Formative Assessment Toolkit

Everything you need to connect formative assessment to teacher practice.
From Formative Assessment to Informative Assessing in the Math Classroom

PREVENTING THE FAILURE TO LEARN

Gregory Firn, EdD
Superintendent in Residence | DreamBox Learning, Inc.
Introduction: The use of leading indicators to inform math instruction

One of the routes to deeper student math learning and a healthy learning mindset is using an “in the moment” formative assessment process rather than “rear-view mirror” summative assessment testing data to inform teaching and learning. Increasingly, experts, researchers, and even new legislation support the use of ongoing, rigorous formative assessment to engage students and provide insights into student thinking so teachers know how to adjust lessons based on learner thinking and performance, and how to teach to mathematics standards.

One effective advance is the use of software that enables embedded ongoing formative assessment and seamless instructional shifts while students are immersed in a game-like environment—used for “stealth assessing”—a boon for educators and students alike. Next generation mathematics software that intelligently adapts, enables the ability to use data to co-create, co-author, and collaborate instruction, while promoting student agency. Now there is no need to wait until a student has failed to intervene and correct the mistake or failure.

Whether teachers are taking advantage of more traditional formative assessment strategies or using education technology to enable ongoing embedded informative assessing, a change in culture and teaching methods is required. The cultural shift necessary for strategically using informative assessing in math doesn’t happen overnight. But the stimulation of metacognitive thinking, student engagement, and instructor insights are worth the results: deeper student understanding and authentic growth in mathematics knowledge and achievement.
Informative assessing defined

The English word “assessment” is derived from the Latin *assidere* “to sit beside.” One way to think about transforming formative assessment to informative assessing is to think of it as akin to living a wellness lifestyle: preventing health problems before they occur. In the same way, in its most authentic state, assessment should serve to prevent intervention, not merely react to instruction, and occurs during the learning process, so that it is unnecessary to wait until a student has failed to treat a mistake or failure to learn. It informs and also provides insight and intelligence to both teacher and learner. Research shows that the collaborative nature of this collaborative approach results in a less stressful environment for teachers and students alike,¹ and in the activation of students as owners of their learning by stimulating metacognition, motivation, interest, attribution, and self-assessment.² I am advocating a shift to thinking of the process as one of *informative assessing*—meaning an ongoing process that informs both teaching and learning.

<table>
<thead>
<tr>
<th></th>
<th><strong>INFORMATIVE ASSESSING</strong></th>
<th><strong>SUMMATIVE ASSESSMENT</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>Form</strong></td>
<td>Ongoing process</td>
<td>Test</td>
</tr>
<tr>
<td><strong>Time factor</strong></td>
<td>In the moment: Integrated while learning is taking place; not a one-time event</td>
<td>Rear-view mirror: What was learned and at a distance from the learning objective at a particular point in time; a one-time event</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>Ongoing</td>
<td>At a particular point in time</td>
</tr>
<tr>
<td><strong>Grading</strong></td>
<td>Not necessarily graded; information is used as feedback for student and teacher</td>
<td>Graded</td>
</tr>
<tr>
<td><strong>Student engagement</strong></td>
<td>Active engagement and self-regulation</td>
<td>Passive</td>
</tr>
<tr>
<td><strong>Use requirements</strong></td>
<td>Defined targets understood by student Defined criteria understood by student Descriptive vs. evaluative feedback</td>
<td>Assessment plan that clearly defines learning targets. Well-designed test using evidence-based best practices</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Constructive feedback and understanding to inform and adjust instruction</td>
<td>Evaluate progress at specific points in time against curriculum and/or standards, program effectiveness, student improvement goals, and student placement</td>
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</table>
The most powerful single modification that enhances achievement is feedback. The simplest prescription for improving education must be ‘dollops of feedback.’

—John Hattie, Author of Visible Learning

One of the challenges with reimagining formative assessment is moving away from how it has been used to predict performance on summative assessments. This is part of the dissonance that teachers face in embracing the shift.

RESEARCH AND EVIDENCE

Informing instruction through ongoing assessment isn’t new—it’s been with us since the time of Socrates—and many teachers have used it in the classroom to elicit feedback and dialogue with students. Educators and researchers refined the concept over time, but in 1998 when the influential review, Inside the Black Box: Raising Standards Through Classroom Assessment, by Paul Black and Dylan Wiliam was published, formative assessment began to gain mindshare in school systems worldwide. Black and Wiliam found that formative assessment promises high-quality education for all, and can raise standards and improve learning outcomes for all students, including those students who are “low attainers” or who have learning disabilities, due in large part to the use of feedback to enhance learning. The Assessment Reform Group, which commissioned Black and Wiliam’s research review, has unequivocally concluded that improved formative assessment practices in classrooms typically yield gains in student achievement roughly equivalent to one to two grade levels in learning.

Source: http://cdn.aaia.org.uk/content/uploads/2010/06/Assessment-for-Learning-Beyond-the-Black-Box.pdf
The power of formative assessment is echoed in the meta-analysis of effective instructional strategies led by Robert Marzano, Debra Pickering, and Jane Pollock, which identified providing feedback—a central principle of formative assessment as one of nine categories of instructional strategies that have statistically significant effects on student achievement. More recently, John Hattie, who authored the book Visible Learning—a meta-analysis of more than 800 research studies involving more than 80 million students—has said, “The most powerful single modification that enhances achievement is feedback. The simplest prescription for improving education must be ‘dollops of feedback’.”

The National Council of Teachers of Mathematics (NCTM) has long supported the use of formative assessment in classroom practice, and confirms the view that it directly correlates with improvement and student achievement. “Formative strategies embedded in instruction provide opportunities for students to make conjectures, incorporate multiple representations in their problem solving, and discuss their mathematical thinking with their peers. Effective formative assessment has a positive impact on student achievement and how they perceive themselves as learners. This stance is backed up by research and the understanding of how students actually learn.”

SUPPORT FOR CHALLENGED AND ADVANCED LEARNERS. No single method, reform, or system is the “silver bullet” that can solve all educational challenges, but improved formative assessing strategies does proffer a potent means for meeting goals for high-performance, high-equity student outcomes, and a pathway to provide students with 21st century knowledge and skills for lifelong learning. Formative assessment researcher Margaret Heritage also notes that its support of key initiatives such as Multi-Tiered System of Supports (MTSS), Response to Intervention (RtI), Common Core State Standards (CCSS), and Next Generation Science Standards (NGSS) help make the case for enculturation of formative assessment. Because formative assessment by its nature teaches to the individual and not the test, it has great potential as a tool to help every learner.

For additional research studies that provide evidence that informative assessing positively impacts teacher practice and student achievement, refer to the Resources section at the end of this document.

A look into Robert Marzano’s meta-analysis and research

Robert Marzano explains the effective practice of ongoing formative assessing in the classroom to power student gains.
Creating a supportive culture

The role of administrators. A school-wide or district-wide commitment to informative assessing is most effective and sustainable when it is done well under the right conditions—meaning, a supportive culture. Developing a culture of informative assessing relies on a coordinated, collaborative, and comprehensive process that stresses professional development for administrators and teachers, and also provides the time for new learning and new tools. School leaders must create time for teachers to improve formative assessing practices and must ensure that teachers receive consistent and constructive feedback on their use of those practices in the classroom. Administration, instructional coaches, and mentor teachers can demonstrate their beliefs in using informative assessing and act in partnership toward a common and sustained goal to incorporate formative assessment.

A Guide to Support Implementation:

Essential Conditions

Collaborative implementation planning by educational leaders at all levels across the school district requires:

1. **Shared vision.** Stakeholders share an understanding of and commitment to the implementation of formative assessment across the district.

2. **Leadership.** Leaders at all levels provide the leadership that moves the organization toward its goal.

3. **Research and evidence.** Implementation decisions must be based on current research as well as recent district and school data.

4. **Resources.** Successful implementation depends upon having sufficient human resources, materials, and funding.

5. **Teacher professional growth.** Ongoing PD is provided to enhance teachers’ understanding of formative assessment processes.

6. **Time.** Successful implementation and sustained change take time.

7. **Community engagement.** Parents, school councils, students, and other community members must be included in developing the vision and plans for its implementation.

Source: [http://www.essentialconditions.ca/essentialconditions_eng.pdf](http://www.essentialconditions.ca/essentialconditions_eng.pdf)
REALISTIC STRATEGIES AT THE ADMINISTRATIVE AND CLASSROOM LEVEL

A two-way street for math students and teachers. As Cathy Fosnot emphasized in her webinar, *Dynamic vs. Static Assessment: A Growth Mindset Perspective,* "Assessment should inform lessons and learning dynamically and formatively, not statically. It should be continuous, support a growth mindset in learners, and provide information about a student’s Zone of Proximal Development, as defined by Vygotsky." It captures genuine mathematizing—learner strategies, their ways of modeling problems, and their understanding of key mathematical ideas. Bottom line, assessment needs to be continuous, dynamic, and adaptive so that it can capture where the child is on the landscape of learning—where they have been, what their struggles are, and where they are going next.”

Feedback is Essential to Effective Formative Assessing

In other words, informative assessing provides information that changes what both the teacher and the learner are doing. Students also learn the skills of self-assessment and peer-assessment. These tools enable them to collaborate with their teachers in developing a shared understanding of their current learning status, and what they need to do to move forward in their learning.
In doing so, they are using metacognitive processes. They reflect on their learning, monitoring what they know and understand, and are determining when they need more information. They also develop self-regulation strategies and are able to adapt their learning tactics to meet their own learning needs. Students must also collaborate with their teachers to determine the criteria for success for each step along the learning progression.\(^{14}\)

In line with the “growth mindset” research from Carol Dweck,\(^{15}\) formative assessing helps set students up for success and assists in the development of new ways of thinking and improving. In mathematics, students who have come to think of themselves as “bad at math” get a clearer idea of what they need to do to develop their understanding and make forward progress: simply focus on making sense of the ideas, looking for relationships and patterns, and develop knowledge and skills. The goal of formative assessing is to inform and improve. As accomplishments are made and one achievement builds upon another, motivation springs up, and that breeds success.

**The Every Student Succeeds Act (ESSA) and the role of assessments.** ESSA, which will take effect after the 2017–2018 school year, represents an unprecedented opportunity for a serious review of the role, purpose, and utility of assessments. Moreover, ESSA will challenge schools and school systems to assess the value of assessments to inform, improve, and impact teaching and learning.\(^{16}\) ESSA recognizes the need for greater balance between formative and summative assessments. The Act itself also encourages the adoption of innovative approaches to formative assessing to help bring even greater equity and improve the quality of teaching and learning.

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**Formative assessing in action**

Learn how math teacher Ben Mook challenges his students to solve real-life problems, and why he emphasizes their thought processes over getting the right answers.

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In other words, informative assessing provides information that changes what both the teacher and the learner are doing.
**Standardized math tests can become less formidable.** In 2008, the National Mathematics Advisory Panel cited research to support the position that the use of formative assessment in mathematics classrooms directly correlates with improvement in student achievement (as measured by tests). “A review of practice by the Organisation for Economic Co-operation and Development (OECD) across eight countries defined formative assessment as frequent, interactive assessments of students’ progress and understanding to identify learning needs and adjust teaching appropriately.”17 Formative strategies embedded in instruction provide opportunities for students to make conjectures, incorporate multiple representations in their problem solving, and discuss their mathematical thinking with their peers, with a positive impact on student achievement and how they perceive themselves as learners.

Formative assessment guides the curriculum through a reflective process focused on student attainment of goals and standards. Because the feedback is so rich and meaningful, students can do well on standardized and other summative tests because they have deeply learned and understand mathematical concepts.18

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**Free, evidence-based resources for administrators and teachers**

**Mathematics Assessment Resource Service**

**Mathematics Formative Assessment System/CPALMS**

Both resources provide lessons, tasks, professional development modules, and tools aligned to the current standards.
DATA AND NEXT GENERATION TECHNOLOGY IN THE INFORMATIVE MATH CLASSROOM

The analysis and ability to act on data is a necessary shift to assess the learning process, and not just the product of learning. With the advent of educational technology that provides in-the-moment data, the collection and understanding of those data has been simplified, thus freeing the teacher to make more effective use of class time. Data that provide insights into how a learner is constructing meaning, forming understanding, and practicing skills in the very moment of learning—in real time—is helping drive a revolution in seamless, continual, embedded formative assessment. The use of data, especially as it relates to the consistent and constant improvement of teaching and learning, is central to creating and sustaining a culture with transformative impact.19

From formative assessment to informative assessment and instruction. A few next-generation educational math software programs provide truly ongoing embedded formative assessing and are able to analyze data delivered in real time to surface how students are thinking and the strategies they are using to solve a problem. This ability means it is possible to interrupt, disrupt, and finally to prevent the failure to learn.

Informative assessing to meet mathematics standards

Gains on Massachusetts Comprehensive Assessment System (MCAS)

<table>
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<tr>
<th>2013–2014</th>
<th>17%</th>
<th>Growth achieved with 60 minutes of DreamBox Learning Math usage per week</th>
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<tbody>
<tr>
<td></td>
<td>9%</td>
<td>FEWER STUDENTS IN WARNING CATEGORY</td>
</tr>
<tr>
<td></td>
<td>12%</td>
<td>MORE STUDENTS MEETING ADVANCED PROFICIENCY</td>
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Massachusetts’ Carlton Innovation School used DreamBox Learning adaptive digital curriculum with embedded ongoing formative assessing within and between lessons to create the optimal learning experience for every student. each student monitors whether an objective has been mastered and provides support with varying strategies until the assigned standard is achieved.

Source: DreamBox Learning
By tracking, analyzing, and responding every time a student takes an action, Intelligent Adaptive Learning software from DreamBox Learning works at the point of learning. In addition to formative assessing, this learning software incorporates “formative instruction” because every lesson utilizes virtual manipulatives that allow students to show their thinking—through rich, interactive, and open-ended problem solving lessons—and allow the capture of every decision a student makes, as well as data regarding response time, strategy used, types of mistakes made, and more. The idea behind continuous assessment isn’t just to enable providing a slightly more difficult or easier problem in response to a single answer. It’s also to understand the strategy being used by the student when an answer was submitted. The data are continuously available to the teacher so he or she can engage, or the information can be used to group students appropriately so they can be supported in meeting learning objectives.

**Conclusion: Informative assessing is transforming math learning**

Using informative assessing in mathematics instruction or any other subject isn’t about teaching to the test or teaching to the middle. It’s about teaching for and to the individual in alignment with key learning outcomes. It is an essential tool for individualization and differentiation, and when enabled by the latest educational technology, it supports deep learning and personalization at scale, for every math learner no matter where they are in their learning journey.

Change is never easy, particularly for reform-weary educators, parents, and students. But research and experience show that this approach of “sitting beside” students and guiding them to mathematics understanding is worth implementing. Now is the time to be reinvigorated and inspired to use practices that make math learning more engaging, more down-to-earth, and frankly, more enjoyable for teachers and students.

Let’s begin now to develop a “prevention to intervention mindset” for all math learners. We stand at the frontier of achieving universal numeracy. The shift to preventing the failure to learn from remediating failed learning is now possible through empowering teachers and learners alike with the new of technology.
REFERENCES


RESOURCES

ORGANIZATIONS

Assessment Reform Group (ARG)—Association for Achievement & Improvement Through Assessment:

Formative Assessment for Students and Teachers (FAST), State Collaboratives on Assessment and Student Standards (SCASS), Chief Council of State School Officers (CCSSO): http://www.ccsso.org/Resources/Programs/Formative_Assessment_for_Students_and_Teachers_%28FAST%29.html

Mathematics Assessment Project. Assessing 21st Century Math and Mathematics Assessment Resource Service:


National Center for the Improvement of Educational Assessments (NCIEA), also known as the Center for Assessment:
http://www.nciea.org/about.php

Alliance for Excellent Education: http://all4ed.org/

BOOKS | RESEARCH


Hanover Research. The Impact of Formative Assessment and Learning Intentions on Student Achievement.


http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0086817


Learn how districts use DreamBox Learning Math and its ongoing embedded informative assessing to close achievement gaps. For a demo, call 877.451.7845.
Formative assessment is a term that describes what good teachers already do!

When teachers evaluate, question, and reflect upon real-time student learning, they can quickly and efficiently adjust their instruction based on student understanding. These ongoing assessment techniques allow teachers to activate student learning and use performance data to consistently differentiate. It is also beneficial in structuring a more regular cycle of student feedback. This informs targeted instruction, helps create appropriate strategy groups, and assists in communicating more effectively with students, parents, and guardians.

ABOUT THIS GUIDE
To illustrate the difference formative assessment can make in improving student understanding and achievement, this guide is focused on algebraic reasoning, which many students find challenging. Using formative assessment strategies in face-to-face and digital environments are important ways to help students make the shift to the analytic, qualitative reasoning about values and variables needed to successfully develop algebra and thinking.

A meta-analysis by Black and Wiliam indicates:

**A ONE-GRADE LEAP IN EFFECTIVENESS WHEN FORMATIVE ASSESSMENT IS USED IN THE CLASSROOM**

Source: *Assessment and Classroom Learning, Black and Wiliam, 1998*
USING FORMATIVE ASSESSMENTS TO ADVANCE ALGEBRAIC UNDERSTANDING

Formative assessment and the data you collect helps you understand student needs and address them more effectively in your classroom every day.

Following are scenarios for primary, intermediate, and middle school grades for you to use in your classroom.

SCENARIO 1: PRIMARY (GRADES K–2)

By second grade, most learners can work beyond the simple computational fluency of $2 + 3 = 5$ and consider new relationships among numbers and unknown quantities. Asking students to compute quantities that relate to a defined sum, instead of simply counting up to find the sum, helps them think more conceptually about mathematical generalizations using algebraic notation.

Shift from $2 + 3 = n$ to $2 + n = 5$

FORMATIVE ASSESSMENT: Early on, students learn the concepts of numbers, counting, addition, subtraction, and cardinality to understand basic mathematical relationships, sums, and differences. These first algebraic reasoning experiences ($2 + __ = 5$) may cause confusion because students may have only developed one view in their minds as to how to solve an equation ($2 + 3 = __$). Formative assessment techniques can lead a teacher to analyze a student’s progress in both the basic computation of numbers and in the new concepts of algebraic reasoning. A teacher may choose to formatively assess quickly with the entire class by asking a computation-based question and having the entire class hold up how many fingers represent the answer. In each question posed to the students, the placement of the missing quantity, either as a sum ($2 + 3 = __$) or as an addend ($2 + __ = 5$) in the equation, differentiates whether a student struggles with the basic computation involved in addition (unknown sum) or the algebraic thinking involved in adding to an unknown quantity (unknown addend). Immediately responding to incorrect patterns of thinking observed when students hold up their fingers to answer, allows for a swift intervention and a new teaching opportunity.

DATA COLLECTION: Using these observations, teachers can choose to group students based on common mistakes, mutual understanding of concepts, and/or mastery. Whether the next steps are remedial, practice, or extension, the teacher has real-time data to support student learning.
SCENARIO 2: INTERMEDIATE (GRADES 3–5)

Intermediate-age learners continue to connect algebraic thinking using patterns and unknown quantities with other mathematical concepts such as decimals, fractions, and negative numbers.

Shift from $270 + x = 566$ to $x + \frac{7}{10} = 0.35$

**FORMATIVE ASSESSMENT:** When reasoning algebraically, students are often activating their knowledge of other math concepts as well, such as rational numbers with decimal representations. With multiple concepts being taught and assessed, it can be difficult for teachers to determine which concepts and/or skills are causing students to draw incorrect mathematical conclusions.

In this example, a student may be struggling with either the concept of computing with rational numbers in general or with the concept of unknown quantities and patterns. It is necessary for teachers to collect evidence of real-time, informal assessment in both areas to inform which steps need to be taken next.

In this case, a teacher may choose to pass out whiteboards and pens to students and ask directed questions that illuminate the concept of decimals and the concept of unknown quantities separately.

**DATA COLLECTION:** As the class responds to questions, the teacher can keep a clipboard in hand to write quick notes on the students’ progress. Making comments on each student every single day may be unrealistic, so it may be that the teacher records only the anomalies in student responses. It is important to think about what kind of list or graphic organizer you want to create for the clipboard in order to maximize efficiency and get the most out of taking shorthand notes.

Some teachers prefer to simply have a sheet with a list of student names and a corresponding box in which to write comments. Other teachers prefer to have a seating chart drawn with boxes that represent their writing space for each student. These notes become a daily record of progress over time, which informs groupings, small group teaching the next day in class, and conferencing opportunities with parents and guardians.

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**WANT TO TAKE A DEEPER DIVE?**

Read *From Formative Assessment to Informative Assessing in the Math Classroom*
SCENARIO 3: MIDDLE SCHOOL (GRADES 6–8)

Middle school students continue their algebraic work with connecting their ideas about patterns, numbers, and operations with more symbolic representations of equations, expressions, and functions. This begins their study of more formal algebra.

Shift from $2x + 4 = 10$ to $y + 2x = 4$

**FORMATIVE ASSESSMENT:** When learning different linear forms of equations such as $y = mx + b$, students work to understand and use an equation to represent the relationship between two variables and values. New concepts arise for the student to think about: variables can represent many unknown quantities instead of having just one value, and the value of one variable is related to the value of the other variables in the equation (when $x$ changes, $y$ changes). Intermingled in this learning is also the idea of rates of change (slope) and the connection to the visual representation of the linear function on a graph or in a table.

With so many ideas for students to consider, teachers must consistently assess which concepts students have made sense of and have demonstrated understanding of, and which concepts have caused pain points. One way to check for understanding and assess for learning is to ask each student to create an assessment for a partner; this forces the student to make meaning of the concepts while designing assessment materials. While working with a partner to complete an assessment, students engage in self-assessment and reflection, which may lead to discovering mistakes in the inherent design, or they may find misunderstanding in the application of concepts.

**DATA COLLECTION:** By allowing students to explore the concept through crafting their own assessments for partners, they gain immediate and direct peer feedback about the validity of the problem(s) they created, they are able to teach one another in the moment, and they can discuss understanding of the concept as a whole. It is important that this is presented as a learning experience instead of as a competition. At the end of the activity, students independently reflect upon their work and communicate to the teacher the roadblocks, questions, and successes they experienced via a narrative written on the back of the assessment. This narrative feedback can help inform appropriate learning targets for the next class session.

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WANT TO TAKE A DEEPER DIVE?
Read *Strategies for Teaching Middle School Math*
GROWING ALGEBRAIC UNDERSTANDING
WITH DIGITAL TOOLS

We shared three formative assessment techniques you can use in your classroom to support developing algebraic understanding. In addition to these techniques, you can consider using DreamBox to perform formative assessment and provide data. That way, you can easily access data without having to do all of the time-consuming data collection. This freedom helps you do what you love: work with your students.

DreamBox software provides:
1. An engaging, seamless way to collect data to help understand how learners are thinking about math concepts, what strategies they are using, and when they’ve demonstrated proficiency in algebra standards.
2. Insight Dashboards help you know when you may need to pivot instruction. The same continuous formative assessment that delivers personalization of path, pace, and sequence for every learner in DreamBox also captures the instructional insights and learning data needed to make informed decisions about instruction and instructional programming.
3. A way to facilitate more meaningful conversations and group students for more effective instruction.
4. The means to dive deeper and take action, about how your class is performing against standards.
5. An engaging environment that uses digital manipulatives, interactive game-like immersion, and immediate feedback to motivate students to persist without feeling like they’re being tested.

Take a look at how DreamBox supports algebraic thinking for every student with ongoing, embedded formative assessment.
SUCCESS STORY
Continuous formative assessment and actionable data power personalization and achievement

Learn how formative assessment embedded within and between lessons creates the optimal learning experience for every math student, every time.

Carlton Innovation School, which serves low-income students, students with disabilities, and English Language Learners, was looking for a way to remediate struggling math learners. They found DreamBox Learning® Math. Between the 2013 and 2014 Massachusetts Comprehensive Assessment System (MCAS) testing period, Carlton enjoyed an increase of 17 percent in math proficiency school-wide.

Now, twelve percent more students are considered “advanced” under the same measurements, and nine percent moved out of the “warning” category. If you’re looking for a way to help your students achieve math mastery, you’ll see how just an hour a week can spur growth.

Gains on the Massachusetts Comprehensive Assessment System (MCAS)

The wide range of learners in each classroom makes it difficult to know where each student is in their learning. To be proactive in meeting all of our students’ needs we have access to data, but we also need to see quickly what that data means.

—Teegan von Burn, Assistance Principal
Carlton Innovation School, Salem, Massachusetts
FREE FORMATIVE ASSESSMENT RESOURCES

Online math toolboxes

Check out these resources that provide thousands of formative assessments, tasks and rubrics, and lesson-study resource kits for algebra and geometry:

**Mathematics Formative Assessment System (MFAS)**
The system includes tasks or problems that teachers can implement with their students, and rubrics that help the teacher interpret students’ responses. Teachers using MFAS ask students to perform mathematical tasks, explain their reasoning, and justify their solutions.

**Mathematics Assessment Project**
The Mathematics Assessment Project is part of the Math Design Collaborative initiated by the Bill & Melinda Gates Foundation. The project set out to design and develop well-engineered tools for formative and summative assessment that expose students’ mathematical knowledge and reasoning, helping teachers guide them towards improvement, while monitoring progress.

**Inside Mathematics Performance Assessment Tasks**
Provides grade-level formative performance assessment tasks with accompanying scoring rubrics and discussion of student work samples. They are aligned to the Common Core State Standards for Mathematics.

DreamBox Learning has many teacher resources related to formative assessment, including blogs and videos. Our Teacher Tools are lessons from K–12 all use ongoing embedded formative assessment. You can also watch helpful webinars, including The Future of Math Learning, featuring Cathy Fosnot.
From intervention to universal growth

How DreamBox Learning® Math is helping to identify and close math learning gaps.

RESULTS AT A GLANCE

DreamBox + Great teaching = increased NWEA Map® scores for all students

After using DreamBox Learning Math in their math intervention programs for one year, NWEA MAP® scores across the board have improved in DeKalb Central School District. Additionally, district interventionists report that growth is occurring for all of their students. DreamBox, combined with quality Tier 1 instruction and small-group instruction, is credited for increasing students’ comprehension of math.

CHALLENGE

Close Learning Gaps with At-Risk Students and Promote Overall District Growth in Math

DeKalb Central School District administrators identified that a percentage of their students required math intervention when results on the Indiana Statewide Testing for Educational Progress Plus (ISTEP+) showed less than ideal performance in mathematics. Furthermore, MAP data revealed that even the 75 to 80 percent of students performing at or above grade level demonstrated learning gaps that prevented them from mastering more challenging concepts.

With the goal of pinpointing the root of the problematic gaps, district and school administrators embarked on a path to increase learning outcomes. It wasn’t an easy task and would require a long-term solution that would universally help students across all grade levels.

“We use DreamBox to drive our one-on-one instruction and lesson plans so we can focus on kids who have huge gaps in their learning. We are able to see where each student is in their learning and where they need additional support, which makes our intervention a lot more powerful for our students.”

—Anna Wiley
Math Intervention Teacher
DeKalb Central School District
SOLUTION

Use formative data to provide targeted intervention

After careful review, a collective group of district leaders decided to implement a math intervention program, which consists of providing one-on-one support for students performing in their grade's lowest quartile, in addition to their classroom instruction. DreamBox Learning Math was selected as a core component of the intervention program because of its ability to identify and close learning gaps by providing rigorous curriculum aligned to the readiness of individual students.

Rather than providing predefined learning progressions, DreamBox uses formative data to deliver specific feedback and scaffolding based on each student’s actions and strategies taken in the moment of learning. This level of adapting promotes developing missed skills, students have become even more successful, resulting in conceptual understanding across grade levels and math topics. By identifying and learning growth for students at all abilities—from those requiring math intervention to those performing at or above grade level.

Excited by her students’ success, Math Intervention Teacher Anna Wiley appreciates that DreamBox supports her in meeting the needs of students. The program surfaces student learning data in a format that makes it easy to identify their learning hurdles and drive both small-group and individual instruction tailored to student needs.

RESULTS

Increased NWEA MAP Scores

After using DreamBox Learning Math as part of their math intervention programs for one year, NWEA scores across the board have improved in DeKalb Central School District. Additionally, district interventionists report that growth is occurring for all of their students. This increase in math comprehension is credited to DreamBox usage, quality Tier 1 instruction, and small-group instruction.

“Because of our concerted effort to use DreamBox as part of our Intervention Program, we are closing the gaps in learning,” says Julia Tipton, Curriculum and Instruction Specialist. With unanimously positive results in the intervention program, DeKalb Central School District now uses DreamBox Learning across all K-5 classes in the district’s four elementary schools.

DEKALB FAST FACTS

• Grades: K–8
• Enrollment: 3,800
• Free and reduced lunch: 40%

DREAMBOX IMPLEMENTATION

• Small group and one-to-one instruction
• Math intervention in grades K-5