

Kids are Behind in Math Because of Covid-19. Here's what Research Says Could Help

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Annotation: The article discusses the level of education after the Covid 19 pandemic. The impact of the pandemic on education and ways to improve students' thinking skills in math classes after online education will be discussed.

Keywords: covid 19, education, online learning, math, thinking ability.

Are students' math struggles during the COVID-19 pandemic completely unprecedented? Yes and no.

Disruption in schools has also meant disruption in testing, so it's been hard to pin down exactly how much the school closures and transitions in and out of virtual learning have affected students' learning—but the evidence so far doesn't bode well, particularly in math.

But research on math development and anxiety, summer learning loss, and math achievement after other disasters can all provide windows into why math learning seems to be taking a bigger hit during the pandemic, and what educators and school leaders can do to stop it. Here are the key things to know.

How much math learning will students really lose during the pandemic?

A handful of studies since last spring have used data from millions of students participating in computer-adaptive tests, such as the Northwest Evaluation Association's MAP Growth test and Illuminate Education's Fast Bridge assessments, to estimate students' learning growth during school closures last spring compared to prior years, and project how much that rate of growth is likely to slow during 2020-21.

The studies vary in how severe they gauge the so-called "COVID slide" to be, but all of them found on average, students would lose more ground in math than in reading. Three studies based on NWEA data predicted students could learn half or up to a full year fewer maths in 2020-21, compared to what they would learn in a typical year. The study based on the Fast Bridge test data showed smaller but still troubling learning losses across every grade: two-and-a-half to four-and-a-half months of learning lost, compared to a month or two in reading.

There are some basic caveats here. These studies looked at spring 2020, when schools shuttered abruptly amid statewide emergency orders and many districts scrambled to set up services and instructional plans for remote learning. The studies assume students in remote learning look like students during the summer, with little formal instruction. That's not the same picture as the 2020-21 school years, in which districts have reopened with formal instructional plans, but classes that may shift from day to day and week to week from in-person to virtual instruction.

Early testing data from this fall seem to bear out that the pandemic has hit students harder in math than reading.

NWEA researchers compared the results of more than 4.4 million students in grades 3-8 tested this fall to their peers tested in fall 2019. They found no difference in reading gains, but on average a 5 to 10 percentile-point difference in math, with Black and Hispanic students in upper elementary seeing the worst learning losses.

Similarly, Curriculum Associates, a company that offers testing, curriculum, and professional development services, compared the test results from a no representative sample of students in grades 1 to 5 in more than 1,000 schools to those of students for the last three years. It also found students lost more ground in math than reading, and 5 to 9 percentage points more students scored two or more grade levels behind in math.

In any case, none of the research so far is granular enough to say that students have lost specific skills, content, or foundations in math, like fractions or number sense.

Moreover, a new national survey from the Understanding Corona virus in America study found that while parents of K-12 students generally think instruction has not gone back to pre-COVID-19 quality, they were significantly more concerned about math than reading, and particularly if their students attended virtual or hybrid classes.

Why might pandemic learning loss be worse in math than other subjects?

Math may be more sensitive to pandemic-related schooling disruptions for a few reasons, experts say:

Unlike reading, math is almost always formally learned at school. Parents are often less well-equipped to help their children with math, at a time when parent support can be even more crucial to student progress. Broader stress and trauma related to the pandemic may

Resen existing math anxiety in some students and math anxiety can exacerbate students' other stress while in class. It can be more challenging for teachers to engage in effective math instructional practices via remote platforms. What's the role of stress and trauma in math learning loss?

As many as 1 in 5 U.S. adults report severe math anxiety. An Ed Week Research Center study published in January found 67 percent of teachers reported students' math anxiety was a challenge. That existing stress may be magnified now by increased worries about illness, money troubles, housing instability, and parent tensions.

In that, the COVID-19 slide may mirror natural disasters more closely than summer slumps. After Hurricane Katrina, for example, researchers found students lost the most ground in math, coming back to school two years below grade level on average. Some of this academic loss was chalked up to outright missed instruction—due to closures or evacuations, for example—but researchers have found stress and trauma from the disasters weighed on students academically and mentally for months or even years. And there's evidence that test anxiety and post-traumatic stress may have fed off each other.

It may be helpful for schools to partner teachers with school psychologists and other support staff to identify students with existing math anxieties as well as those who have higher stress and trauma exposure during the pandemic.

Experts in math anxiety also suggest teachers incorporate short anti-stress exercises into remote instruction and ask about students' stress levels explicitly, as it may be difficult to impossible to read expressions in virtual settings.

How will remote learning affect math teaching?

While hybrid and virtual schools have been gaining traction in the last decade, the sudden and complete move to virtual learning for most districts last spring and the ongoing shifts in format have been highly disruptive to instruction.

The need for teacher training in new ed-tech platforms and tools may crowd out needs for other professional development, according to Sarah Johnson, chief executive officer of the nonprofit Teaching Lab. “One pre-COVID problem was [a lack of] math elementary teacher content knowledge and pedagogical content knowledge,” Johnson said. “As we shift to online instruction and teachers have to manage so much more, teachers might just not have the time to develop their content knowledge skills in that.”

David Blazar, an assistant professor of education policy and economics at the University of Maryland, who has studied math teaching, agreed. In one study of elementary math teachers, Blazar found the more teachers used inquiry-oriented instruction—in which teachers pose questions and scenarios to help students think through a problem and connect procedures to broader math concepts—the greater students’ math learning. But it’s a kind of teaching that is challenging even in physical classrooms.

In online settings, teachers will need to draw “super explicit links to help make sense of mathematical concepts,” Blazar said, and find ways for students to show their work. And while apps and worksheets can help students practice procedures they’ve learned, some math researchers worry that, especially in the upper elementary grades, teachers might rely on them too much to the detriment of reasoning and modeling with math.

“I think what’s going to fall through the cracks is the kind of discussions around meaning-making in math that they will be challenged to do remotely,” said Jon R. Star, a professor at the Harvard Graduate School of Education who studies children’s math learning. “I think that’s going to be so hard to do, and in some ways could make the curriculum less meaningful, and less conceptual, and less kind of deeply mathematical, which is already something we struggle with.”

Star and Blazar both voiced concern that it can be more difficult for teachers to monitor and guide small groups of students tackling a problem together online without the right tools.

What should happen with curriculum?

There’s a movement in some states and districts to identify “power standards,” or the most critical elements of learning in each grade. But some math experts warn about those approaches because newer math curricula tend to be spiral, with concepts introduced in early grades reappearing. That means in later grades the curriculum will assume students have learned things they may not have learned.

“This is a choice about which is the lesser evil, from the teacher’s perspective,” Star said.

“There are smart ways to do this and not-so-smart ways to do this, and the smart way is to see the standards fitting into a progression, rather than saying, ‘This is important, and these ones aren’t,’ ” said William McCallum, professor emeritus of math at the University of Arizona and CEO of Illustrative Mathematics, an open-source math curriculum. “You merge and combine and give greater emphasis to your main points.”

Inevitably, though, some things are going to receive less emphasis than in prior years, and teachers in later grades will need to be made aware of what was de-emphasized. One likely loss? Star predicts it will be geometric concepts introduced in grades 3-5. Because algebra is a key gatekeeper

to higher-level math courses and an entrance requirement to higher education, teachers are likely to focus on the underpinnings of algebraic reasoning over geometry.

Schools in more than 10 states have experimented with computer-based “curriculum playlists,” which use algorithms to map out and deliver customized lessons to students as they master different skills. This format, which may be easier to transfer back and forth between remote and hybrid classes, is likely to see more use during the pandemic. But large-scale studies of programs using the approach on math have found widely disparate implementation and mixed results on whether this curriculum format accelerates student learning.

How can teachers and parents work together to bolster students’ math learning during the pandemic?

One of the most common themes across learning loss research is the importance of parent support in student learning. Students with highly involved parents who report participating in educational activities over the summer tend to lose less ground. And early studies of responses to the pandemic have found schools are “increasingly dependent on families to facilitate instruction during the current crisis,” according to Douglas Harris of the Education Research Alliance for New Orleans, in a study of district reopening during the pandemic.

That can be a heavier lift in math. Studies have suggested families may be less likely to engage in math versus reading activities with their children due to math anxiety and new instructional methods for teaching Common Core State Standards that differ from how parents themselves learned math.

Kelly McCormick, a professional learning consultant for NWEA, said if a district moved to a common-core-aligned program or another kind of new curriculum, teachers can use their own training as a model to think of math processes that are likely to trip up parents and provide short videos or chats with parents to help them prepare.

Educators may suggest math-related games and apps that encourage families to integrate math conversations into their home lives. Some studies have found children of math-anxious parents who regularly used a family-focused math app showed more progress in math than students of similar parents who did not use the app.

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