Solving the Iceberg Problem

Addressing Learning Loss in Middle School Math through Tailored Acceleration

2020

Acknowledgments

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Executive Summary

This report is for middle-school math teachers and their school and district leaders, who are now facing a daunting challenge: addressing the significant learning loss from COVID-19 while ensuring their students continue to master the math skills they need to be college and career ready.

For over a decade, our nonprofit organization, New Classrooms Innovation Partners, has been working with middle schools to implement and iterate on a comprehensive middle-school math program to effectively address the problem of learning loss. Our work has enabled us to deeply understand its current manifestation and develop a comprehensive approach for addressing it—an approach we call *tailored acceleration*.
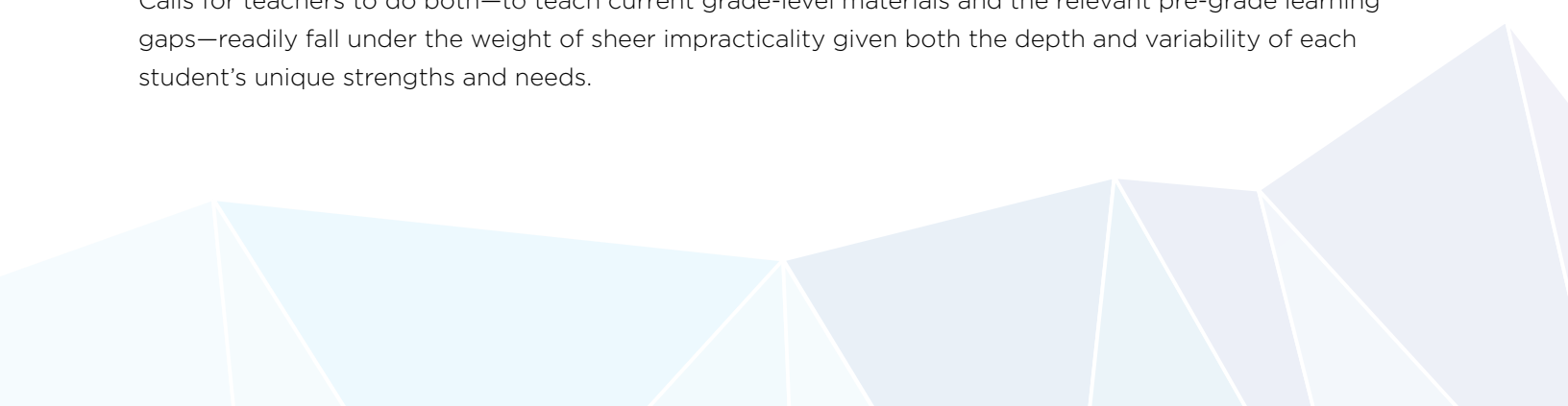
The Challenge

Learning Loss Is Not a New Problem

Although school closures resulting from COVID-19 have deepened and universalized learning loss, this is not a new problem. Our 2019 report, **The Iceberg Problem**, argued that learning loss—which we defined as the accumulation of unfinished learning of key math skills from prior grades—was derailing middle-school students from reaching proficiency long before schools were closed due to COVID-19. This moment affords a new opportunity for schools to comprehensively address learning loss, both COVID-19 and pre-COVID-19-related.

Current Approaches Won't Solve the Problem of Learning Loss

Many of the strategies historically employed to address learning loss have inherently come with problematic tradeoffs. In some cases, students have been placed in remedial math courses that may address some pre-grade gaps, but may have also made it much harder for them to ultimately catch up to grade-level proficiency. In other cases, students receive grade-level instruction even though they lack the requisite foundational knowledge to succeed with more advanced concepts, causing them to fall even further behind. Calls for teachers to do both—to teach current grade-level materials and the relevant pre-grade learning gaps—readily fall under the weight of sheer impracticality given both the depth and variability of each student's unique strengths and needs.

The Solution: Tailored Acceleration

The limitations of each of these approaches reflect the constraints embedded within any classroom environment where all twenty-eight or so students are taught the same concept at the same time. In middle-grade math, where research shows that incoming student achievement levels can span seven grade levels, aligning what's being taught with what each student should next learn can be a massive challenge for even the most experienced teachers. Layering on the additional mandate to cover all of the grade-level curricula can make that task nearly impossible.

The idea behind tailored acceleration is to combine high-quality, teacher-led instruction with other instructional approaches so that all students do not need to learn the same thing at the same time. Once freed from that constraint, students can then access the most essential building-block skills from prior grades with the key on-grade skills to create individualized learning pathways that get them back to grade-level and beyond as fast as possible. The goal of tailored acceleration is to ensure that all students attain college and career readiness in math—regardless of where they may be starting—while adhering to the principles of high expectations, rigorous accountability, and educational equity.

There are at least five fundamental ways in which tailored acceleration shifts what happens in most middle-grade math classrooms today.

Table 1: Shifts from Current Middle-School Math to Tailored Acceleration

Traditional Approach	Tailored Acceleration
Teachers focus on grade-level skills.	Teachers focus on a strategic mix of pre-, on-, and post-grade skills.
Instruction is aimed at enabling students to achieve grade-level proficiency within one school year.	For some students (especially post COVID-19), achieving grade-level proficiency will require learning pathways that span more than one year.
Coverage of grade-level curriculum is paramount.	Student mastery of essential skills is paramount.
Growth reflects changes in performance relative to grade-level skills.	Growth reflects progress on essential pre-, on-, and post-grade level skills.
Classroom teachers instruct students on the same skill at the same time.	Classroom teachers enable multiple instructional modalities so that each student can focus on the skills needed to accelerate.

While schools capable of accelerating each student based on his or her strengths and needs may have been unimaginable just a decade ago, this is no longer out of reach. With tailored acceleration, teacher-led instruction remains the most important and impactful way that students would generally learn given the necessity of pedagogical skill, the importance of the teacher-student relationship, and the fact that learning is inherently a social and emotional process. However, other modalities, especially when strategically supported by technology, can complement the work that teachers do in ways that deepen conceptual understanding.

What These Shifts Mean in Practice

Today, a seventh-grade teacher with incoming students performing at a fourth-grade level faces a difficult choice: meet students where they are, knowing they'll likely learn a lot but do poorly on the state test, or expose them to seventh-grade content, knowing they are unlikely to learn most of it but may pick up a few new skills that are not as predecessor-dependent.

Tailored acceleration gives the teacher a better option to consider. Rather than looking to fill every pre-grade learning gap, the student can focus on those prior skills most relevant to succeeding with grade-level material. Sometimes, learning a grade-level skill may enable the student to organically address a pre-grade skill gap, but, in other cases, this approach is unlikely to be effective. In some cases, complete mastery—and, in other cases, partial mastery—of a pre-grade standard is essential. The idea is that each student can access the most efficient learning path based on their starting points to get to grade-level proficiency—even if it takes more than a year.

In some cases, learning a grade-level skill may enable the student to organically address a pre-grade skill gap; while in other cases, relying upon grade-level instruction is misguided. Partial mastery of a pre-grade skill may be all that's required to move on for some skills, while for other skills, a more complete understanding is essential.

What matters is that each student can access the most efficient learning path to get to college and career readiness.

In addition to proposing multiple learning modalities, this report details other strategies to make tailored acceleration work, such as diagnosing unfinished learning, prioritizing the most essential skills, and regularly assessing student progress. It also lays out key programmatic design choices for schools to consider around the use of instructional time, the homogeneity of student grouping, and whether to design an in-house program or partner with organizations that have pre-existing solutions.

We know the stakes could not be higher—especially for students at risk of not graduating ready for college or a career. As former teachers, principals, district administrators, and state officials, we witnessed the extent to which having inadequate math skills—especially failure to master Algebra 1—thwarts the trajectory of students through high school and college. Even before COVID-19, only one-third of U.S. students were achieving college and career readiness. To avoid exacerbating this already dire situation, we must update our instructional and classroom approaches to support far greater success now.

There has never been a more opportune moment to make a shift toward tailored acceleration. The confluence of several forces—a widespread recognition of learning loss, the infusion of educational technology brought upon by school closures, the uncertainty around the future of state assessment and accountability policy, and the necessity of tending to students' social and emotional development—suggests now is the time to try new ways to meet students where they are and ensure they reach proficiency and beyond.

For those educators willing to step out in front, this report strives to serve as a starting point for how to best navigate down this path.

SECTION I:
The Challenge

Incomplete Learning in the Time of COVID-19

Because of COVID-19 learning loss, Northwest Evaluation Association (NWEA) projects that "students will enter math classrooms next fall with less than 50 percent of the learning gains and, in some grades, nearly a full year behind what we would observe in normal conditions."[1]

This extensive loss, which, according to NWEA, will surpass the learning loss in reading, also presents an enormous obstacle to future academic success. That's because math instruction reflects a body of knowledge made up of interconnected concepts and designed around coherent progressions from grade to grade that build new understanding onto foundations built in previous years. The cumulative nature of math means that when students have missed key foundational concepts from prior years, their ability to progress to more advanced concepts is severely limited, and learning loss continues to accumulate.

Learning Loss Before COVID-19

Greatly complicating this situation is that even before COVID-19, many students were performing below grade level—sometimes well below because of their unfinished learning from the prior years.

As demonstrated in **The Iceberg Problem**, modest gaps in the learning of foundational skills year after year often mask a dramatic accumulation of learning loss (see Figure 1).

Once students have missed key concepts in one grade, most schools are ill-equipped to help them rebuild what they missed and simultaneously cover grade-level material. When a teacher, for example, covers seventh-grade material when students are missing key concepts from fifth or sixth grade, learning gaps can readily accumulate. The pattern repeats, year after year, such that by the time students enter high school, many are unprepared for mathematical coursework that will keep them on track for high-school graduation and postsecondary success.

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1   Megan Kuhfeld and Beth Tarasawa, "The COVID-19 Slide: What Summer Learning Loss Can Tell Us About the Potential Impact of School Closures on Student Academic Achievement," Northwest Evaluation Association, April 2020: nwea.org/content/uploads/2020/05/Collaborative-Brief_COVID-19-Slide-APR20.pdf.

Figure 1: How Learning Gaps Accumulate Over Time
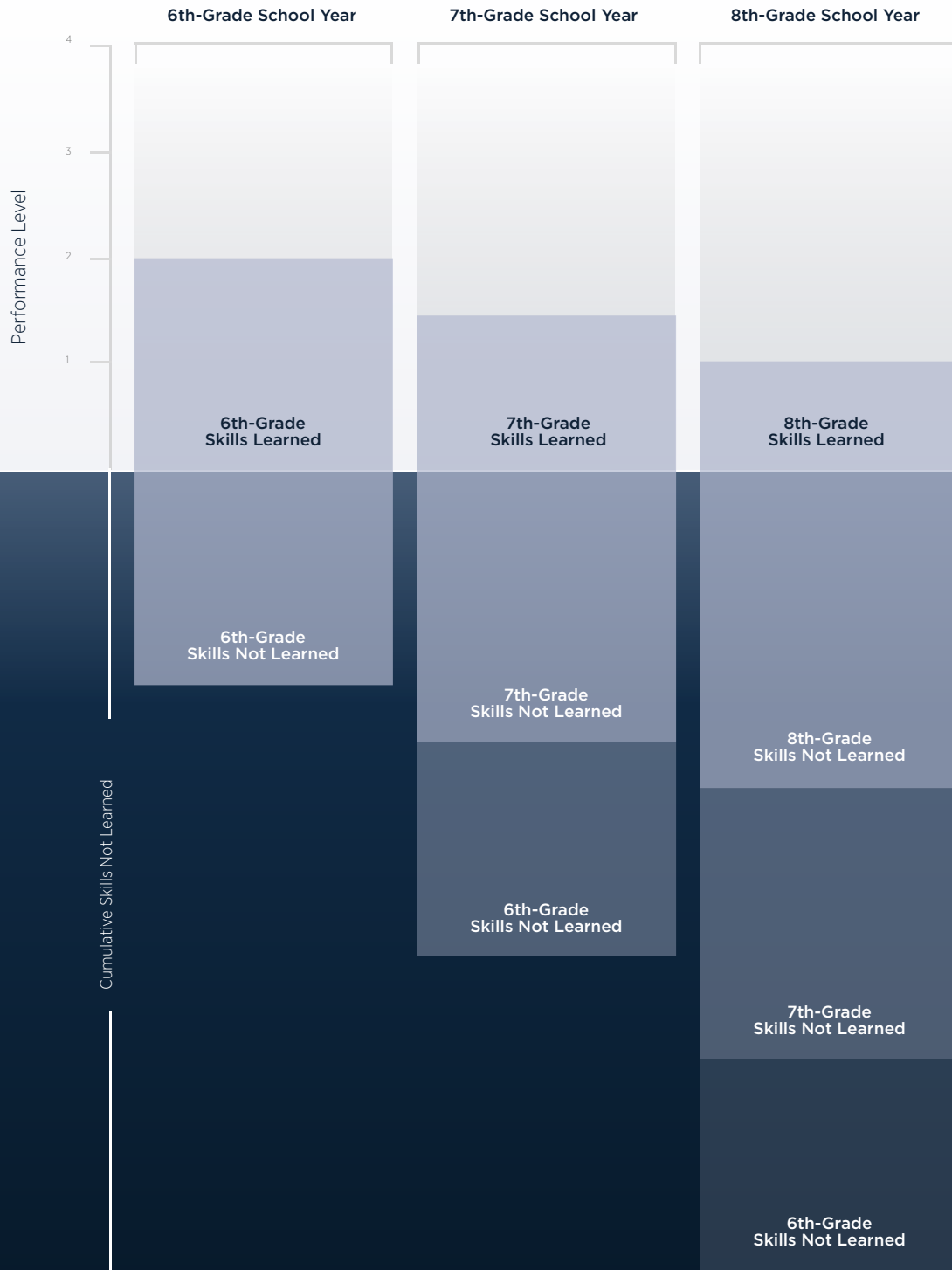
Modest declines in proficiency levels can mask a dramatic accumulation of unfinished learning

Longitudinal studies of individual students demonstrate the extent that students who fall behind not only stay behind but also lose even greater ground (see Figure 2).

In a 2012 study conducted by ACT, researchers tracked math test results from tens of thousands of students—one group from fourth grade to eighth grade, and another from eighth grade to twelfth grade. Among their findings:

• Students "far off track" in fourth grade had a 10 percent chance of reaching eighth grade expectations, while students far off track in eighth grade only had a 3 percent chance of reaching twelfth-grade expectations.

• Students "off track" rather than "far off track" in fourth grade, still only had a 46 percent chance of reaching grade-level expectations in eighth grade. Eighth-graders off track only had a 19 percent chance of reaching twelfth-grade expectations.

This is why serious efforts to address learning loss cannot focus just on the skills students did not learn during the school closure period, but must also include the unfinished learning that students accumulated from prior years.

Why a Focus on Middle Schools?

The challenges facing middle-grade math teachers are, in part, a reflection of the fact that, for a variety of reasons, many students do not build key foundational knowledge while in elementary school. While reform in elementary math education is essential to prevent learning loss in the first place, today's middle schools must still find ways to successfully prepare their students for the rigors of high school—no matter where they may be starting from. Once students are enrolled in high school, catching up can become prohibitively difficult for students given the depths of accumulated learning loss and the fact that students must earn high school course credits to graduate. That's why improving middle grade math provides a critical opportunity for ensuring far more students graduate ready for college and a career.

Limitations of Traditional Approaches

Come fall of 2020, math teachers across the country will be assigned to work with groups of students, many of whom will not only be behind, but will be behind in varying ways. Historically, schools have tried to manage unfinished learning by either assigning students to classes that largely focus on pre-grade remediation or by enrolling students in classes focused exclusively on grade-level material. The fact that even before COVID-19, only about one-third of U.S. students achieve college and career readiness suggests the profound limitations of both approaches.

Limitations of Focusing Exclusively on Unlearned Pre-grade Skills

The problem with focusing exclusively on pre-grade skills, even for a couple of months, is how hard it is for students to ever get back to grade-level proficiency. Any progress students make on pre-grade skills can be offset by the fact that relative to grade-level expectations, students can fall further behind with the passing of each school year. Take, for example, an incoming seventh-grader who begins the school year with dozens of skills that were either not learned or only partially learned from previous school years. Many of the skills on the seventh-grade curriculum require predecessor knowledge from either the sixth grade, the fifth grade, or prior to fifth grade. When a school focuses instruction solely on these predecessor skills, this student will be wholly unprepared for eighth-grade instruction and beyond.

Making matters worse, while some review within a remedial class may be appropriate, teaching can readily devolve into generalized instruction on pre-grade skills that some of the students already know. This wastes precious instructional time that would otherwise be used to help them accelerate back to grade level and beyond.

A Note on the Relationship Between Standards and Skills

Standards are not curricula. Education publishers and teachers have the critical role of converting them into lesson-level activities which, in the aggregate, encompass the grade-level standards. We would call the understandings developed in lesson-level activities a skill. Standards often incorporate multiple skills, each of which can generally be taught in a single class session.

Each skill within a curriculum can be taught in ways that incorporate their procedural, conceptual, and applied dimensions. Although some lessons may focus on discrete skills at varying levels of depth, teachers must also integrate lessons that enable students to explore their connections to one another, to broader mathematical ideas, and to the world more generally.

Remedial classes can also have a particularly pernicious impact on students of color, as unconscious biases can cloud judgments about what students are truly capable of learning. Research shows that significantly higher percentages of low-income, black, and Latino students enter remedial education than their white or affluent peers.[2]

In sum, remedial classes can too easily become aimless, ineffective, and inequitable.

> The problem with focusing exclusively on pre-grade skills, even for a couple of months, is how hard it is for students to ever get back to grade-level proficiency.

Limitations of Focusing Solely on Grade-level Work

At the same time, focusing solely on grade-level standards precludes students from having the opportunity to address their unfinished learning from prior years. Because math is cumulative, missing key foundational concepts from prior years can prevent students from succeeding with more advanced concepts.

As a result, while marching that same incoming seventh-grader along the same curriculum without addressing these gaps may yield some benefit (there are *some* skills for which the student's incoming knowledge base may be sufficient), it will also likely cause unfinished learning to continue increasing while again wasting instructional time that could have been used to address key foundational gaps. This is not just massively inefficient, but it also is dispiriting for students who end up believing math isn't for them.

Can Teachers Do Both?

Insisting that teachers should somehow both teach students the grade-level content and simultaneously scaffold instruction to address learning loss can be problematic. The comprehensiveness of the math standards themselves generally requires teachers to dedicate the entire school year to fully cover all the grade-level topics.

When middle-school students start the school year with a wide variety of learning gaps in math, often spanning multiple years, the challenge of both covering grade-level material and strategically addressing unfinished learning without any adjustments to instructional time can be particularly daunting. Factor in learning loss related to COVID-19, and it can be nearly impossible—particularly when students begin the school year multiple years behind. Attempting to overcome these challenges, in fact, may cause many students to fall further behind while placing an entirely unreasonable burden on their teachers.

Middle-School Math Instruction:
Just in Case, Just in Time, or Just Right?

Guidance recently issued by organizations including the Council of the Great City Schools, the National Council of Teachers of Mathematics, the National Council of Supervisors of Mathematics, and Student Achievement Partners rightly advises teachers against exclusively focusing on **"just-in-case"** pre-grade remediation before returning to grade-level material given the limitations and risks associated with that approach. The guidance, instead, recommends **"just-in-time"** remediation, where teachers focus on a select set of pre-grade skills just before teaching the grade-level skills. To facilitate this, SAP names the priorities in mathematics (K-8) and ELA/Literacy that should be the focus of instruction given the unique challenges of the 2020-21 academic year — including which grade-level standards to eliminate and which to merge, as well as which pre-grade skills from the prior school year to incorporate as part of their grade-level instruction.

Through our decade-long work in middle school, we have also learned that comprehensively addressing learning loss in service of students' achieving college and career readiness depends on two key factors:

1. Incorporating unlearned pre-grade skills that reach back multiple years for many students. In fact, recent research by NWEA, in partnership with multiple universities, found that as early as fifth grade, one-third of students, on average, were performing two grades behind – a gap only likely to increase post-COVID-19.

2. Teaching different students different underlying pre-grade skills to succeed with grade-level content given the variety of unlearned skills among middle-school students.

Only innovative classroom approaches can enable each student to learn the **"just right"** set of pre-grade skills (going as far back as necessary), as well as the on-grade and post-grade skills that will best enable them to accelerate to college and career readiness.

SECTION II:

Moving Beyond the Conventional Approach: Tailored Acceleration and Its Key Assumptions

Those looking to seriously tackle learning loss and put students on a viable path to college and career readiness will need to challenge some of the basic tenets of our current education system. But which aspects of our conventional approaches require rethinking, and why?

Members of our organization have spent their professional lives working to answer this question—first as former math teachers and school administrators, and, more recently, while working with districts, schools, and teachers to implement a comprehensive middle-school math model that addresses unfinished math learning in service of moving students to grade-level proficiency.

In developing and continually iterating on our model, we have closely tracked what works and doesn't work by analyzing the performance of tens of thousands of records of students in the classrooms we support.

These analyses have led us to recognize that neither pre-grade remediation nor sticking to grade-level standards (even with episodic spiraling of prior skills) will do the job. Rather, because math is cumulative, accelerating students' learning toward college and career readiness requires creating learning pathways for each student that strategically integrate essential pre-grade skills with on-grade and even post-grade skills in order to get students to grade-level proficiency as fast as possible.

We call this approach *tailored acceleration*.

The ultimate goal of this approach is to help students become college and career ready in math from wherever they may be starting. To get there, tailored acceleration reaffirms a commitment to challenging standards, high expectations, and rigorous accountability while also rethinking five core assumptions that underlie what happens in most middle-grade math classrooms today.

> The ultimate goal of this approach is to help students become college and career ready in math from wherever they may be starting.

What Tailored Acceleration Reaffirms

Challenging state standards play many essential roles: they reflect the skills and knowledge students need for college, for careers, and for life. They also provide an invaluable road map for understanding the progression of mathematical concepts that students must master to graduate ready for college or a career.

Aligned, year-end assessments for accountability purposes, too, play a critical role in providing far greater transparency into achievement gaps, infusing objective data into decision-making, and making information available to families about whether students are reaching key educational milestones. Together, these systems can help provide essential guardrails to mitigate and, ultimately, reverse the pernicious legacy of our historically rooted, deeply inequitable education system.

Tailored acceleration reaffirms these values by relentlessly focusing on the end goal: achieving college and career readiness as quickly as possible. Done well, tailored acceleration also can heighten their importance—by leveraging the relationships and progressions embedded within the standards as the basis for a tailored instructional pathway for each student; and by providing *more* precise measurements of progress to that objective than the current system affords.

Shifts to Current Assumptions about Middle-School Math

Although high expectations and challenging standards remain centerpieces of tailored acceleration, this approach requires educators to rethink at least five core assumptions of middle-school math instruction.

Table 1: Key Underlying Assumptions

Traditional Approach	Tailored Acceleration
Teachers focus on grade-level skills.	Teachers focus on a strategic mix of pre-, on-, and post-grade skills.
Instruction is aimed at enabling students to achieve grade-level proficiency within one school year.	For some students (especially post COVID-19), achieving grade-level proficiency will require learning pathways that span more than one year.
Coverage of grade-level curriculum is paramount.	Student mastery of essential skills is paramount.
Growth reflects changes in performance relative to grade-level skills.	Growth reflects progress on essential pre-, on-, and post-grade level skills.
Classroom teachers instruct students on the same skill at the same time.	Classroom teachers enable multiple instructional modalities so that each student can focus on the skills needed to accelerate.

1. Teachers Should Focus on "Just-right" Skills: A Strategic Set of Pre-grade, On-grade, and Post-grade Skills to Tailor and Accelerate Learning

Today's K-12 educational systems cannot easily accommodate learning loss because its standards, tests, school structures, textbooks, and other instructional materials generally focus on grade-level skills. Think of the seventh-grade teacher with incoming students who are performing at a fourth-grade level. Currently, the teacher faces an unacceptable choice: meet students where they are, knowing they'll likely learn a lot but do poorly on the state test, or expose them to seventh-grade content, knowing they are unlikely to learn most of it but may pick up a few new skills that are not as predecessor-dependent.

Tailored acceleration offers this teacher a better option for addressing this challenge. Rather than looking to fill every pre-grade skill gap, instruction is focused on the pre-grade skills that students must learn in order to master grade-level material. In some cases, for example, learning a seventh-grade skill may enable the student to organically address a fifth- or sixth-grade skill gap, while in other cases, relying upon grade-level instruction to address pre-grade gaps is misguided. In some cases, partial mastery of a pre-grade skill may be all that's required to move on, while in other cases, a more complete understanding is essential. Some skills have few pre-grade predecessors, while others have far more. What matters is that students can access the most efficient learning path to get to grade-level proficiency.

To guide teachers in making these choices, we have developed a skill map for middle-school math that includes the approximately 300 interrelated math skills students must learn in order to master all middle-grade math standards through Algebra 1. Considering unfinished learning and developing learning pathways for each student in the context of these skills and their relationships to one another allows educators to take a more surgical approach to accelerating each student—whether behind, on track, or ahead.

By delinking mastery from grade-level expectations, tailored acceleration enables teachers to teach essential pre-grade, on-grade, and post-grade skills from wherever each student is starting.

Figures 3a and **3b** on the following page show how tailored acceleration may work for an incoming seventh grader with learning loss.

2. For Some Students (Especially Post-COVID-19), Achieving Grade-level Proficiency Will Require Learning Pathways That Span More Than One Year

An honest accounting of the degree of learning loss—not just from COVID-19 but also before it—will lead school leaders to an uncomfortable conclusion: many students are highly unlikely to catch up in one year given where they are starting from and the available instructional time. This is not a reflection of having low expectations; rather, it is an acceptance of research: the Institute for Education Policy at Johns Hopkins found, after analyzing sixth- and eighth-grade cohort data from across six states and the District of Columbia, that less than 1 percent of middle schools were able to improve their proficiency levels by at least 30 points on state year-end assessments—a level of improvement which, in many schools, would still leave large numbers of students performing below proficiency.[3]

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3   Alanna Bjorklund-Young and Jay Plasman, "Reducing the Achievement Gap: An Empirical Analysis of Middle School Math Performance in Six States and Washington, D.C.," The Institute for Educational Policy at Johns Hopkins University, April 2019: edpolicy.education.jhu.edu/wp-content/uploads/2019/04/Achievement-Gap-Policy-Brief.pdf.

Figure 3a: Learning Loss of Incoming Seventh-Grade Student (Student A)

PRE-GRADE 5   GRADE 5   GRADE 6   GRADE 7   GRADE 8 and Algebra

LEGEND

- Pre-grade skill that is fully learned
- Pre-grade skill that is partially learned
- Pre-grade skill that has not been learned
- Traditional grade-level curriculum
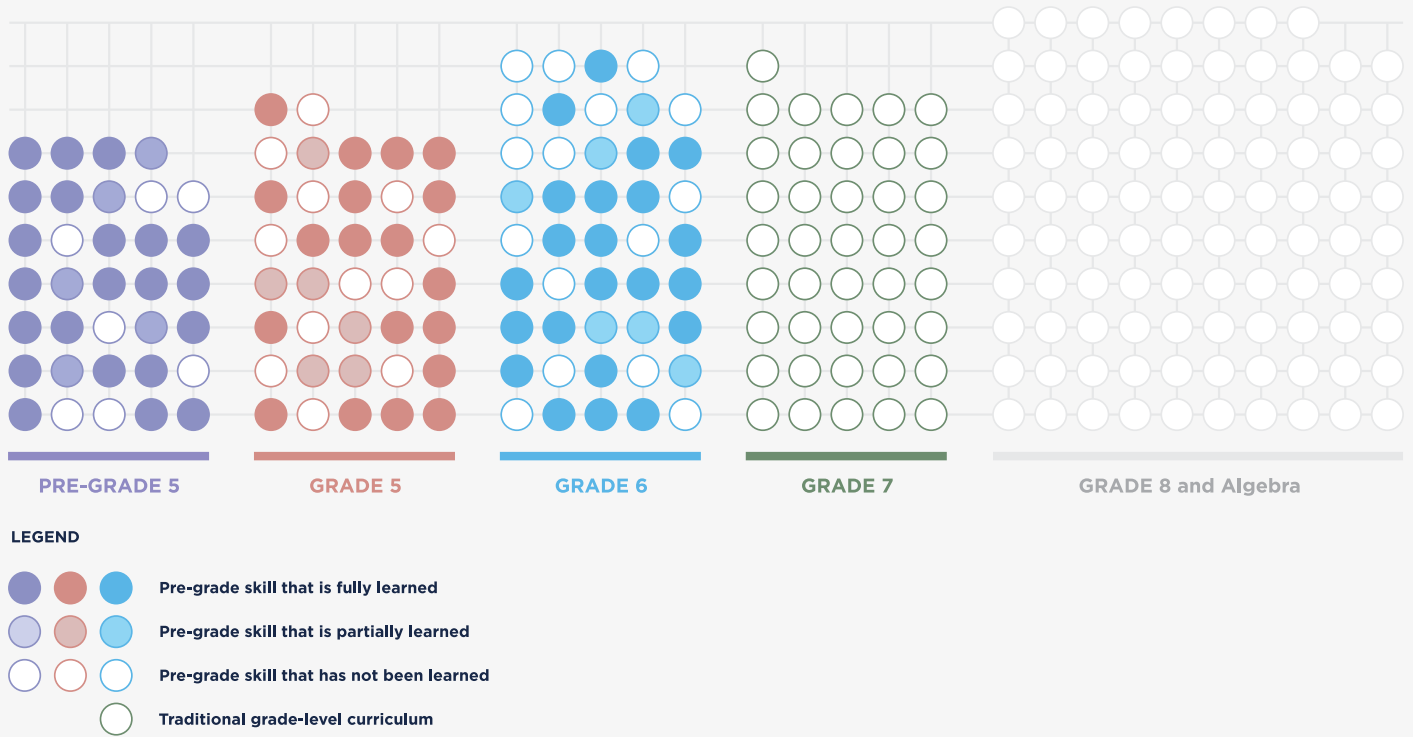
Figure 3b: Tailored Acceleration for Student A While in Seventh-Grade

PRE-GRADE 5   GRADE 5   GRADE 6   GRADE 7   GRADE 8 and Algebra

LEGEND

- Pre-grade skill that is fully learned
- Pre-grade skill that is partially learned
- Pre-grade skill that has not been learned
- Traditional grade-level curriculum
- Seventh grade instructional focus with tailored acceleration
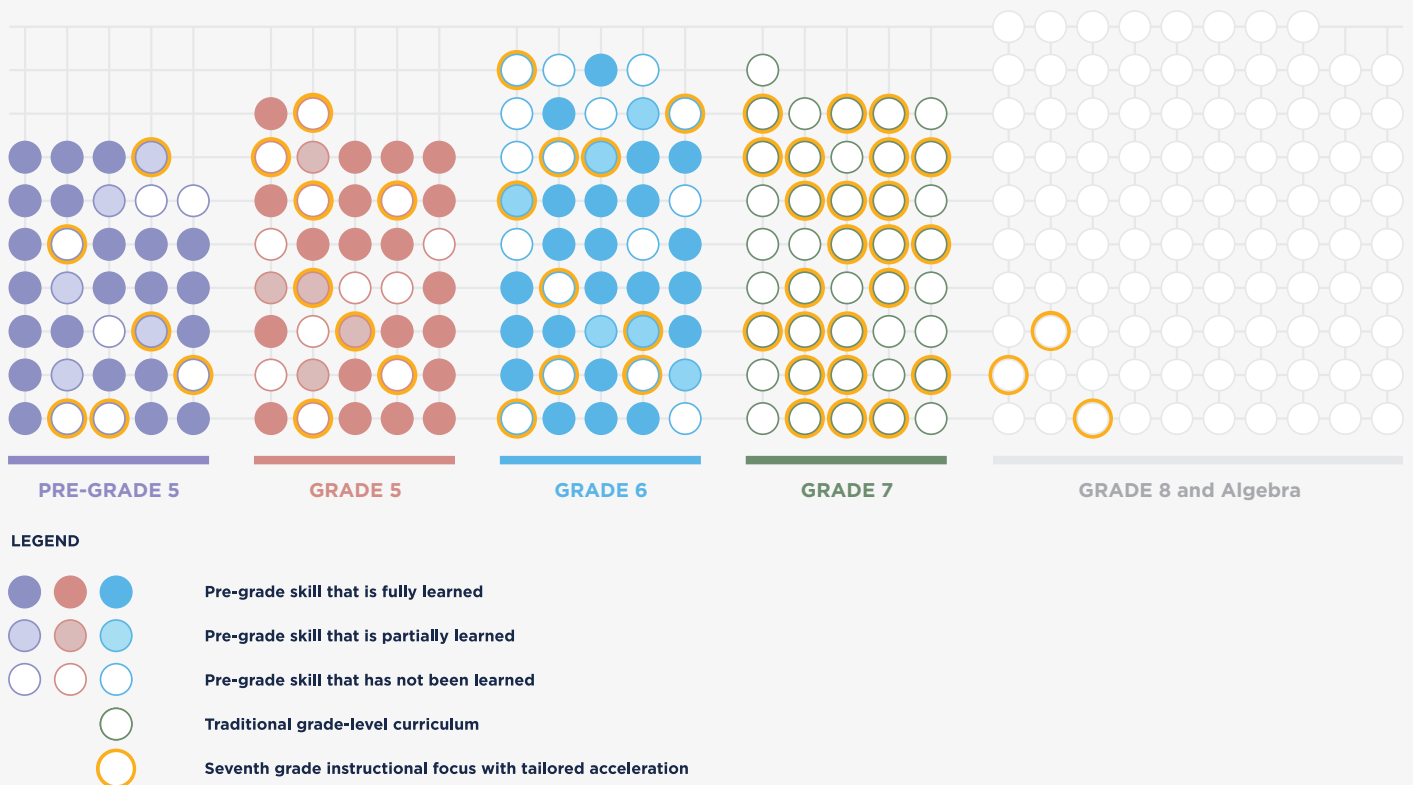
The driving impetus for tailored acceleration is the belief that students are fully capable of achieving college readiness. But for some, getting there requires addressing unfinished learning that has accumulated from prior years. An instructional program structured around each year's grade-level standards affords little opportunity to address those needs, while a thoughtfully designed multi-year approach (with measurable checkpoints along the way to serve as guardrails) affords them a far better chance to reach college readiness.

3. Mastery of Curriculum is Paramount

Student success in school and life depends on mastery, not simply exposure. While in many subjects, students may benefit from grappling with grade-level content even when they haven't mastered foundational concepts from prior years, these benefits often do not hold true in middle-school math. There are several grade-level skills where predecessor knowledge from prior years is essential for achieving mastery.

More important, mastery-based approaches can give students a far better chance to graduate ready for college or a career.

Take, for example, an incoming fifth-grader who begins the school year knowing none of the approximately 300 skills embedded in state standards that would take her through Algebra I. Having approximately 1,300 instructional days prior to graduating from high school (163 instructional days multiplied by 8 years) to learn them, the fifth-grader could learn an average of one skill every 4.3 days and master all 300 by the end of twelfth grade. This would be an exceptionally slow pace for most students, in our experience, when students are getting the right set of skills to work on.

But students are generally not progressing even at that pace given the fact that only about one-third of students nationally achieve this benchmark each year. **While the causes for these systemic failures are complex and varied, one potential and less-discussed reason might be the fact that a systemic focus on covering grade-level and course material is leading to massive instructional inefficiencies— students are frequently taught skills they either already know or do not have the requisite foundational knowledge to learn.** When students are taught math in ways that match the skills they are working on with what they are next ready to learn, instruction not only can become more efficient, but it can also be more engaging and reaffirming for students.

> More important, mastery-based approaches can give students a far better chance to graduate ready for college or a career.

4. Growth Reflects Progress on Essential Pre-, On-, and Post-grade Level Skills in Pursuit of Mastery

Because tailored acceleration enables students to address key learning gaps in service of achieving college and career readiness, it is essential to measure learning growth in ways that reflect progress on pre-, on-, and post-grade skills. However, state summative assessments are not built to do this because nearly all of the tested items are focused on grade-level standards. Thus, although many states and districts use state assessments to make determinations about learning growth, these determinations are severely limited by the fact that they are not designed to detect learning growth on pre- or post-grade skills.

Many of today's adaptive assessments make it possible to measure learning growth across different grade-levels.

Leveraging adaptive assessments to determine student learning growth can help to facilitate a multi-year instructional approach that both addresses learning loss and ensures students get back on the traditional instructional path to college and career readiness.

Figure 4: Tailored Acceleration Enables Students to Get Back on Track

the point at which each student catches up

PRE-GRADE 5   GRADE 5   GRADE 6   GRADE 7   GRADE 8   ALGEBRA   COLLEGE & CAREER READINESS

LEGEND

Traditional Instructional Path

Tailored Acceleration
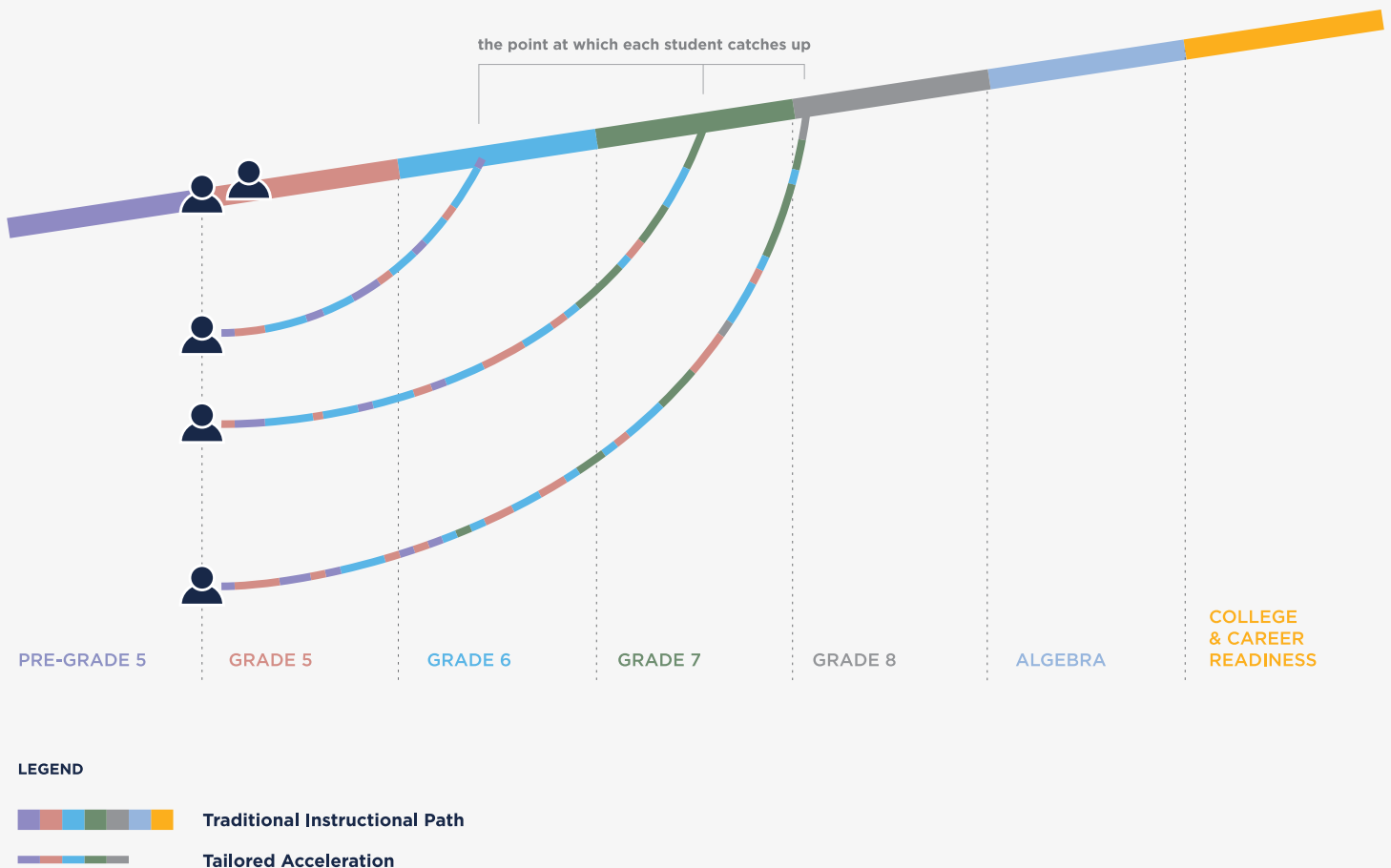
5. Rely on Multiple Instructional Modalities to Support Tailored Acceleration

Finally, tailoring middle-school math programs requires multiple instructional approaches, or *modalities*, so different students can learn different skills contemporaneously. **Teacher-led instruction** remains the most important and impactful way that students generally learn given the necessity of pedagogical skill, the importance of the teacher-student relationship, and the fact that learning is inherently a social and emotional process. However, other modalities can complement the work that teachers do in ways that deepen conceptual understanding and support tailored acceleration.

- **Collaborative modalities** allow peers to learn from one another, collectively problem solve, and build community.

- **Independent modalities** can accommodate each student's unique strengths, needs, and incoming skill sets while supporting them to progress at an appropriate pace, learn quietly from their misconceptions, and own their academic development.

In a world oriented around paper-based assignments, organizing a classroom around tailored acceleration would have been too burdensome to do regularly. The time required to diagnose each student's unique strengths and needs, aggregate lessons from multiple sources, assign activities to students, group and regroup students, and continually assess for mastery would have simply been impractical. However, today's technology makes these and other components of a multi-modal classroom far more doable.

Technology, however, is not a panacea. Not every school and home has sufficient access—digital instruction is a poor substitute for great teaching and some off-the-shelf software products are more effective and useful than others. But applied strategically, technology can enable each student to learn in ways that are far more attuned to his or her unique strengths and needs.

No doubt, investing in multiple modalities requires extensive planning or and/or pre-designed integration. But the fact that students can learn through a variety of instructional modalities (most importantly from teachers, but also from peers and by themselves) is what enables schools to reimagine the classroom so that each student can accelerate on his or her tailored path.

> The final shift middle school math programs must make to holistically address learning loss and fuel each student's learning pace is embracing multiple instructional approaches, or *modalities,* so different students can learn different skills contemporaneously.

SECTION III:

Creating a Tailored Acceleration Strategy: Diagnosing Gaps, Prioritizing Skills

The first step in building a plan for tailored acceleration is to determine the set of skills that students need to master in order to get back on track. To do this, schools must have

- an underlying skill map or framework;
- diagnostic tools to determine each student's starting point;
- the ability to strategically determine whether and how to prioritize teaching the skills that can get students back on track;
- assessments to gauge progress; and
- a plan to meaningfully engage parents in the process.

Create or Leverage an Underlying Skill Map or Framework

A common, multi-grade skill map that articulates the relationships between different skills within and across different grade levels is an essential tool for tailored acceleration. Thoughtful skill maps provide clear and consistent descriptions of the skills themselves so that teachers are aligned around an explicit definition of each one. They also can help to ensure that lesson plans, instructional resources, and assessments are all aligned around common understandings.

Our organization, **New Classrooms Innovations Partners**, has created a mathematics skill map that incorporates the approximately 300 skills that are included in states' math standards from grade five through Algebra 1 (along with several pre-fifth-grade skills that are predecessors to grade five). **Appendix A** includes our *Major Concepts Map for Sixth Grade Skills*.

Other organizations, such as **Student Achievement Partners**, **SUDDS**, and **Dynamic Learning Maps** also have published helpful skill maps that can be used for this purpose. Because different states can often define skills differently, align them to different grade levels, and make different choices as to what is and is not included, teachers may wish to use these or other skill maps as starting points for creating their own.

Diagnose Each Student's Incoming Achievement Level

Next, schools must diagnose each student's incoming levels of mastery to determine the focus of instruction and ensure that instructional time is not wasted re-teaching previously mastered skills or teaching skills that students are highly unlikely to master given identified gaps in their predecessor knowledge. Diagnostic assessments can be used to address this need, although many have limited precision at the skill level. As a result, schools may want to complement diagnostic assessments with additional data to refine their approach. They also may wish to incorporate a set of inference rules that can help them to presume skill mastery when students demonstrate proficiency on more advanced concepts. In doing so, it is essential that assessments of students' incoming mastery levels are based on evidence, rather than on unconscious biases around student ability.

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Note that New Classrooms recently **announced** it will be making available a free diagnostic assessment that generates individualized academic road maps for each student. The road map will reflect the subset of pre-grade, on-grade, and post-grade skills each student must still learn in order to ensure they graduate college and career ready.

Determine an Initial Academic Scope, Including by Prioritizing Skills

Once schools have a clear understanding of students' learning loss, they must determine the most appropriate target time frame to get students back on track. In doing so, many schools will likely need to prioritize an ambitious subset of skills that can be learned within the instructional time available.

Prioritizing a set of skills involves timing the most relevant pre-grade skills to the introduction of key on-grade and even post-grade skills. For example, all student instruction in the seventh grade could be "anchored" in seventh-grade-level material, but students would be learning a mix of pre-grade and on-grade skills in service of achieving grade-level mastery.

Relying on our skill map, **Figure 5** demonstrates the number of specific skills from each prior grade a student must learn (the yellow boxes in a specific column) in order to master the applicable grade-level skills covered in the state's year-end, grade-level test (the darker box at the top of each column). In the sixth grade, for example, this state test can cover approximately 44 skills, such as how to evaluate numerical expressions. But students won't know how to evaluate numerical expressions if they've never learned how to multiply and divide large numbers in prior grades. Mastering the 44 sixth-grade skills requires knowing 29 out of the 37 fifth-grade skills, as well as 34 skills from before fifth grade.

Figure 5: Total Number of Grade-Level Skills and Applicable Pre-Grade Predecessor Skills Each Grade

Focus of Grade-Level Tests					
Algebra					51
8th Grade				47	26
7th Grade			41	16	18
6th Grade		44	29	21	26
5th Grade	37	29	27	20	18
Pre-5	34	34	36	32	29

Prerequisite Skills

	5th Grade	6th Grade	7th Grade	8th Grade	Algebra
CUMULATIVE	71	107	133	136	168
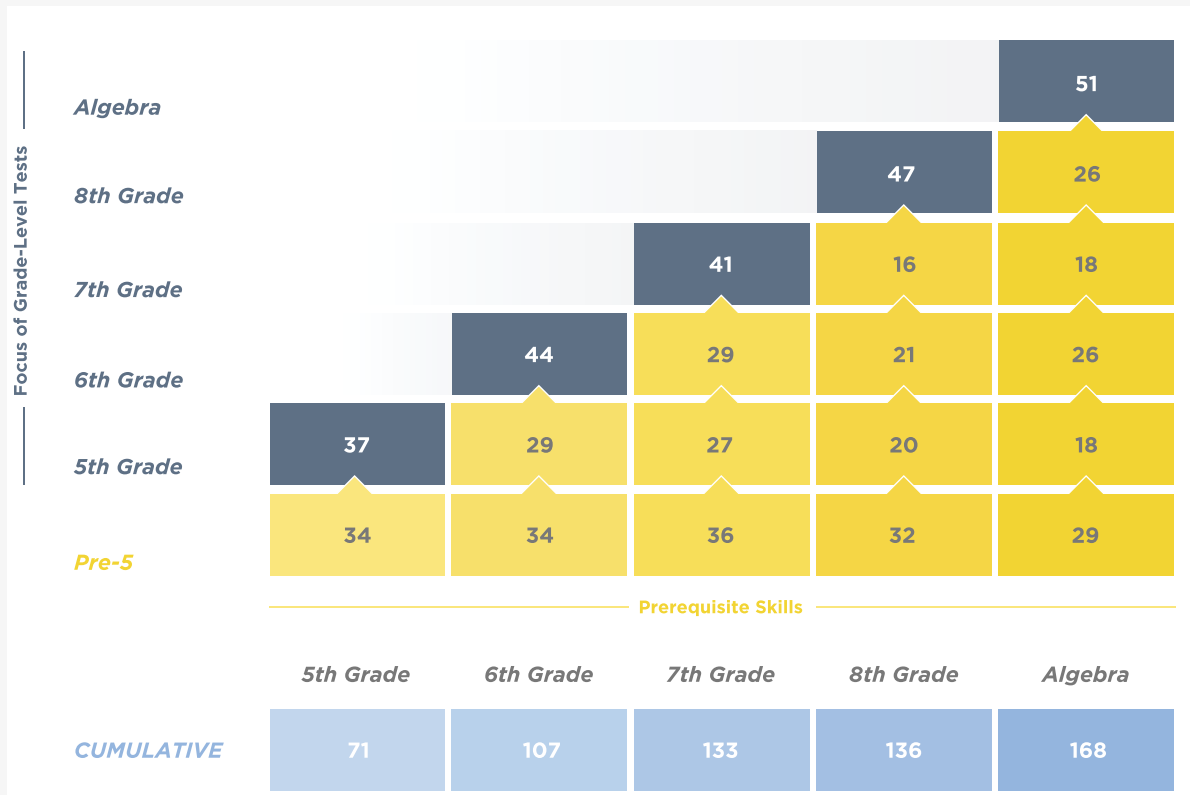
Note that even after prioritizing skills, schools that anchor instruction in grade-level material may need to add instructional time so they can cover grade-level content and applicable pre-grade learning gaps. If the additional time isn't enough, schools may choose to focus instruction on the grade-level and predecessor knowledge for a future grade level. For example, students who begin the sixth grade multiple years behind can focus for three years (sixth, seventh, and eighth grade) on the subset of predecessor and grade-level skills for eighth grade or Algebra.

Conversations about skills prioritization can be uncomfortable and can evoke concerns of students being deprived of access to important academic content. However, for those middle-school students who are beginning school years multiple years behind, and whose schools are unable to add enough instructional time, it is difficult to see how, without the strategic prioritization of skills, they will catch back up to the traditional instructional path.

Rethink Interim Assessment Strategies

In addition to year-end state tests that measure grade-level proficiency, many schools and school districts already administer other interim tests two to three times during the school year in order to help guide instruction. These interim assessments are often used to predict performance on state year-end tests, and thus reinforce an overall testing strategy that creates instructional incentives at odds with tailored acceleration.

Schools committed to comprehensively addressing learning loss through tailored acceleration will want to rethink their interim strategies. In doing so, they will want to consider using adaptive assessments such as NWEA's MAP and Curriculum Associates' i-Ready, which are both built to capture gains that cross multiple grade levels. These adaptive assessments have also published linking studies that enable results to be statistically linked to performance on summative state tests.

Figure 6: Tailored Acceleration with Interim Touchpoints

the point at which each student catches up

PRE-GRADE 5 · GRADE 5 · GRADE 6 · GRADE 7 · GRADE 8 · ALGEBRA · COLLEGE & CAREER READINESS

LEGEND

Traditional Instructional Path

Tailored Acceleration

● Interim Assessment
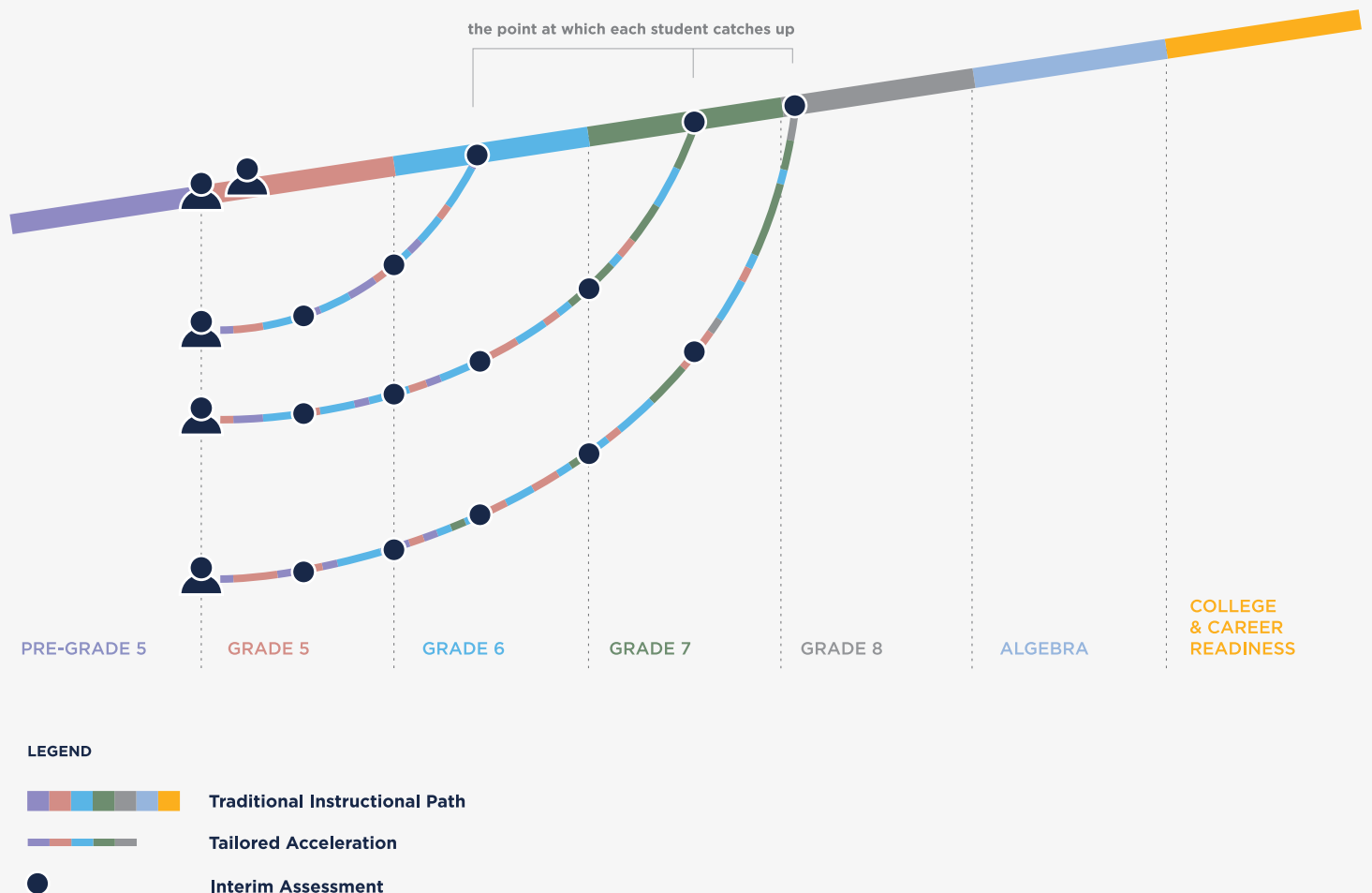
Meaningfully Engage Parents

While an approach focused on meeting the strengths and needs of each student can better accelerate progress, it will nonetheless differ from what parents are accustomed to seeing. Therefore, before planning any program, schools may want to get feedback for parents on which approaches for addressing learning loss best fit the school community, followed by clear communication with parents about the approaches the school has adopted. Providing accessible resources that enable parents to support their child's progress can further enable acceleration.

A Note on Meeting the Needs of Higher Performing Students

A one-size-fits-all approach to learning loss and instruction is often misaligned with the needs of students who are ahead, not just those who are behind. For example, although many students are fully capable of going beyond what's reflected in their state's standards, they may not be able to accelerate further because school accountability is focused on the grade-level test. This can lead many high-performing students to fall off track over time. (See Education Navigators, **Lost in the Crowd: The Fragility of HIgh Performance Among Low-Income Students**, April 2018.)

SECTION IV:

Creating a Tailored Acceleration Strategy: Key Program Design Choices

Recent school closures will require schools to rethink the timing, pacing, and content of the core academic program to ensure mastery. Those seeking to innovate will inevitably face several program design choices, including:

1

Whether to increase instructional time or maintain the existing allotted time.

2

Whether to enable tailored acceleration by replacing the core math program or by supplementing it.

3

Whether to group students within or across performance levels.

4

Whether to design your own tailored acceleration program or adopt an existing one.

Table 2 on the next page lays out the pros and cons of each choice and "bottom line" recommendations for creating an effective tailored acceleration program. (For additional program considerations, see **Appendix B**.)

Table 2: Tailored Acceleration Program Considerations: The Pros, the Cons, and the Bottom Line

1. Maintain or Extend Instructional Time

CHOICE	PRO	CON
Maintain current time	• no administrative or contractual ramifications	• current instructional hours may be insufficient to address learning loss
Add instructional time (more days, longer ones, summer programs)	• provides key opportunities to address learning loss and support student acceleration	• administrative challenges (e.g., bus schedules, school hours) • increased cost • potential implications for some provisions in collective bargaining agreements • uncertain impact if not done with quality
BOTTOM LINE	Especially during COVID-19 and beyond, it is hard to imagine many students accelerating to proficiency without more instructional time.	

2. Redesign Core Program or Implement a Supplemental Program: How to Make the Best Use of More Time

CHOICE	PRO	CON
Redesign core program	• Ensures all math instruction is moving in the same direction and aligned around tailored acceleration	• requires careful planning, coaching, and collaboration • requires either new materials or the adoption of a new program • may not align with current policy expectations
Supplement math program outside of core program (which still teaches grade-level standards)	• increases learning time • can increase attention to and support for a group of students • easier to implement	• hard to synchronize with a core academic program (because the time it takes to teach a grade-level skill can differ from the time required to teach its predecessor skill or skills) • students still may need to be retaught many of the skills covered during core instruction
BOTTOM LINE	Even with successful supplemental programs, the success of tailored acceleration for many students will depend on core-program redesign.	

3. Group Students Within or Across Performance Levels

CHOICE	PRO	CON
Group across performance levels (heterogeneous)	• avoids stigmatizing • enables students who have shown proficiency with a concept to support students who are still gaining proficiency	• differentiation is more challenging • risks increasing learning loss for some students and curtailing growth for others
Group by performance level so students so students in a group share the same strengths and needs (homogeneous)	• requires less instructional differentiation by teachers • instructional time can be tailored to skills that students do not yet know and are ready to learn	• stigma can attach to performance-based groupings • students perceive they are on a fixed track (and often are treated that way)
BOTTOM LINE	Done well, same-ability grouping can better tailor math instruction to each group's needs—as long as the groups are dynamic (e.g., they change frequently based on specific skill performance; teachers rotate between different groups; some time is reserved for mixed-ability groups to broadly problem solve). These dynamic approaches, however, can impose a considerable burden on teachers.	

4. Design Your Own Tailored Acceleration Program, Adopt an Existing One, or Do Something in Between

CHOICE	PRO	CON
Design a home-grown program	• can reflect the precise needs of a school community • can lead to greater levels of teacher investment • can incorporate one or more existing tools, products, and/or services as components (see **Appendix C** for helpful resources)	• time and cost to develop and maintain • components may not fit with one another • may require technological capacities that are not available
Adopt an existing program (see following page for a description of Teach to One: Math, the program we operate)	• reduces the burden of program development • provides a comprehensive approach • aligns program components • may come with additional supports	• may not be fully aligned with a school's overall vision • may require accommodations to meet program requirements • cost to purchase and implement
BOTTOM LINE	Schools should actively explore each option and determine, based on their strengths and capabilities, which approach best fits the needs of their students, school, and families.	

Our nonprofit organization, **New Classrooms Innovation Partners**, has grappled with many of the design choices presented in **Table 2** (as well as the issues described in **Appendix B**). This has led us to work with schools to develop a comprehensive middle-school mathematics program called **Teach to One: Math**, which enables tailored acceleration. It is currently in operation in leading middle and high schools across the country.

Teach to One Math is a tailored acceleration solution for meeting the unique strengths and needs of each student.

Key Components

Individualized Curriculum

Each year, the program generates an individualized curriculum for each student that integrates essential pre-grade, on-grade, and post-grade skills to address learning loss holistically and put each one on a tailored path to college and career readiness.

Multiple Modalities

Multiple educators work together to deliver this curriculum through multiple instructional modalities that integrate teacher-led instruction, small group collaboration, and independent learning.

Frequent Student Regrouping

Each day, a scheduling program uses data from a brief assessment called an "exit slip" to generate unique daily student schedules that group students based on what each student is ready to learn and what approach is most likely to work best.

The Use of Technology when it Provides Unique Value

In addition to creating student schedules, technology also supports student diagnostics, at-home learning, and remote instruction if students are absent or schools are closed.

A Core or Supplemental Solution

Teach to One: Math can be implemented as either a core math program or as a supplemental offering.

A Focus on Learning Growth

To measure learning growth over time, students typically take the Measures of Academic Progress (MAP) test up to three times a year. School leaders are provided with detailed reporting on overall student progress, which can span more than a single year.

A third-party study of schools implementing Teach to One: Math over a three year period found that student gains on NWEA MAP were 23 percent higher than the national average. In schools that were willing and able to focus the program more on individual student learning growth (as opposed to prioritizing grade-level exposure), gains were 53% above the national average.[4]

Individualized Math Instruction Through Multiple Instructional Approaches:

How Teach-to-One: Math Does It

Imagine you're a seventh-grader. You have reading in room 201 during the first period and P.E. in the gym during the second period. For the third period, you have math. Instead of walking into a traditional classroom, you join one hundred of your peers in the school's math center, which is a large, open space. You're greeted by a team of teachers who are spread out across several different learning stations. You look up at a big TV monitor, find your name, and see which station to go to.

Depending on the day, you spend the first thirty-five minutes at one station working on probability with a teacher and fourteen peers whose skill progressions happen to intersect with that concept. Then you spend the next thirty-five minutes at another station working with a small group of peers on a collaborative activity relating to probability. For the final ten minutes, you'll take an online exit slip to assess how well you understand probability. Based on the data from the exit slip, the program will generate a unique schedule for you for the following day based on whether you've learned probability or need some additional time to master it.

SECTION V:

Aligning Policy to Effectively Implement Tailored Acceleration and Overcome Learning Loss

Those committed to addressing learning loss must address current misaligned education policies (and resulting systems)—starting with those related to testing and accountability.

Over the last several decades, policymakers have adopted a series of laws, regulations, and practices that have continually reinforced the primacy of age-based instruction and standardized accountability systems revolving around grade-level standards. These policies have led districts and schools to focus their policy and practice on state grade-level reading and math assessments. Today, these policies may be undermining efforts to address learning loss by dampening the appetite for programs and interventions that depart from a grade-level-only focus.

Schools looking to challenge this paradigm will need the support of senior administrators and policymakers to provide them with the space and cover to take thoughtful approaches to addressing learning loss that are aligned with the ultimate objective of college and career readiness. This might include:
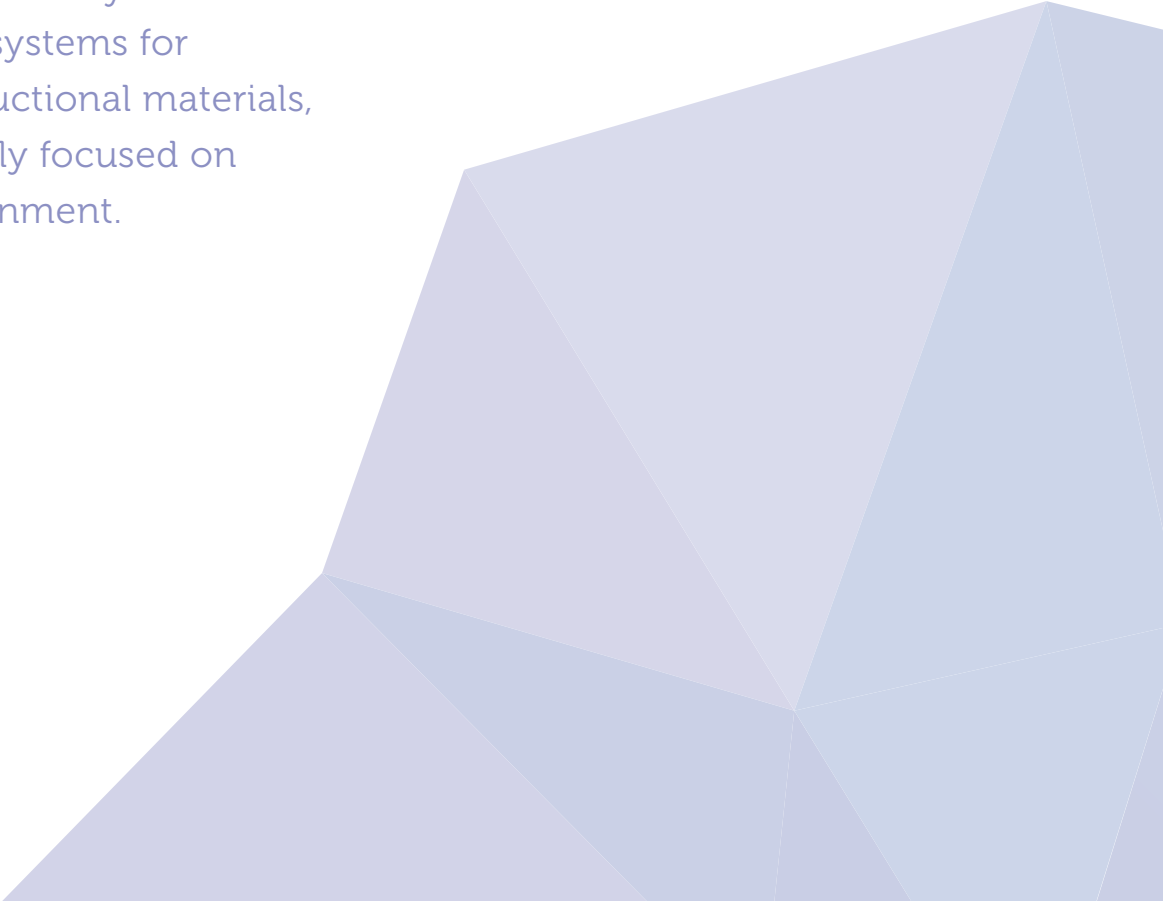
- **Granting permission** for schools to target ambitious attainment targets that extend beyond a single school year, as opposed to annual attainment benchmarks. In these cases, schools could still be held accountable annually for meeting growth targets on adaptive assessments.

- **Complementing current statewide assessments with adaptive assessments** that include standards from multiple grade levels, and thus can better assess overall learning growth. Some of these assessments can also be statistically linked to results on current state summative assessments.

- **Piloting state adaptive assessments**, as Georgia and Nebraska have done, which use data from multiple test administrations to generate information about students' overall learning growth *and* performance relative to grade-level standards.

- **Developing innovative accountability pilots** to complement the innovative assessment systems sponsored in the Every Student Succeeds Act (ESSA).

- **Adjusting statewide accountability plans** to weight key grade-level transition points more heavily and/or allow for growth to be measured across multiple years.

- **Creating Math Innovation Zones** where participating schools and their districts can develop new approaches to meet students where they each are and accelerate from that point forward, far beyond what they might otherwise have achieved.

- **Calling on district leaders,** who have greater flexibility than states, **to serve as laboratories** for accountability innovation, with the backstop of state accountability systems providing an additional layer of assurance and transparency.

These approaches may be the best available options since the U.S. Congress is unlikely to revisit the core tenets of ESSA anytime soon.

Assessment and accountability policies are not the only barriers to enabling tailored acceleration. States and districts looking to support tailored acceleration will also need to consider other policies—most notably their processes and systems for procuring instructional materials, which are largely focused on grade-level alignment.

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Conclusion

As schools begin to plan for what school reopening may look like in the fall, they will have the opportunity to confront what for many was a vexing challenge long before COVID-19— managing learning loss.

While the challenge of unfinished learning long predates the virus, there will be new expectations from parents, community leaders, and senior administrators to articulate a plan for how schools can help students to recover from missing out on, at minimum, three to four months of instruction. These plans can be shaped in one of two ways.

Under one approach, schools can focus on articulating plans for covering the material that students may have missed while they were out. The gravitational pull to reset school to the way things were before they closed will be strong, and school communities will long for the familiar routines and characteristics of school, including a system oriented exclusively around grade-level instruction. In these cases, schools' plans will center on modifying curriculum and finding additional instructional hours to get back as quickly as possible to the way things were. Many of these solutions will sound responsive, but they will often be wholly inadequate.

Under another approach, educational leaders will see this planning process as an opportunity to rethink learning loss more comprehensively. In doing so, they will want to challenge the age-based, standards-aligned paradigm that has shaped our educational system for several decades and look to develop approaches to instruction that are more responsive to where students are starting from and where they need to get to. The inability of a significant majority of American students to reach proficiency level or above in math, even before COVID-19, will further motivate them.

Leaders now have more reasons than ever to consider tailored acceleration geared to the long-term objective of college and career readiness.

First, school closures have resulted in renewed attention to learning loss, which is now severely and inequitably impacting far more students than was the case before schools closed. A continued focus on grade-level standards, when students verifiably do not have the foundational knowledge to succeed, wastes precious instructional time and frustrates both students and teachers alike. Parents, too, will be demanding solutions for getting their children on track, and school leaders will need strategies and approaches that are sufficiently responsive to this expectation—especially if schools can't reopen in the fall or must close midway through the school year.

Second, states did not administer summative grade-level assessments in the spring of 2020, and it is unclear what they will do in future years. Federal and state assessment and accountability policies may shift in some ways because of school closures. This could provide the space for innovative approaches to instruction and assessment that allow for more tailored and integrated paths to college and career readiness.

Third, the abrupt shift to distance learning may have helped some educators to recognize some of the benefits of using technology. Few will argue that remote learning is better than in-class learning. Many, however, may be looking to bring into their future classrooms some of its key elements such as software to support classroom workflow, digital tools that enable asynchronous learning, and brief, real-time assessments that help teachers to measure and facilitate student understanding. These tools can make tailored acceleration more viable.

Fourth, the closure period has reinforced the criticality of ensuring students' academic programs are responsive to their social and emotional needs once schools reopen. The combination of the loss of loved ones, economic distress, and the lack of social interaction has assuredly impacted the social and emotional building blocks for learning. While all students need to be appropriately challenged each day, returning to an exclusive focus on grade-level instruction that, for many students, is far beyond where they are starting from can exacerbate feelings of powerlessness and further erode motivation.

For these leaders willing to step out in front, we hope the approaches and information included in this report serve as the starting point for how best to venture down this path. The universe of possibilities available to implement tailored approaches to acceleration extend far beyond what is included here.

We hope these ideas can serve to inspire schools to develop new approaches, tools, and ideas for ensuring a learning environment that is better structured and equipped to meet the unique strengths and needs of each of each of their students, while putting them on their own tailored path to college and career readiness.

6TH GRADE MAJOR CONCEPTS MAP
192 skills in 65 Major Concepts + 125 Additional Skills in Appendix only

POST
Algebra Extension
11
Skills in
4
Major Concepts

ALG
47
Skills in
16
Major Concepts
25 Skills in
Additional Concepts

8th
GRADE
42
Skills in
12
Major Concepts
7 Skills in
Additional Concepts

7th
GRADE
24
Skills in
7
Major Concepts
18 Skills in
Additional Concepts

6th
GRADE
23
Skills in
9
Major Concepts
22 Skills in
Additional Concepts

5th
GRADE
24
Skills in
9
Major Concepts
13 Skills in
Additional Concepts

PRE
2-4TH GRADE
FOUNDATIONAL
35
Skills in
13
Major Concepts
11 Skills in
Additional Concepts

Rational Equations

Rational Expressions

Sequences

Trigonometric Ratios

System of Functions 7
Advanced Systems of Functions

Solving Complex Linear Inequalities

Solving Quadratics 4
Solving Quadratic Equations

Graphing Quadratics

Exponential Functions

Factoring Polynomials

Solving Complex Equations 10
Manipulating Linear Equations

Graphing Linear Inequalities

Algebraic Functions 10
Function Properties

Operations w/Algebraic Expressions 7
Polynomial Operations

Understanding Correlations

Systems of Linear Equations

Solving Complex Linear Equations

Multi-Step Equations

Interpreting Functions

Linear Functions

Transformational Geometry 7
Series of Transformations

Pythagorean Theorem

Scientific Notation

Square & Cube Roots

Laws of Exponents

Understanding Functions

Types of Transformations

Missing Angles

Algebraic Inequalities

Solving Basic Equations 6
Two-Step Equations

Operations with Linear Expressions

Rational Numbers 9
Operations with Rational Numbers

Ratio Reasoning 10
Proportional Relationships

Percents 9
Applying Percents

Representing Rational Numbers

Translating Expressions

Simple Equations

Evaluating Expressions 5
Evaluating Algebraic Expressions

Rational Numbers & The Number Line

Rates

Understanding Percents

Evaluating Numerical Expressions

Ratios

Fraction Operations 14
Dividing Fractions

Adding & Subtracting Decimals

Dividing Decimals

Multiplying Decimals

Multiplying Fractions

Place Value 11
Properties & Powers of 10

Adding & Subtracting Unlike Fractions

Decimal Place Value

Dimensional Geometry 7
Understanding Volume

Whole Numbers Operations 17
Multiply & Divide Large Numbers

Adding & Subtracting Like Fractions

Basic Algebraic Thinking

Understanding Division

Understanding Fractions 9
Fraction Equivalence

Understanding 2-D Objects

Compare Whole Numbers

Understanding Multiplication

Understanding Area

Comparing Fractions

Whole Number Place Value

Understanding Addition & Subtraction

Representing Fractions

See **Major Concept Maps** for the fifth, sixth, seventh, and eighth grades, as well as for Algebra 1.

Additional Considerations When Designing Tailored Acceleration Programs

In addition to grappling with the instructional choices discussed in Table 2 in section III, Creating a Tailored Acceleration Strategy, several more considerations go into designing a tailored acceleration program

Professional Development and Collaboration

Integrated acceleration can be perceived, at least initially, as more difficult to implement than coverage-based approaches to instruction. Depending on which strategy a school pursues, teachers will need different kinds of supports from coaches and colleagues to ensure adequate preparation. Leveraging adaptive software may require training in how best to integrate and access data from the products themselves, while the support required to integrate high-dosage tutoring may focus on thorough communication and coordination between schools and the respective tutoring program. For in-house programs, administrators should not simply assume that teachers are well versed in how best to teach skills outside of their assigned grade level.

Special Student Populations.

Any approach taken by schools to address learning loss must adequately account for the unique needs of students with disabilities. In many cases, schools will need to discuss with parents how the proposed approaches to addressing learning loss aligns with students' Individualized Education Plans and whether these plans should be modified. The proposed approaches must also ensure that adequate strategies are in place to address learning loss among English language learners.

Supporting New Enrollees

Schools will need plans to both diagnose unfinished learning for those who transfer into a school during the middle-school years, as well as a methodology for determining the appropriate timeline for achieving their academic objective.

Scoring and Grading

Schools implementing integrated acceleration must norm on the methodology to calculate student grades. This may include factors such as performance on various assessments, homework, and class participation. In-house programs that involve continually regrouping students and rotating teachers may need to designate a single teacher-of-record for each student.

Promotion Standards.

Schools shifting to integrated acceleration will need to articulate the standards they intend to apply to guide grade-level promotion. This will require considering how to weigh growth on pre-grade skills and mastery of on-grade skills.

Some Relevant Tools and Resources for Tailored Acceleration

A COMPREHENSIVE LEARNING MODEL:

- **Teach to One: Math**
  A comprehensive middle-school math program providing an integrated set of tools and supports to fully address learning loss and accelerate students' mastery toward college and career readiness.

OTHER TOOLS AND RESOURCES THAT SUPPORT ONE OR MORE ASPECTS OF TAILORED ACCELERATION.

SKILL MAPS

- **Student Achievement Partners**, **SUDDS**, and **Dynamic Learning Maps**

STUDENT MASTERY TRACKERS ACROSS MULTIPLE GRADE LEVELS:

- **School4one** and **Mastery Track**
  Software products for tracking student mastery. These products allow for significant customization even though they are pre-loaded with learning objectives.

LEARNING GROWTH ASSESSMENTS

- **MAP assessment (NWEA)**, **i-Ready (Curriculum Associates)**, and **STAR Math (Renaissance Learning)**
  Interim assessments of learning growth. These can be linked to summative assessments and tests of college and career readiness.

MASTERY-BASED GRADING STRATEGIES:

- **ReDesignu.org**
  Helpful tools for developing mastery-based grading strategies; additional resources for mastery-based education more broadly.

DIGITAL CONTENT FOR K-12 STUDENTS:

- **Khan Academy**, **i-Ready**, and **Dreambox**
  Products allowing students to progress through digital content at their own pace and in ways that are personalized. More frequently used in supplemental contexts rather than serving as students' core curriculum; has reporting capabilities.

- **LearnZillion**, **BuzzMath**, and **IXL**
  Products allowing schools to designate a defined set of skills for all students within a cohort to focus on.

HIGH-DOSE TUTORING:

- **Blueprint Schools** and **Saga Education**
  Professional tutoring organizations partnering with schools to provide in-school tutoring services.

- **FEV Tutor** and **TutorMe**
  Organizations providing virtual live tutors, usually bringing with them a set of diagnostic tools and instructional materials to leverage.