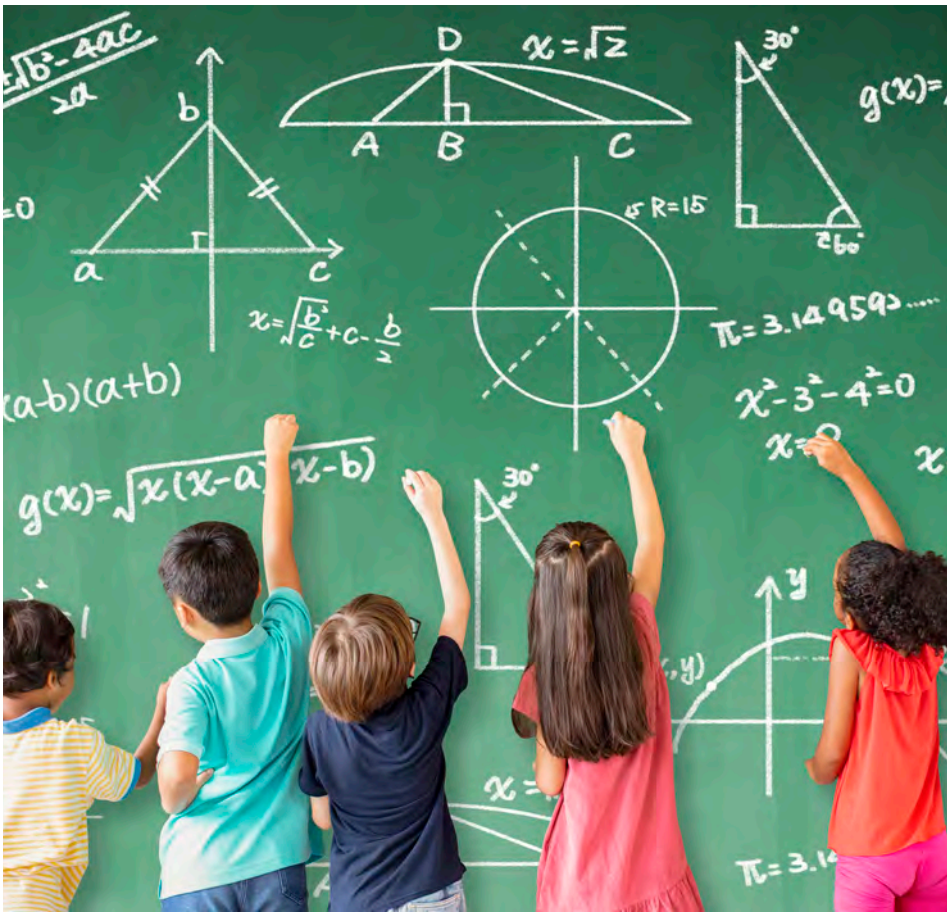


States can shift away from grade-level myopia to help students catch up.

The Urgent Need for Tailored Math Instruction

Joel Rose and Michael Watson

Teachers have long struggled with the tension between ensuring a rigorous education for all their students and the reality that students arrive at the start of a school year with vastly different skills and conceptual understandings. The tension can be even more acute in math, which relies heavily on students mastering foundational concepts in prior years. The last two years made matters far worse—especially for students from historically disadvantaged groups.[1]

Given this trajectory, state policymakers, administrators, and teachers have choices to make. Should they double down on the teaching of grade-level material, as federal policies signal they ought? Or should they instead refocus instruction and systemic incentives on meeting each student where they are?

Research suggests the latter. Lev Vygotsky's research on the "zone of proximal development" suggests that the fastest way to accelerate student learning is to provide opportunities where students are challenged at the appropriate level for their existing skills and knowledge—not too easy, not too difficult.[2] Students might not be able to conquer a brand-new topic on their own, but with the right supports, they can learn and retain something new that was previously out of reach.

In cumulative subjects like math, the need to focus instruction within students' zone of proximal development may even

be more essential. Eighth grade students, for example, are expected to learn about multistep equations, regardless of whether they already mastered critical skills such as solving simple equations, operations on rational numbers, or adding and subtracting algebraic expressions. Each of those concepts take time to master—something not always possible with a breezy review in advance of a grade-level lesson.

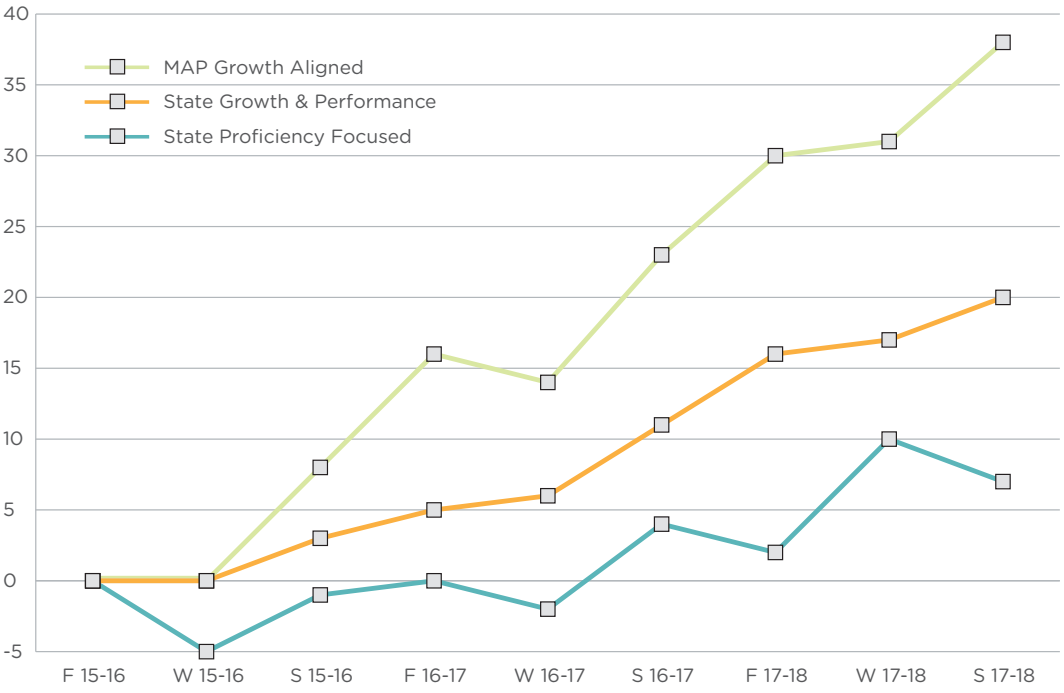
Following a policy push in the early 2000s to place many eighth-grade students in algebra who would otherwise have taken a pre-algebra course, researchers explored the impact of giving students content beyond their zone of proximal development. Tom Loveless found in a 2008 study that very low-achieving math students enrolled in algebra courses performed about seven grade levels below their peers on the National Assessment of Educational Progress and struggled with questions that tested elementary-level understanding.[3] Another study found that low-achieving students pushed into algebra did less well in subsequent math courses throughout high school, especially in geometry.[4]

The fact that it is so unlikely for students to catch up to grade level once they're behind is a reflection not of their capability but of a systemic approach that treats all students the same based on their age instead of what they know and do not know. Students would be far more likely to catch up and even get ahead if they could access an instructional program tailored to what they need to learn. Providing students with that opportunity requires a set of pedagogical strategies more in line with the research and a set of federal and state policies that permit schools to adopt them.[5]

Our own organization's research supports addressing key foundational gaps in the service of tailored acceleration. The program we designed, Teach to One, operated in multiple schools from 2015 to 2018. During that time, schools requested a variety of program adjustments that either emphasized or deemphasized grade-level content. A 2019 study looking at student progress found that students in schools that emphasized pregrade and grade-level exposure that met students' zone of proximal development made stronger gains than those focused solely on grade-level material (figure 1).[6]

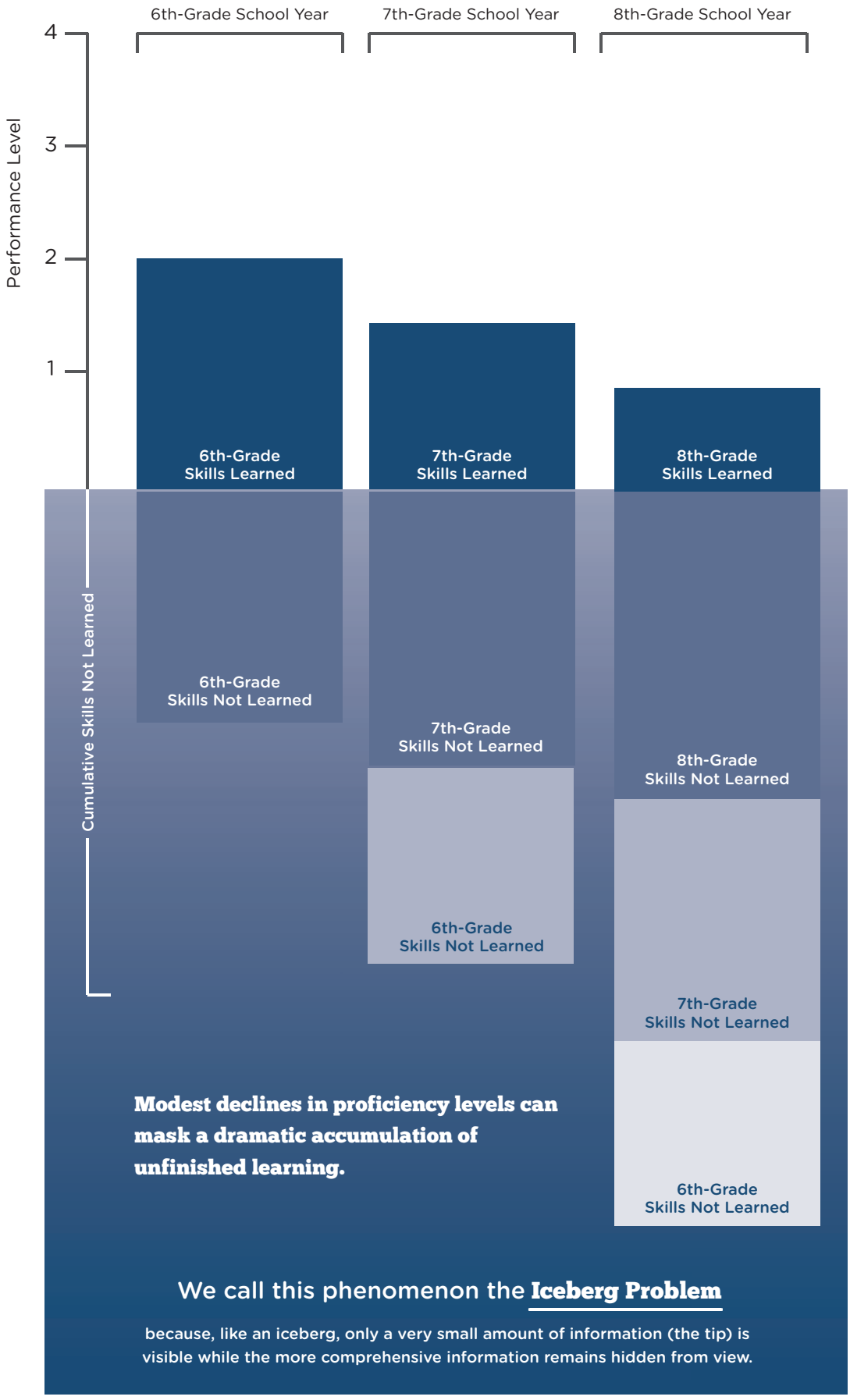
Students would be far more likely to catch up if they could access an instructional program tailored to what they need to learn.

Figure 1. Change in School-Level Percentile by School Category



Source: Jessie Margolis, "Three-Year Map Growth at Schools Using Teach to One: Math" (MarGrady Research, February 2019).

Figure 2. How Learning Gaps Accumulate Over Time



What Drives Grade-Level Focus

Education policy nonetheless signals a clear preference: teach to grade level and accelerate grade-level exposure. The historical inadequacies of remedial education, the need for a clear and coherent system of accountability, and the importance of trying to mitigate the systemic and subconscious biases within the K-12 system have collectively outweighed what might be pedagogically more impactful for individual students.

The shift to more rigorous college- and career-ready standards was one of the biggest policy developments in recent decades. Federal law, adopted in 2001 under No Child Left Behind and amended in 2015 under the Every Student Succeeds Act (ESSA), requires each state to administer annual math and reading tests aligned with grade-level standards for grades 3 through 8 and at least once in high school. The cumulative impact has been a set of more consistent expectations for students based on benchmarks pegged to a college- and career-readiness trajectory. This effort yielded progress in several areas, including greater transparency into achievement gaps between student subgroups, increased clarity for teachers on what they should be expecting from students, coordinated and aligned grade-level summative state assessments, and more objective information for families on whether students are reaching key milestones.

While these are important, worthy achievements, it is hard to argue that these policies have lived up to their promise. Roughly one-third of students graduated ready for college or a career back then, and the same is true today. Performance on international assessments have not moved in 20 years, while recent trends on the National Assessment of Educational Progress indicate that performance is going in the wrong direction.[7]

Policymakers can fairly debate the myriad factors that feed student performance trends and the overall impact of the law itself, but few could credibly argue that the teach-grade-level-only approach in math was systematically succeeding before the pandemic. As millions of students have since fallen even further behind, these policies seem even more problematic.

Teachers and students bear the brunt of all of this. School report cards (and in some cases teacher evaluations) continue to rely on grade-level assessments, which almost exclusively include grade-level material. Since covering those standards takes the full 180-day school year, there isn't much time to address students' foundational gaps. Nor do teachers have the tools to do so in the grade-aligned textbooks that guide daily instruction. Thus many teachers will opt to focus on grade-level content. This core academic strategy will result in students falling further behind as learning gaps accumulate year after year (figure 2), a phenomenon we detailed in a 2019 report, "The Iceberg Problem."[8]

A Misunderstood Definition of Growth

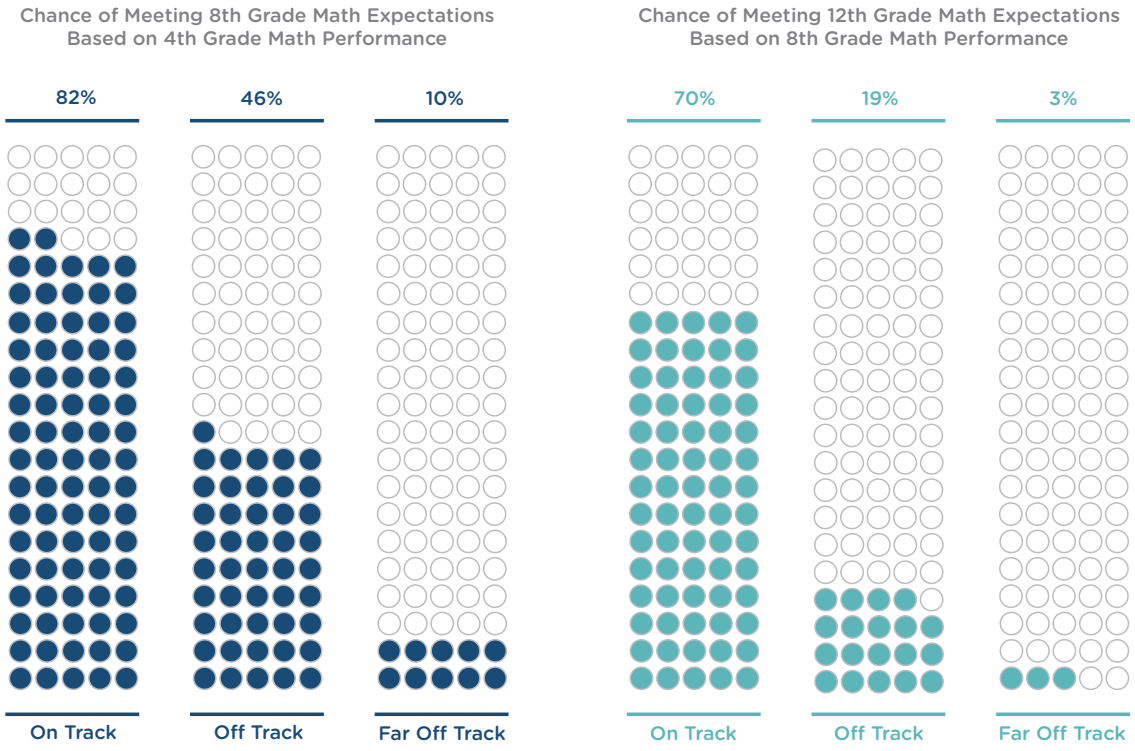
Some state policymakers may believe their basic approach to accountability addresses this problem because it includes both proficiency and growth. Indeed, ESSA permits states to include growth metrics in their accountability system and to weight growth's relative importance in different ways.

But because each grade-level assessment is based almost exclusively on grade-level material, true learning growth is not being measured. Even for states that have created better assessments that measure pregrade and on-grade standards, the federal accountability system points states toward measuring only grade-level questions. A student in a sixth-grade class who scored a Level 1 on the fifth-grade test and then a Level 1 again on the sixth-grade test looks like she did not grow. Growth does not in this example reflect the difference from where the student started and where she is now. It is a reflection of her performance relative to each grade's standards.

While the distinction may seem academic, it is actually quite significant because of the underlying instructional incentives. Policies signal to a sixth-grade teacher, for example, that she should teach all students the sixth-grade curriculum regardless of where they start from. If a student began the year on a third-grade level and her teacher was able to accelerate her to a fifth-grade level, those learning gains (two years of learning in a single year!) would not be captured under the accountability system; it would only consider her mastery of sixth-grade material.

Few could credibly argue that the teach-grade-level-only approach in math was systematically succeeding before the pandemic.

Figure 3. Likelihood of Catching Up



Source: Chrys Dougherty and Steve Fleming, "Getting Students on Track to College and Career Readiness: How Many Catch Up from Far Behind?" ACT, November 2012.

The grade-level-or-bust playbook turns a temporary state of academic deficit into a permanent one.

Given this approach, schools and districts will insist that their teachers focus instruction on sixth-grade material with the hope that students will demonstrate a greater level of mastery on the sixth-grade test than on the test in the preceding year. While a student will not master most of what she is taught, it is at least possible that she will pick up on enough sixth-grade skills to get to a Level 2.

Does this approach actually result in students catching up? One study conducted by the Institute for Education Sciences at Johns Hopkins University examined more than 1,600 middle schools and found that only 1 percent of the schools were able to consistently reduce the achievement gap in math and improve scores for the lowest-performing students.[9]

For the vast majority of students, the grade-level-or-bust playbook turns a temporary state of academic deficit into a permanent one. A study released by the ACT in 2012 showed just how unlikely it is for students to catch up once they have fallen behind (figure 3). Among its findings, a student who was "far off track" in eighth-grade math had only a 3 percent chance of reaching college readiness by the end of high school.[10]

The Role for State Policy

State policymakers have an essential role in a pivoting away from one-size-fits-all instruction to an approach more centered on the unique needs of each student. Many teachers will continue to focus on grade-level instruction until states step in and begin to articulate a new vision, set of policies, and regulatory landscape.

Some state policymakers will rightly argue that the current orientation around annual grade-level standards are a product of federal legislation that will be the law of the land until the next renewal of the Elementary and Secondary Education Act. While the law itself does hinder states looking to embrace a student-centered paradigm, there are still several shifts they can consider in order

to create the space for more personalized approaches to instruction.

First, states can more accurately capture comprehensive learning growth by creating or using assessments that cover standards from across multiple grade levels. Nebraska and Georgia, for example, began piloting new state assessment systems that incorporate items from multiple grade levels and that are designed to capture both proficiency and true learning growth.[11]

Second, states can modify their accountability systems in ways that would create more space for personalization. For example, they can more heavily weight student proficiency at key grade levels (e.g., fifth or eighth grade) or change ESSA-aligned growth metrics to consider shifts over multiple school years (e.g., changes from fifth to eighth grade) in order to allow schools to take a multiyear approach to acceleration. They may also create a separate accountability system that would run alongside the federal system in order to provide more clarity on true student learning growth.

Third, states may use funds set aside in federal recovery dollars to launch math innovation zones, as North Dakota and Montana have done.[12] Modeled after what Texas set up before the pandemic, these innovation zones are statewide efforts to incubate high-quality blended learning programs. These programs effectively operate under a different system for accountability that runs alongside the federal system and that give volunteer schools permission to implement solutions that are more oriented around meeting each student's unique needs and building their strengths. Fourth, states should examine their procurement and state curriculum adoption policies and strategies to ensure their definition of high-quality instructional materials allows for innovative solutions that integrate precise diagnostics, multigrade content, and personalized instructional pathways to proficiency.

An Overdue Shift

Policymakers cannot ignore the fact that math learning is cumulative. When students do not fully master foundational skills, unfinished learning accumulates, making it increasingly challenging for the student to catch up.

The instructional incentives and pressure to deliver exclusively grade-level content created by the predominant assessment and accountability structures is fundamentally at odds with the needs of students who enter school multiple grade levels behind. These same policies may be causing some of the most disadvantaged students to fall even further behind in the pandemic's wake. The resulting blind spot in accountability threatens the equity and transparency these systems were designed to protect.

Expectations matter, but expectations are not all that matter. Students need a viable path that connects where they are starting from to where they need to be. The need for state leaders to explore innovative strategies centered on learning acceleration and recovery existed long before the pandemic. It is now more visible and more urgent.

But until states comprehensively revisit their existing policy infrastructure and create the conditions for new approaches to teaching and learning that challenge the grade-level orthodoxy, it is difficult to see how comprehensive efforts aimed at learning recovery in math can succeed. ■

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[2]Seth Chaiklin, "The Zone of Proximal Development in Vygotsky's Analysis of Learning and Instruction," in Alex Kozulin et al., eds.,*Vygotsky's Educational Theory and Practice in Cultural Context* (Cambridge, UK: Cambridge University Press, 2003).

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[4]Charles T. Clotfelter, Helen F. Ladd, and Jacob L. Vigdor, "Algebra for 8th Graders: Evidence on Its Effects from 10 North Carolina Districts" (Washington, DC: The CALDER Center, American Institutes for Research, 2013).

[5]New Classrooms, "The Iceberg Problem: How Assessment and Accountability Policies Cause Learning Gaps in Math to Persist below the Surface…and What to Do about It" (New York: Author, 2019), https://newclassrooms.org/icebergproblem/.

[6]Note that a broader group of students, including those not continuously enrolled, showed average three-year gains of 13 percentile points. Jessie Margolis, "Three-Year Map Growth at Schools Using Teach to One: Math" (MarGrady Research, February 2019), http://margrady.com/tto/. The statistical power of these studies is not sufficient to prove that meeting individual student needs is more impactful than focusing on grade-level expectations. But it still carries more weight than research focusing on grade-level instruction regardless of students' starting points.

[7]National Center for Education Statistics, U.S. Department of Education and the Institute of Education Sciences, "NAEP Report Card: Mathematics," The Nation's Report Card, https://www.nationsreportcard.gov/mathematics.

[8]New Classrooms, "Iceberg Problem."

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States can more accurately capture comprehensive learning growth by creating or using assessments that cover standards from across multiple grade levels.

Joel Rose is the co-founder and chief executive officer at New Classrooms, which published "The Iceberg Problem," from which this essay is adapted. Michael Watson is the vice president of policy and advocacy for New Classrooms and the former chief academic officer and associate secretary of education for Delaware (2013–18).

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[5]TNTP, "The Opportunity Myth: What Students Can Show Us about How School Is Letting Them Down—and How to Fix It," web page (2018), https://tntp.org/publications/view/student-experiences/the-opportunity-myth.

[6]Curriculum Associates, "Academic Achievement at the End of the 2020–2021 School Year: Insights after More Than a Year of Disrupted Teaching and Learning," research brief (North Billerica, MA: Author, June 2021), https://www.curriculumassociates.com/-/media/mainsite/files/i-ready/iready-understanding-student-needs-paper-spring-results-2021.pdf; Karyn Lewis et al., "Learning during COVID-19: Reading and Math Achievement in the 2020–21 School Year," brief (NWEA Center for School and Student Progress, July 2021); Renaissance Learning, "How Kids Are Performing: Tracking the School-Year Impact of COVID-19 on Reading and Mathematics Achievement," special report series (Wisconsin Rapids, WI: Author. Spring 2021 edition).

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[12]Virginia Department of Education, "2020–2021 SOL Test Results Reflect National Trends, Unprecedented Challenges," press release, August 26, 2021.

[13]National Council of Teachers of Mathematics, "Moving Forward: Mathematics Learning in the Era of COVID-19" (Reston, VA: NCTM, June 2020), https://www.nctm.org/uploadedFiles/Research_and_Advocacy/NCTM_NCSM_Moving_Forward.pdf.

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cont'd from page 31...10 Lessons Learned...

while offering innovative opportunities to get students ready for life beyond the standards.

Bonus: The state-level working of the system is so far removed from the general classroom that it is incumbent on state leaders to make extra effort to communicate and network with practitioners. ■

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