed to deliver disparities in educational opportunities. The bottom line is, we must seize this moment to redesign the system to deliver the excellence and equity needed for every child to be able to thrive.[58]

- Education policy and systems must embrace a whole-child approach to education. The pandemic has crystallized the lack of sufficient balance in the types of instruction and supports that schools prioritize.

  - Going forward, the education system must better balance what we teach, how we teach it, and how we reward the full range of skills that matter for and define a child's development and education. The institutions that create education policy and practice must make many changes to ensure that schools teach and reward the development of cognitive and socioemotional skills. The shift begins with recognizing that skills of both types are mutually supportive, not mutually exclusive.[59]

  - A whole-child approach to education would include policies and practices that also close both opportunity and enrichment gaps.

    - For example, a whole-child approach that embraces and employs a broader range of assessments, and uses these assessments for "formative and informative" purposes, rather than for judging and sorting students, would also go a long way to closing the gaps. This shift recognizes that traditional tests are designed to capture only a narrow slice of what children know and can do, and that these tests are biased toward the types of skills that are closely correlated with parents' socioeconomic status, not necessarily, and

not exclusively, children's potential.

- Education policy must also acknowledge and address the impacts of poverty and of racial and economic segregation on students' capacity to learn and on teachers' abilities to do their jobs.

  - School districts must conduct a detailed needs assessment of the district overall and of each school in the district, identifying where poverty and all other stressors that are intertwined with poverty impact the ability of children to learn, and mapping out community resources that can be leveraged to meet those needs. And it means working through a variety of channels (and with a variety of partners) to close the opportunity and enrichment gaps that have long impeded progress for low-income students, students of color, and students from immigrant families and communities.[60]

  - Education systems must tackle head-on the school- and district-based disparities that mirror and compound the disparities that children experience at home. In high-poverty schools, and in schools serving larger shares of minority students, there is generally less access to the education "inputs" that lead to good outcomes, whether it is highly credentialed teachers, access to after-school programs, access to AP classes, positive ways of dealing with discipline issues, etc. A broad range of tools and resources must be deployed to close gaps by types of school on all fronts, making education funding more adequate and more equitable.

  - School systems and their community partners must also establish a flexible set of strategies to offer wraparound supports—such as health clinics, community gardens, and parenting classes—tailored to the specific features of the community and the diversity of the communities serving our 55 million students across the country.

- Administrators and institutions must treat teachers as professionals whose knowledge and experiences are a valuable resource for improving education.

  - All the institutions in the education system and society at large must value education and educators and treat teachers as professionals. Teachers' judgement is critical to identifying what children and educators need. School districts and education institutions must improve the types and usefulness of the professional development and supports offered to teachers, to allow them to keep up with advances in research on effective teaching and face the challenges of the job. Teachers must also be given more of a say in the decisions affecting their jobs and careers, from the materials they use in their classrooms to the types of training they receive. Valuing educators also includes paying them at a level commensurate with what similar college-educated workers earn in other professions. Research shows that taking these steps can help attract professionals to teaching as a career and help prevent them from retiring or quitting their schools and the profession.[61]

- Policymakers must recognize that education policy alone cannot ensure that all children have the foundation they need to get a good education. We need an

economic agenda to accompany the rebuilding that lifts all children up and closes the opportunity gaps that are educational and not educational in nature. Children in low-income families—often children of color—lack many of the resources that their higher income and white peers have, which puts them at a disadvantage before they even enter their classrooms. Some opportunity gaps can be addressed by strengthened education policies. But the ones of a different nature would call for better public policies and a stronger economic agenda.[62]

- Finally, policymakers at all levels must establish and fund contingency plans for the next time we experience a crisis as disruptive and overwhelming as the coronavirus pandemic, whether that occurs in the next handful of years or further into the future.

Conclusion

Despite the fact that we do not know exactly how the COVID-19 pandemic is affecting children's needs and academic performance, we know enough from existing research on learning during somewhat comparable educational experiences, and from news and observations of how education is being produced during the crisis, to assess the likely consequences on educational outcomes both overall and for relatively disadvantaged subgroups.

We reviewed the research on what to expect when children experience a substantial loss of learning time, when schools make a sudden shift to remote learning and home schooling without meeting the conditions for their effectiveness, and when circumstances lead to a massive increase in stress and disruption for children and their families. We also reviewed evidence that has emerged during the crisis on the multiple challenges that children, their teachers, schools, families, and communities face, all of which exacerbate opportunity gaps. Indeed, the evidence points to disparities in opportunities that exacerbate existing inequities and place major stress on low-income students and their teachers, in particular. Due to the digital divide and many other factors, these children are most likely to lose more substantial learning time. And their families are also most likely to experience compounded stresses—such as job loss, the loss of health care, the lack of paid sick leave, the lack of child care, and the need to work on site in "essential" jobs that put them at health risks: all these factors make it much harder for these families to attend to children who are suddenly home schooling and struggling with ad-hoc efforts at remote learning.

Together, the lessons learned point to the need to enact an agenda that lifts up children and reduces educational inequities after the interruption to schooling due to the coronavirus is over. The agenda must also rebuild the system so that lifting up children and reducing inequities in education become the new norm. To accomplish this, we outline a three-stage response. The first stage is immediate relief for students and educators so they can function better in the early 2020–2021 school year as remote learning continues in some form for many children. The second stage is significant short-term investments during the recovery that will enable students whose education was interrupted by the coronavirus crisis to catch up and continue their development. The third stage is longer-

term reforms to rebuild the education system so that the challenges documented here are corrected and the system finally delivers an excellent, equitable education to *all* children.

In the rebuilding phase, it is essential to establish an education system that embraces a whole-child approach, addresses the impacts of poverty and inequality on students' capacity to learn and on teachers' abilities to do their jobs, offers a flexible set of wraparound supports to mitigate the impacts of the inequities that are built into the system, values education and educators, and creates viable contingency plans for future crises.

In closing, the ultimate consequences of the pandemic for K–12 education in the United States will indeed be a function of the quality, intensity, and comprehensiveness of our response to counter the pandemic's negative lasting effects. Indeed, our call for relief, recovery, and reform has a historical precedent. As Darren Walker, president of the Ford Foundation, recently noted:

> During the Great Depression, President Franklin Delano Roosevelt affirmed the need for relief, recovery, and reform—in that order. Today, we must follow these same steps—beyond reform to a broader, deeper reimagination of our society. (Darren Walker 2020).

This societal reimagination certainly encompasses a reimagination of our education system. With the right vision, we can actually ensure that public education plays a critical role in restoring the human and social capital in our country and in readying us for the next challenges, big or small, that we may confront in the future. Our children and our future depend on it.

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Acknowledgments

Endnotes

1. For references on production of education, see Coleman et al. 1966; Hanushek 1979; Todd and Wolpin 2003.

2. Note, too, that we do not offer an in-depth review of these very extensive bodies of work, but rather use them to better understand what it is at play and to frame what we should anticipate the next-phase and post-pandemic outcomes to look like.

3. Students in grades kindergarten and first, for example, experienced larger gains as measured by the ECLS-K assessments in math and reading between the fall and the spring of those years. For example, our descriptive analysis of the ECLS-K 2010–2011 data suggests that students gain an average of 0.7 SD in kindergarten. For a discussion on spring to spring gains by grades (average of 0.45 SD across grades), see Bloom et al. 2008.

4. These kinds of challenges and trade-offs may also be relevant to the decisions schools will need to make for 2020–2021. For example, von Hippel (2020), when discussing school instruction that spans 12 months, explains that although year-round calendars increase summer learning, in most cases they reduce learning at other times of year, so that the total amount learned over a 12-month period is no greater under a year-round calendar than under a nine-month calendar.

5. Assessing a seminal study by Alexander, Entwisle, and Olson (2007), based on a sample of Baltimore students who were tracked from first grade in 1982 to age 22, Kuhfel explains that most of the test-score gap by socioeconomic status (SES) in ninth grade was explained by "differing summer experiences in the early elementary years."

6. The more recent research also discusses several technical challenges that would require some concern about the findings. For example, there were characteristics of the tests used to assess skills before and after the summer that made them not comparable, or that made the tests more difficult in the fall than in the spring; very small samples in particular contexts; and other caveats. See von Hippel and Hamrock (2019) and von Hippel, Workman, and Downey (2018).

7. Atteberry and McEachin (2020) find that slightly over half of the students lose nearly all their school-year progress but the rest of the students actually maintain their school-year learning. Kuhfeld (2019) similarly finds that the summer loss is not generalized, but points to a larger loss overall, with around 60–80% of students losing ground in the elementary school grades (and an even larger share with respect to math). Kuhfeld (2019) also finds that the slide is larger in higher grades than in lower grades, and that performance gaps between minority and nonminority students did not increase, but gaps between students in high-poverty versus low-poverty schools increased significantly but by a small amount (at most, students in high-poverty schools lost one week of learning). The two studies (Atteberry and McEachin 2020 and Kuhfeld 2019) use the NWEA's MAP Growth reading and math assessments. von Hippel, Workman, and Downey (2018) estimate that during the summer, performance gaps by socioeconomic status slightly increase for children in their first years in school. Our own exploratory analysis of the ECLS-K 2010–2011 data coincides with finding most students experience gains during the summers (both in math and reading), and that the performance gaps widen between low- and high-income children (using household income as a proxy for socioeconomic status). See also Quinn et al. 2016.

8. Definitions of chronic absenteeism vary by study, school district, etc. They typically are based on the number of days or a share of days missed over an entire school year, and they are only available on a yearly basis. For example, the U.S. Department of Education (2016) defines chronically absent students as those who "miss at least 15 days of school in a year." Elsewhere, chronic absenteeism is frequently defined as missing 10% or more of the total number of days the student is enrolled in school or missing a month or more of school in the previous year (Ehrlich et al. 2013; Balfanz and Byrnes 2012).

9. Some examples are J-PAL 2017, Jordan 2019, and Balu 2019.

10. This 1.5 million figure is of course not completely illustrative today because overall enrollment numbers are expected to have grown since 2010. As a related reference, the National Center for Education Statistics estimates that there were 656 virtual schools in the U.S. in 2017–2018, enrolling about 279,000 students (0.55 percent of total enrollment) (NCES 2019b).

11. The literature on use of devices for education covers a lot of ground: findings tend to be a function of the type of technology/device used, the intensity, the developmental period/age, etc. (Crone and Konijn 2018; Walsh et al. 2018, see a summary in García 2018). To illustrate a few of these associations, researchers have found that time spent using a mobile phone and watching TV and sending text messages is correlated with lower achievement, slower reading times, and more intuitive but less analytic thinking, and it is also correlated with a faster but less accurate performance in a test of selective attention capacity and skills, as well as in processing-speed ability (Evans-Schmidt and Vandewater 2008; Lepp, Barkley, and Karpinski 2014; Fox, Rosen, and Crawford 2009; Barr et al. 2015; Abramson et al. 2009). Video-gaming can positively influence visual attention and spatial skills (attention capacity, quicker attention deployment, and faster processing, according to Evans-Schmidt and Vandewater 2008). More frequent use of social media is negatively correlated with grade point averages (GPA), academic performance, and hours per week spent studying (Junco 2012; Karpinski et al. 2012; Kirschner and Karpinski 2010). Texting, using Facebook (and accessing Facebook while studying), and conducting internet searches unrelated to academic activity concurrent with homework completion all negatively correlate with

GPA (Junco and Cotten 2012; Rosen, Carrier, and Cheever 2013; Wilmer, Sherman and Chein 2017). Media use (including social media) positively correlates with social and emotional learning (SEL) development, relationships with peers, and engagement, but also with addiction, bullying, mood and self-esteem problems, and time not sleeping/exercising/studying, some due to the trade-offs between time spent on some of these activities (Crone and Konijn 2018; Lemola et al. 2015; American Academy of Pediatrics 2011). The evidence also points out that if the content watched is high-quality educational programming, and does not displace other cognitively enriching experiences, screen time is positively correlated with achievement, engagement, and attitudes toward learning (Evans-Schmidt and Vandewater 2008). Concerns with excessive screen time have been well covered in the media during the months of the pandemic. See for example Kamenetz 2020a; Cheng and Wilkinson 2020.

12. Some information for households with children during the pandemic has been released by the U.S. Census Bureau through the Household Pulse Survey Tables for a target population of adults 18 years and older. See U.S. Census Bureau 2020a.

13. They say: "These students' learning and persistence outcomes are worse when they take online courses than they would have been had these same students taken in-person courses." See Zhao 2020 for some discussion of the challenges around online learning. NCES has used this period to build a repository of this research, which is discussed in Soldner 2020.

14. One in three online charter schools reported that all of their courses were self-paced. On average, online charter schools provide less simultaneous learning and teaching in a week than conventional schools would have in a day and less one-on-one instruction, with larger student-to-teacher ratios. Principals in these schools reported that the greatest challenge was student engagement (a challenge cited almost three times as often as any other issue) (Gill et al. 2015). Based on national data, across all tested students in online charters, the typical annual academic losses are -0.25 SD for math and -0.10 SD for reading (Woodworth et al. 2015). See Bueno 2020 for a more updated study of full-time virtual school attendance in Georgia, which shows negative effects ranging from -0.1 to -0.4 SD on performance.

15. This share has been relatively stable since 2007.

16. Subjects tested include reading, language l, mathematics (with computation), science, social studies, core (with computation), and composite (with computation).

17. As researchers note, the evidence is limited by the inability to use experimental or even quasi-experimental methods, precluding them from drawing conclusions as to causality (Belfield 2004; Cheng and Donnelly 2019; Lubienski, Pukett, and Brewer 2013). Belfield (2004) explains the three empirical issues that arise when comparing outcomes from home schooling against public schooling: 1) the common concern over the endogeneity of school choice, that is different types of families choose the type of school that their children attend, and little can be inferred about the impacts of schools for students who do not attend them; 2) the need to distinguish the absolute performance of home-schoolers from the treatment effect of home schooling—"Given the above-median resources of many home-schooling families, academic performance should be high even if home schooling itself is not differentially effective. Full controls for family background are needed, however, to identify a treatment effect"; 3) "home-schoolers can often choose which tests to take and when to take them (and have parents administer them), introducing other biases."

18. Bacher-Hicks, Goodman, and Mulhern (2020) examine the search for online learning platforms used by schools and supplemental resources on Google. They find that the search intensity had roughly doubled relative to baseline. (They also find that the intensity rose twice as much in areas with above-median SES as in areas with below-median SES, where SES is measures by household

income, parental education, and computer and internet access.

19. This lack of time for planning has in a way continued during the summer. As the news reports have broadly shown, many schools were going to reopen but they had to cancel at the last minute, which probably meant that the plans in place were no longer aligned with students' and teachers' needs. In other cases, the uncertainty about resources available (as discussed later in the report) led to a squandered opportunity to plan accordingly.

20. The authors point to the nine factors that determine the quality of online teaching and learning, including modality, pacing, student-instructor ratio, pedagogy (type), role of online assessments, students' online roles, instructors' online roles, online communication synchrony, and source of feedback. While all may not apply as strongly in K–12 education, the range of considerations highlights the challenges public school teachers will face in attempting to make remote instruction effective.

21. More broadly, these aspects about online instruction also touch upon the relevance of teacher professional development, the importance of establishing learning communities for teachers, and teachers' access to a sound system of supports (Darling-Hammond et al. 2017; Kraft, Blazar, and Hogan 2018; García and Weiss 2019). Among other advantages, learning communities allow teachers to acquire new skills, update their knowledge, and strengthen their practice and effectiveness in the classroom, all critically important factors for education quality and also for the stability of the teaching workforce (García and Weiss 2019).

22. As we explained in our study, the professional development module that delivered data for the 2011–2012 SASS is rotating and was not included in the most recent data set available when we were conducting our study (2015–2016), but it will be in the next cycle, 2017–2018.

23. Teachers also reported having very little input on which activities to undertake for their professional development. Only 11.1 percent of teachers have a great deal of influence determining the content of in-service professional development programs. As we noted in García and Weiss 2019, this disregard for teachers' input is quite troubling, given national and international surveys and testimonies showing that teachers want to play a more direct role in selecting the types and content of professional development opportunities offered to them (see Bill & Melinda Gates Foundation 2014; Loewus 2019; OECD 2019; Kirk 2019; Schwartz 2019).

24. For example, in Washington, D.C., the school district has indicated attendance is compulsory for students ages 5–17. Schools will use daily attendance as an indicator of student engagement in learning together with information on completing assignments and participation in live classes (District of Columbia Office of the Mayor 2020).

25. This sharply academic focus narrowed with the 2001 passage of the federal No Child Left Behind Act, which replaced the earlier version of the Elementary and Secondary Education Act (ESEA). The 2015 passage of the Every Student Succeeds Act attempted to dial back that pressure (see CASEL 2020; Kostyo, Cardichon, and Darling-Hammond 2018). Useful references on these issues and some others discussed below are Bloom 1964; Borghans et al. 2008; Duckworth and Yeager 2015; Levin 2012; Jones et al. 2016; Jones et al. 2019; Shonkoff and Phillips 2000; Lippman et al. 2015; Petway, Brenneman, and Kyllonen 2016; UNESCO's Incheon Declaration for Education 2030 (UNESCO et al. 2016); and our own work on these issues: García 2014; García and Weiss 2016.

26. For those interested in this approach, Tirivayi et al. (2020) offer a comprehensive examination of past public policy responses to emergency crises.

27. Technically, this is known as lack of external validity. This research documents that approximately 50 million primary- and lower-secondary-age children are out of school in conflict-affected

countries around the world (Save the Children 2013). Natural disasters, which also displace large numbers of students, are four times as prevalent today as they were in the 1980s, likely due to the growing impacts of climate change, and that number is predicted to increase exponentially in the next 20 years (Oxfam International 2007; Save the Children 2008; USAID 2014).

28. Further, research has explored the effects on the communities to which children and their families migrate (known as spillover effects from emergency migrants on the host communities), as well as some of the factors that explain them. Hurricane Maria in September 2017 caused a large influx of students from Puerto Rico to Florida's public schools—about 12,000 students between October 2017 and May 2018. Studies found immediate negative effects on the performance outcomes of host students (students in the schools accepting new students from the disaster area) following hurricane Maria. Studies also found immediate negative effects on the performance outcomes of host students following Hurricane Katrina in September 2005, though they found zero effects on Florida's public schools following the Haitian migrant influx after the earthquake in January 2010 and two years after it (Özek 2020; Imberman, Kugler, and Sacerdote 2012; Figlio and Özek 2019). Özek (2020) found significant adverse effects of hurricane migrants on the educational outcomes of existing students in the first year. Specifically, he found that a 5-percentage-point increase in the share of hurricane migrants reduced test scores in math and in English language arts (ELA) by an amount equivalent to one to two months of instruction, increased the likelihood of being involved in a disciplinary incident by 15–20% (of the dependent variable mean) in middle and high school, and increased the likelihood of existing students leaving their schools before the start of the 2018–2019 school year by roughly 7% (with larger increases among white and African American students). Effects were mainly concentrated among higher-performing students, especially in disadvantaged school settings.

29. Historically, there is strong agreement that in these circumstances, having access to education (versus not having access) leads "to a range of positive outcomes including child protection and well-being, economic development, peace building, and reconstruction" (Burde et al. 2017).

30. Other contingency planning strategies involve providing psychosocial programs or supplemental educational activities that protect children from harm. The strategies avoid unstructured days where traumatizing memories linger, fears thrive, and violence is always possible (Sommers 1999). Some education content, for example in refugee contexts, may be designed to mitigate conflict, and peace education programs show promise in changing attitudes and behaviors toward members of those perceived as the "other" (Burde et al. 2017). As Anderson (2020) indicates, "it is not only the mechanism and approach that is used but also the quality and methods of teaching that are critical to understand." Different mechanisms for delivering education include radio, podcast, or television broadcasts; online programs or virtual peer learning circles; and even the provision of kits with basic materials (pencils, exercise books, erasers, etc.). Another critical element is to ensure that children have access to the instructional mechanisms used.

31. A recent publication by The Century Foundation notes "the significant variation in both per-pupil spending and student outcomes across the country" and estimates that the U.S. needs to spend an additional $150 billion to ensure that all students "achieve national average outcomes" (TCF 2020). For research about the important role that opportunity gaps and family income play in education performance, see Coleman et al. 1966; Reardon 2011; García and Weiss 2017; Putnam 2015; Rothstein 2004; and Weiss and Reville 2019.

32. Food insecurity is a different measure than poverty. The former, in the Bauer article, refers to the share of households reporting to the U.S. Census Bureau that it was sometimes or often the case that the children in the household "were not eating enough because we just couldn't afford enough food." But poverty rates are also an instructive measure during this crisis. Using an

unlikely scenario of an unemployment rate of 30% this year due to COVD-19, Parolin and Wimer (2020) estimate that poverty rates in the United States could reach their highest levels in 50 years. Specifically, they estimate that if unemployment rates stay at 30% throughout the year, the supplemental poverty measure (SPM) rate for children would rise by more than 7 percentage points, from 13.6% to 20.9% (the SPM created by the U.S. Census Bureau is a measure of poverty that some researchers consider more accurate than the official poverty measure because it takes into account income from such benefits as food stamps and housing assistance).

33. A total of 1.5 million students surveyed in the 2017–2018 school year had experienced homelessness at some point during the last three school years (USICH 2020).

34. Even if they don't lose their jobs, some workers and virtually all essential workers don't have access to work remotely (following the traditional racial/SES inequities). The inability to work remotely means that keeping their jobs and thus their access to health insurance disproportionately exposes them to the virus (Gould and Shierholz 2020; Bivens and Zipperer 2020) and makes it nearly impossible for them to supervise their children and assist them in their education needs.

35. For updated information, nationally and for various subgroups, see the CDC COVID Data Tracker (CDC 2020c).

36. This is a problem both for students in dense urban areas, where normally strong hospital systems have been overwhelmed at times during the pandemic, and in rural areas, where already gutted systems have lacked the capacity to deal with the onslaught of cases. See, for example, the description of New York City's hospitals when that city was hit hard early in the pandemic in Arnold 2020 as well as Sandoval 2020's more recent account of a small rural hospital on the Texas–Mexico border.

37. Specifically, in our studies, poor students are students eligible for the federal free or reduced-price lunch programs under federal guidelines that deliver such meals based on family income falling below a certain threshold. Non-poor students are students who are ineligible for those programs. For a recent discussion, see Cookson 2020.

38. While 25% of superintendents reported that almost all of their students (91–100%) had internet access at home and 26% reported that almost all of their students had devices to connect to the internet at home, substantial shares of superintendents reported gaps in that access: 23% estimated that just 81–90% had access to internet and devices; 16–17% estimated that 71–80% had access to internet and devices; 11% estimated that just 61–70% had access to internet and devices; 10% said the share with access to internet and devices was 50% or less; and 14% said the share with access to internet and devices was 50% or less (Rogers and Ellerson Ng 2020).

39. As early as March, Texas waived requirements that students take its standardized state STAAR test due to the closure of schools (Swaby 2020), and Massachusetts did the same in April (Lisinski 2020). See also Brookings Institution 2020; Darling-Hammond and Kini 2020; NEPC 2020; Ravitch 2020.

40. AFT 2020d. Capstone projects are end-of-year term projects that students can complete to bring the school year to a close in lieu of statewide standardized assessments (see Weingarten 2020). For some examples of these projects, see Dickinson 2020.

41. U.S. Census Bureau (2020b). McNichol and Leachman (2020) estimate "$555 billion in shortfalls over state fiscal years 2020–2022." Bivens (2020) reviews estimates of a revenue shortfall for state and local governments of nearly $1 trillion.

42. See Baker and DiCarlo 2020; Leachman and Figueroa 2019; Partelow, Yin, and Sargrad 2020.

43. Since March 2020, the House of Representatives and the Senate have passed four coronavirus relief packages totaling over $3 trillion. The most current proposed measures are the HEROES and HEALS Acts (Lee 2020a, b; Progressive Caucus Action Fund 2020). For a discussion on the relatively small amounts that public schools and education have received, see Jordan 2020b; Reber and Gordon 2020. See also Snell 2020.

44. An obvious lesson learned from the COVID-19 crisis is that schools and related sectors like early childhood education and child care are undervalued relative to their key contributions to the societal good. Schools are "essential to the operation of the country... It is impossible to restart the economy without the schools, they go together" and are "a critical part of the social safety net for children" (ASI 2020). Education and also health and social services are "forms of investment, not consumption; necessities, not luxuries" (Folbre 2016). Just as we have learned that many formerly invisible workers are "essential" to the daily functioning of our economy, we must treat education as the essential service it is and support it as such.

45. Blad 2020; Broadwater 2020; Calargo 2020; Ferris 2020; Ferguson 2020; Strauss 2020; Valant 2020.

46. See Tinubu Ali and Herrera 2020; Cohodes 2020.

47. One potential silver lining of the coronavirus pandemic is that it brings attention to a longstanding issue in education: the inadequate systems of professional development for teachers (see García and Weiss 2019). As practitioners, researchers, and policymakers collaborate more closely on professional development offerings that will help teachers teach during the pandemic, that model can inform a broader look at the systems of professional supports available to teachers and prompt more research on what constitutes optimal professional development—i.e., what professional development offerings need to cover, how the offerings should be delivered and where and for how long, and how teachers are connected to the opportunities. As we showed in García and Weiss 2019, teachers want these supports but too often are offered one-size-fits-all programs when there is no single optimal combination valid for all teachers at all times and in all settings. Also shown in García and Weiss 2019, enhanced professional development would play a role in keeping teachers in the classroom and attracting new professionals into teaching.

48. See for example U.S. Senate 2020 for an overview of the proposed Coronavirus Child Care and Education Relief Act.

49. See CDC 2020a, 2020b; AASA 2020; UNESCO et al. 2020; NEA 2020; AFT 2020a; National Superintendents Roundtable 2020. There are still many things that scientists and public health experts do not know about the prevalence, transmission, and long-term consequences of contracting COVID-19 among children and adolescents. Likewise, there is no universally agreed on threshold of incidence of the disease under which activities can safely resume. While these questions are beyond the scope of this report and our areas of expertise, they are critical factors weighing on the reopening of our schools. Several studies point to lower prevalence of infection among children than on average but also to the need to assess whether the incidence of the disease among children can be influenced by selective testing, how prevalence of the virus among children compares with prevalence among their parents (i.e., whether the rate of infection of parents is different from their children's), how these have changed over time (i.e., whether the immunity lasts longer for children or for parents, etc.), etc. (Idele et al. 2020; Pollán et al. 2020; Heald-Sargent et al. 2020). The American Academy of Pediatrics (2020) is requesting that schools reopen. See Goldstein 2020b.

50. While there is no precise estimate of how much following these guidelines would cost, the School Superintendents Association estimates that the average school district will need an additional $1.78 million to meet the COVID-19-related expenses of reopening schools (AASA 2020). The National Academy of Sciences estimates the cost of health-related supplies at $1.8 million for a school district serving 3,200 students (National Academies of Sciences, Engineering, and Medicine 2020). The Council of Chief State School Officers explains that the costs associated with opening schools safely under appropriate health and safety protocols would add up to about $30 billion across all schools (CCSSO 2020). The American Federation of Teachers culls from a number of sources to estimate that a total of $116.5 billion is needed for all measures, $35 billion of which would be needed for additional instructional staff to support adequate social distancing (AFT 2020b, 2020c). See also DiNapoli Jr. 2020 and Berman 2020. The cost of reopening schools is an unsettled issue.

51. See ASI 2020; CPCC, The Education Trust, NEA 2020; Duflo 2020; Brookings Institution 2020.

52. See Gordon 2013; RESEARCHED 2020.

53. AFT 2020d; Weingarten 2020; Dickinson 2020.

54. See García and Weiss 2020; Will 2020; Page 2020; Hamilton, Kaufman, and Diliberti 2020; NIRS 2020. For early retirements of teachers and principals, see Will 2020 and Page 2020. For challenges imposed by remote instruction, see Greif Green and Bettini 2020; Prothero 2020. In terms of recessions, public education job losses following the Great Recession exceeded 316,000 between September 2008 and September 2011 (BLS 2020). The job losses in April 2020 alone were already greater than in all of the Great Recession: 468,800 jobs were lost just a month after the pandemic started (Gould 2020b; see BLS 2020 for a still deeper decrease in May and a slight recovery in June and July). An estimate of the consequences of a 15% reduction in state education funding says that it could lead to the loss of more than 300,000 teaching positions (or 8.4%; see Griffith 2020).

55. See Darling-Hammond et al. 2020; Shonkoff and Phillips 2000; García and Weiss 2016; Walker, Tim 2020; Weiss and Reville 2019; Zhao 2020; Clark et al. 2020; Goldstein 2020a.

56. See Mishel and Rothstein 2003 and Schanzenbach 2020 for a recent review of the influence of class size on achievement. Note that this literature was not reviewed in the literature review section of this report because class size has generally not been a feature of the pandemic. However, in the literature, smaller classes are an implicit recommendation from various subfields. For evidence on summer programs, see McCombs et al. 2019. For evidence on tutoring effectiveness, see Nickow, Oreopoulos, and Quan 2020. On personalized learning, see Kim 2019.

57. Ferguson et al. 2020; García 2020; Hamilton, Kaufman, and Diliberti 2020.

58. Oakes, Maier, and Daniel 2017; Gonzalez 2018; Weiss and Reville 2019; Darling-Hammond et al. 2020; Starr 2020.

59. Darling-Hammond et al. (2020) discuss this framework as informed by evidence from the science of learning and development. See the different principles of practice in their Figure 1.

60. Weiss and Reville 2019; Shonkoff and Williams 2020.

61. EPI's series of reports on the teacher shortage documents the factors that lead teachers to quit (and likely discourage people from entering the profession). See Economic Policy Institute 2020. See Allegretto and Mishel 2019 for estimates of the teacher pay penalty (how much less teachers earn in wages and benefits than comparable college-educated workers in other professions).

62. See García 2015 and García and Weiss 2017, among others.

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