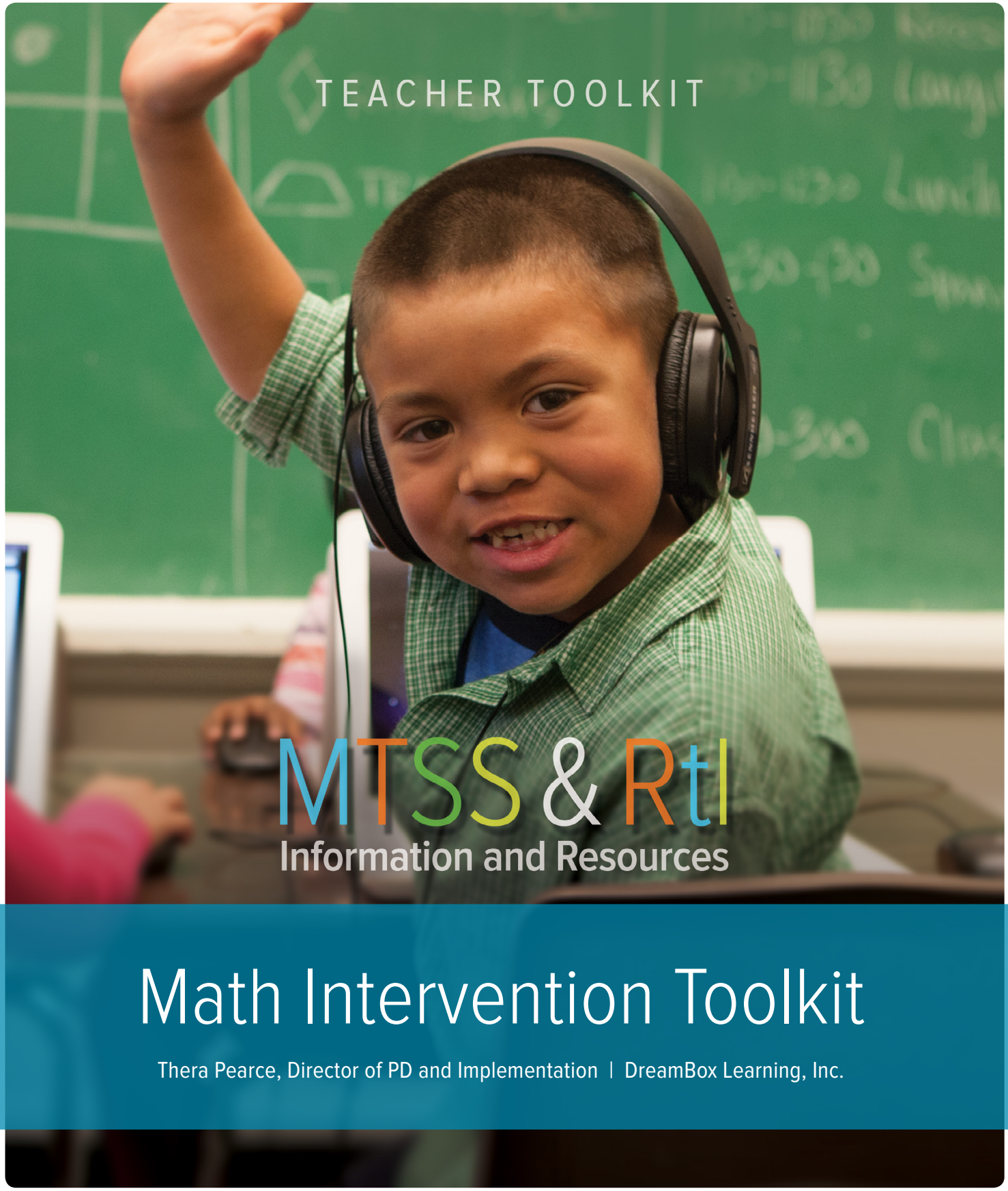

Math Intervention Toolkit

Thera Pearce, Director of PD and Implementation | DreamBox Learning, Inc.

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A wealth of intervention resources

There's a lot of information available about Multi-Tiered Systems of Support (MTSS) and Response to Intervention (RtI), but making sense of it all and putting theory into practice in your math classes can be less accessible. That's why we've put this toolkit together.

Intervention basics and math specifics. You'll learn how MTSS and RtI are different and how they work together. We'll also explore the time-tested problem-solving approach in RtI, and the importance of growth mindset, formative assessment, and the role of data collection to your students' math success.

Easy-to-use tools. You'll also find assets that can be used in the math classroom right now—a multi-layered, easy-to-use progress monitoring tool, growth mindset classroom practices, and formative assessment activities for your students. These resources will empower you to differentiate instruction and make the most of teaching and learning time.

There's always more to learn. For a deeper dive, we've included additional resources that will help enrich your practice and give you more and better ways to collaborate with educators, parents, and students.

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Intervention basics

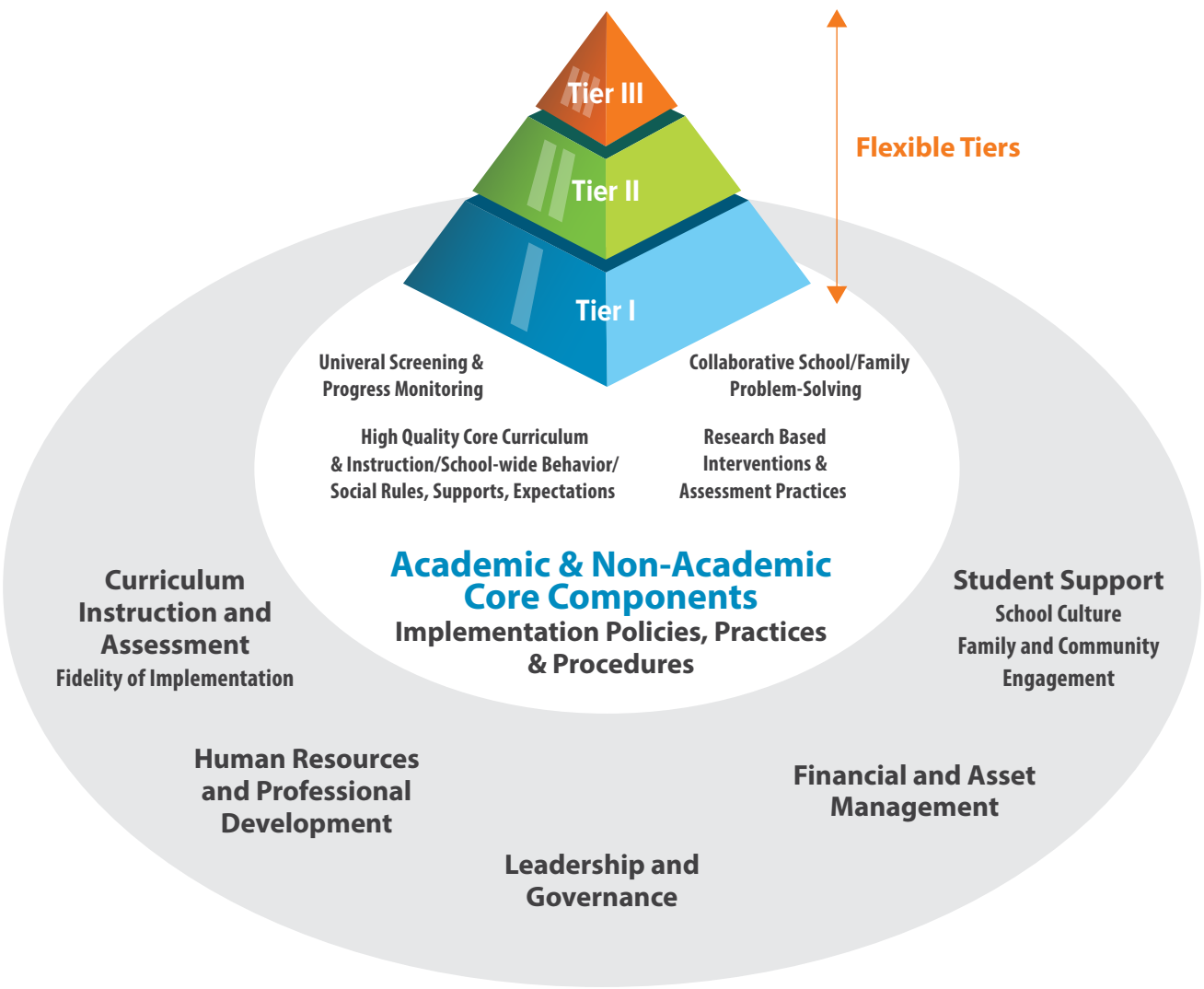
MTSS AND RTI

Before we get to math-specific intervention tools, let's review intervention frameworks and how they function. MTSS and RtI frameworks can seem similar, but MTSS is a comprehensive, umbrella-type approach that encompasses RtI and other systems.

Multi-Tiered Systems of Support (MTSS) defined. MTSS is a coherent continuum of evidence based, system-wide practices and procedures to support a rapid response to academic and behavioral needs, with frequent data-based monitoring for instructional decision-making to empower each student to achieve to high standards. Because behavioral and emotional problems are often a part of student learning challenges, MTSS also includes other multi-tiered systems including behavioral models such as PBS (Positive Behavior Support), and SST (Student Support Team). The goal of MTSS is 80 percent academic proficiency.

MTSS is a comprehensive, umbrella-type approach that encompasses RtI and other systems.

Multi-Tiered Systems of Support (MTSS)



Source: Adapted from mass.gov/edu

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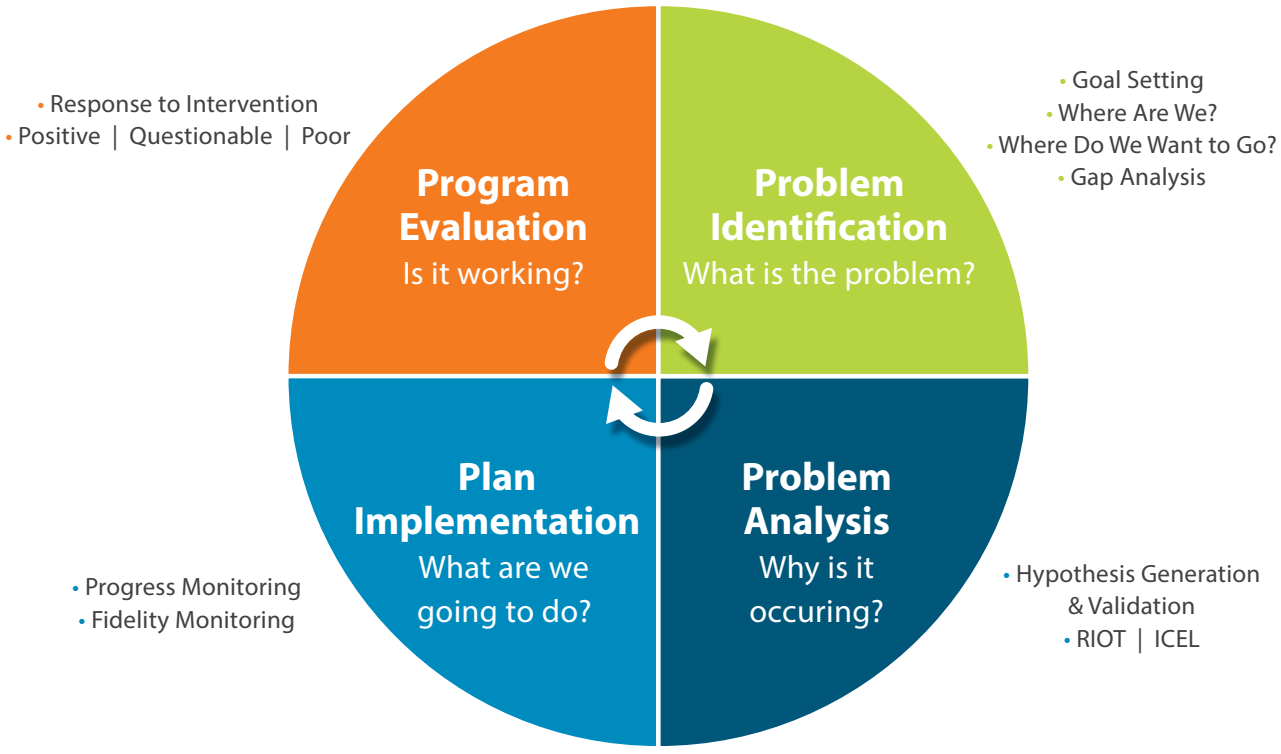
Response to intervention (RtI) defined. You can see that it's related to the MTSS description, but the focus of RtI is on academics and the individual student. The RtI Network defines RtI as, "a multi-tiered approach to help struggling learners. Students' progress is closely monitored at each stage of intervention to determine the need for further research-based instruction and/or intervention in general education, or both."[1]

There are three tiers of RtI:

- **Tier I: Universal level | 80–90 percent of students.** Learners can get what they need in the traditional classroom with high-quality, research-based instruction. The curriculum should be standards-driven, rigorous, and relevant.
- **Tier II: Targeted level | 5–15 percent of students.** Learners are underachieving and should receive individualized support. That includes standards-based curriculum and supplemental instruction along with remediation of specific skills or concepts. Individualized interventions are differentiated, scaffolded, and targeted to each student.
- **Tier III: Intensive level | 1–5 percent of students.** Learners are significantly underachieving and require individualized, intensive skill-specific intervention with one-to-one or small-group instruction outside the classroom.

The Problem-Solving Approach in RtI



Source: Adapted from rti.dadeschools.net, Ch.4: Four-Step Problem Solving Model

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The problem-solving approach is a time-tested, team-based one that's been used in school districts for more than two decades. Instructional support teams, also known as teacher assistance teams, work together for each student of concern to:

- **Identify the problem and its cause(s)**
- **Develop a plan to attend to the problem**
- **Implement the agreed upon plan**
- **Evaluate the plan's effectiveness**

Using a school-based team to select interventions and make decisions allows for more brainstorming and flexibility. With a menu of intervention options to choose from, the student can receive instruction more closely aligned with his or her individual or specific academic needs.

Using a school-based team to select interventions and make decisions allows for more brainstorming and flexibility.

In this paper, we're focusing on the Plan Implementation quadrant of RtI (*see the lower left quadrant in the graphic on page 4*). The implementation plan should include strong progress and fidelity monitoring to ensure success:

- **Progress monitoring.** As soon as a student is identified as at risk, his or her progress is monitored based on Tier I instruction at least monthly, but ideally weekly or biweekly. Progress is measured by comparing his or her expected rate of learning based on local or national norms and the actual rate of learning. A teacher can use these measurements to gauge the effectiveness of teaching and to adjust instructional techniques to meet the needs of the individual student. ***A student who's not responding adequately to Tier I instruction moves on to Tier II and increasingly intensive levels of intervention and instruction.***
- **Fidelity monitoring.** This is the measurement of the degree to which the program is implemented as intended by the program developer, including the quality of implementation. Fidelity is about being consistent and accurate in implementation. When Tier I or Tier II interventions aren't working, this is the first aspect to investigate. Fidelity can be measured by self-reporting data, observation, logs, lesson plans, and student work. The checks used should create open communication and productive feedback by providing teachers with opportunities to learn and collaborate.

Check out the progress monitoring tool on page 10 that simplifies individual and class achievement levels.

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COLLABORATION AND ENGAGEMENT

MTSS and RtI aren't a general education or special education initiative. They are a way to bring people and resources together to support students who experience difficulties so they can be successful in school and in life.

- **Teachers working together.** General and special educators join forces, pool resources, and share expertise to meet shared goals for instruction and assessment. The collaboration of teachers should be supported throughout the educational system.
- **Family participation.** RtI is about creating meaningful family–school relationships, and engaged partnerships between educators and families. Each RtI tier represents increased intensity of problem-solving and services, and more frequent data collection.
- **Student engagement.** Teaching students responsibility, self-monitoring and control, and cognitively based strategies decreases disruptive behavior and improves the learning environment.[2] Students taught to observe and record their own behavior, compare it with predetermined criteria, and then acknowledge/reward their own successes is an effective intervention.

That's a very quick overview of some of the important aspects of intervention.

To learn more, be sure to review the resources we've included that provide in-depth information. (*See page 14.*)

Now, let's take a look at more math-specific approaches and methods.

Growth mindset, data, and formative assessment in math intervention

FOSTERING GROWTH MINDSET IS AN IMPORTANT ASPECT OF RTI

"I'm bad at math." Students say it all the time and it's simply not true. Every student can become "a math person" with work and the right frame of mind. It's time to do some myth-busting, particularly with math intervention students.

Based in large part on the work of researchers like Carol S. Dweck and Jo Boaler, it's been found that growth mindset can have a direct impact on achievement in mathematics. Dweck said, "Students who believe that intelligence or math and science ability is simply a fixed trait (a fixed mindset) are at a significant disadvantage compared to students who believe that their abilities can be developed (a growth mindset)." Research has shown that changing mindset enhances achievement, and that it's teachers who play a significant role in reshaping students' perception of their math abilities.[3]

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Here are some ideas to reorient mindsets:

- **Take advantage of the MindSetKit.** Stanford University's Project for Education Research That Scales (PERTS) free mindset resources offers courses with videos, exercises, and lesson plans to benefit both teachers and students.
- **Make growth mindset an integral part of your math teaching practice.** The power of believing that you can improve is one of the most important things you can model and teach for your students. A crucial concept in mindset-shifting is that if something feels tough, that's where the real learning takes place, and persevering through what's most difficult yields the biggest gains.
- **Teaching math in terms of conceptual understanding.** An essential companion to deterring the fixed mindset is to step away from rote memorization and present problems in a way that fosters conceptual understanding.
- **Encourage students' investment in their own learning.** "I'm never going to use this in real life" is often a barrier to motivating students. Connecting to real-world situations, providing some degree of autonomy and choice in selecting or carrying out an activity, and game-like formats (embedded within software or in activities) can be highly motivating.

Check out math growth mindset statements you can use in your classroom to shift students' thinking. (*See page 11.*)

Research has shown that changing mindset enhances achievement, and that it's teachers who play a significant role in reshaping students' perception of their math abilities.

DATA AND FORMATIVE ASSESSMENT IN MATH INTERVENTIONS

An important part of progress monitoring is data collection. Any decisions made for the educational or general well-being of students should be evaluated using efficacy evidence, in other words, data. Data is the way to answer the essential questions around intervention:

Who needs additional instruction? What is their present level of performance? What is the performance target? Have we met the target? Where do we go from here?

The use of data in instructional decision-making has been shown to lead to improved student performance.[4] Since there is no single source or type of data that can reveal everything that's needed to make balanced, well-informed instructional decisions, it's important to use more than one data source and collect multiple types of information.

Three sources of data are:

- **Curriculum Based Measurement (CBM).** Student performance in basic skills or content knowledge.
- **Formative assessment.** Occur through the learning and teaching process.
- **Summative assessment.** Occur at the end of a project, unit, course, semester, program, or school year.

But to improve instruction and learning, it's not the sheer quantity of the data that matters, but what you do with the information.[5]

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Effective math formative assessment provides ongoing data that changes what both the teacher and the learner are doing.

Data and formative assessment best practices. Adjusting instruction in math or any other subject using data and formative assessment takes patience, training, and support. Here are some characteristics of a successful math formative assessment program that makes use of data to keep in mind:

- **Develop meaningful, timely feedback loops.** Effective math formative assessment provides ongoing data that changes what both the teacher and the learner are doing.
- **Independent learning.** Ideally, blended learning is employed so that students are able to engage in some informative assessing activities independent of the teacher. This is how students learn self-assessment and gain confidence.
- **Personalized learning.** Personalized learning and individualized instruction are crucial elements of student-centric teaching that foster real progress and achievement.
- **Collaborative implementation.** A team effort, involving educational leaders at all levels across the school district, is required for successful implementation in an effective assessment culture. This effort includes sufficient resources (human resources, materials, and funding), ongoing teacher professional growth, and community engagement in developing the vision and plans for implementation.

Check out math formative assessment activities. (*See page 12.*)

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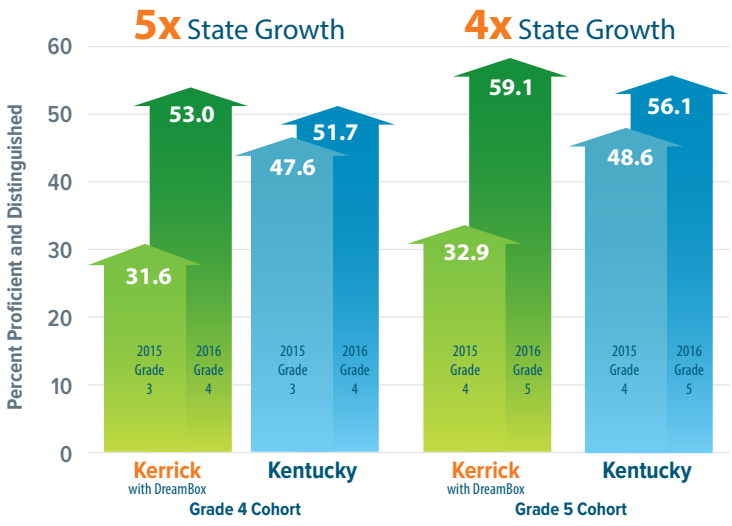
RTI SUCCESS STORY | KERRICK ELEMENTARY SCHOOL—LOUISVILLE, KY

DreamBox Learning brought double-digit gains on statewide exams

After math scores on state-mandated testing dropped two consecutive years in a row, administrators at this Title I School knew they needed help. A quarter of the school's student population is transient, and educators noticed that many of the students transferring into the school, even those considered on grade-level, exhibited gaps in their learning. To make strides in closing these gaps, school administrators recognized that teachers needed to have insight into what those learning gaps are for each student. they needed a program that could identify gaps and help teachers "re-teach" some missed or lapsed skills, while enriching overall learning.



DreamBox Learning, which aligns with the school'smath teaching approach, was selected because it easily narrows in on learning gaps, providing teachers with real-time feedback that they could use to enhance students' math performance.

DreamBox empowered teachers to more accurately monitor student learning while providing useful feedback to promote growth. It helped identify strengths and weaknesses, and to uncover target areas that need work, and then work through those weaknesses. DreamBox provided information to use with students to determine their instructional needs and to have team discussions about how to differentiate Tier I students while supporting their Tier I and Tier III students. Kerrick continues to use DreamBox based on the growth they've seen in student achievement.

> "We were blown away by the growth. To have that many students increase their performance level was fantastic."
>
> —Gina Finnell Ziegler, Goal Clarity Coach

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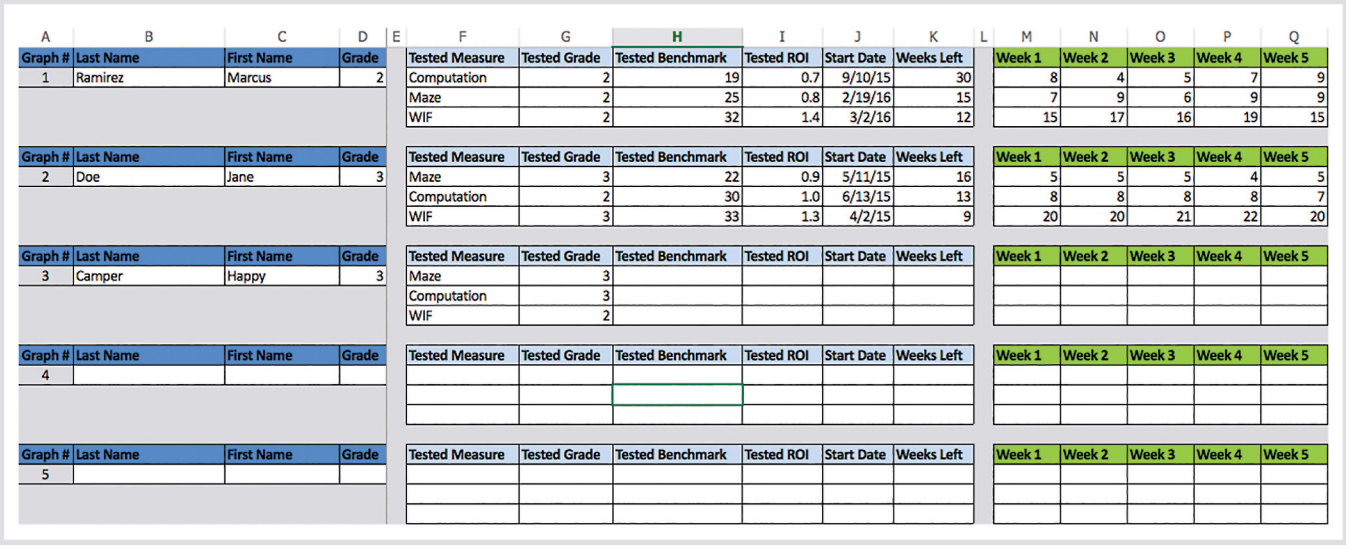
Intervention tools to use right now in your math classroom

STUDENT PROGRESS MONITORING TOOL

Dr. D. M. Kearns, Assistant Professor of Special Education of Educational Psychology and Research Scientist, Center for Behavioral Education and Research at the University of Connecticut has created an easy-to-use Excel-based progress monitoring tool to help educators (easily) gather academic progress monitoring data. Data can be stored for multiple students across multiple measures, and the tool can graph student progress and set individualized goals for a student on specific measures.

If you need more background, Using Academic Progress Monitoring for Individualized Instructional Planning is helpful in understanding the uses of progress monitoring in formative assessment.

Here's a screen shot of one of the easy-to-use data-entry tabs:



Graph #	Last Name	First Name	Grade
1	Ramirez	Marcus	2
2	Doe	Jane	3
3	Camper	Happy	3
4			
5			

Tested Measure	Tested Grade	Tested Benchmark	Tested ROI	Start Date	Weeks Left	Week 1	Week 2	Week 3	Week 4	Week 5
Computation	2	19	0.7	9/10/15	30	8	4	5	7	9
Maze	2	25	0.8	2/19/16	15	7	9	6	9	9
WIF	2	32	1.4	3/2/16	12	15	17	16	19	15
Maze	3	22	0.9	5/11/15	16	5	5	5	4	5
Computation	2	30	1.0	6/13/15	13	8	8	8	8	7
WIF	3	33	1.3	4/2/15	9	20	20	21	22	20
Maze	3									
Computation	3									
WIF	2									

Click on the chart to open the Progress Monitoring Tool[6]

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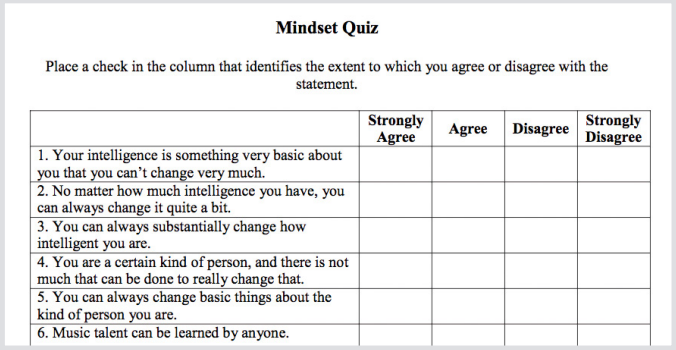
GROWTH MINDSET TOOLS TO MOTIVATE YOUR MATH STUDENTS

Mindset quiz

There are no right or wrong answers! The quiz is a fun way to help you understand how your students mindset and prompt them to consider their own thinking. it's also a great conversation starter and motivational tool.

Click on the graphic to access the full quiz.

Source: The National Council for Community and Education Partnerships



Mindset Quiz

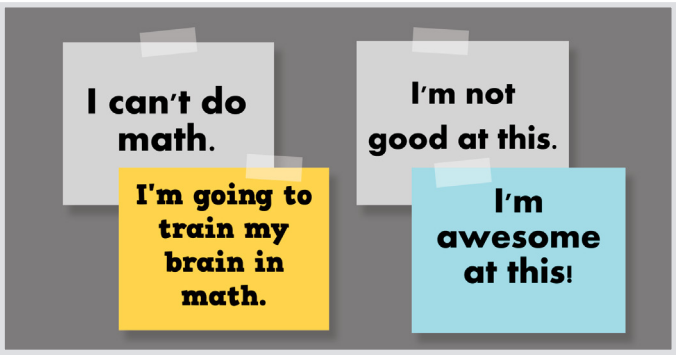
Place a check in the column that identifies the extent to which you agree or disagree with the statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. Your intelligence is something very basic about you that you can't change very much.				
2. No matter how much intelligence you have, you can always change it quite a bit.				
3. You can always substantially change how intelligent you are.				
4. You are a certain kind of person, and there is not much that can be done to really change that.				
5. You can always change basic things about the kind of person you are.				
6. Music talent can be learned by anyone.				

Make it visual

Ask your students to think about how they approach math and other subjects with a growth mindset board.

Source: The Math = Love blog



Make what you say every day motivating

Crafting growth mindset statements with your students can give them a boost of optimism and motivation. Growth mindset statements typically:

- **Set up a specific course of action for moving forward.**
- **Acknowledge hurdles and frame them as learning opportunities.**
- **Communicate optimism that the student can and will move toward success with sufficient effort, and by following recommended process, and making use of resources.**

Here are some examples:

- **Praise:** "Your math skills are improving! The extra time you're putting in is making a real difference."
- **Work-Prompt:** "Keep going with your assignment—there's still time. If you get stuck on a problem, ask me or a classmate for help. You can do this."
- **Encouragement:** "Who had a fabulous struggle today?"

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TWO FORMATIVE ASSESSMENT ACTIVITIES TO ENGAGE MATH STUDENTS

These two formative assessment activities for students to do on their own provides immediate feedback which can be used to adjust lessons and get students involved in their own learning and are designed to be used on a regular basis.

Create your own test questions

This fun formative assessment activity can be used to evaluate total student comprehension of the content and provide students with their own study guide.

- **Standard:** Various—this is a multi-use strategy
- **Materials:** None
- **Time Needed:** 10–15 minutes
- **Preparation:** None

Instructions: Teachers ask students to prepare math problems to help create a summative assessment of the content being taught. Students create any number of problems the teacher requires, modeled after their homework or classwork, in order to create their own study guide. The students must solve the problems and return them to their teachers for evaluation. Based on the quality of responses from the students, teachers may choose to use the problems for a quiz, an in-class game or contest, or to create a summative assessment. Teachers should integrate them into the curriculum so students get a chance to see their work!

Learning Logs overview

Students use Learning Logs to help integrate content, process, and personal feelings. Learning Logs can also become a vehicle for exchange among parents, teachers, and students.

- **Standard:** Various—this is a multi-use strategy
- **Materials:** Notebook or composition book for each student
- **Time Needed:** 5 minutes at the end of a class; plus time for assessment conferences
- **Preparation:** None

Instructions: At the end of a lesson, students are given five minutes to reflect on their learning by writing in their Learning Log. Logs can include problem-solving entries, observations, questions about lectures, word problems they have created, predictions before a concept is taught, definitions of key vocabulary, justification of a solution to a problem, summaries of the day's lesson, comments about homework assignments, and reflection on the student's own understanding and the questions that may still exist.

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The teacher can guide the students in their writing until they get used to it by asking open-ended questions:

- **What did I do in class today?**
- **What did I learn?**
- **What did I find interesting?**
- **What questions do I have about what I learned?**
- **What was the objective of today's lesson?**
- **What connections did I make to previous lessons and concepts?**

These topics can help teachers identify strengths and weaknesses in their students' understanding of math content and address individual needs. Short assessment conferences are scheduled throughout a week or at the end of a unit to discuss the reflections and provide feedback to students. Teachers can also assess students in cooperative groups, thus reducing the time required for conferences.

These topics can help teachers identify strengths and weaknesses in their students' understanding of math content and address individual needs.

Formative Assessment Activities adapted from Formative Assessment Activities: Can They Do the Math? Susan Walsh, Spring 2013.

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RESOURCES

Organizations with information-rich websites

Association for Supervision and Curriculum Development (ASCD)
National Association of State Directors of Special Education
National Center on Intensive Intervention
National Center on Response to Intervention
National Council of Teachers of Mathematics
RTI Action Network

Intervention Research

Center for the Neural Basis of Cognition Research Roundup | Up-to-the-minute research and archives from the University of Pittsburgh and Carnegie Mellon University.
Research Spotlight on RTI | Overview and the components of a successful program from National Education Association (NEA).
Research Support for RTI | Effective implementation, plus efficacy studies and best practices.

Practical Intervention Help for Teachers

Ask the Expert | Over two dozen videos with expert answers for commonly asked questions from the Center on Response to Intervention.
Assisting Students Struggling with Mathematics | RTI for Elementary and Middle Schools: A guide to address the needs of students from the U.S. Department of Education.
Colorado Department of Education Resources | Information about MTSS.
Implementer Series: Understanding Types of Assessment within an RTI Framework | Self-paced learning modules explain commonly used assessments within RTI from the Center on Response to Intervention.
Ongoing Student Assessment | Learn more about RTI assessment in this series of articles from the RTI Action Network.
RTI Fact Sheet | A one-page FAQ from the New Mexico Public Education Department.
Using an RTI Framework to Improve Student Learning (PDF) | A pocket guide to the use of a research-based RTI framework from the American Institutes for Research.
Wrightslaw | Links to articles and free publications related to RtI.

Parents

A Parent's Guide to RTI | Useful tips and FAQs to help families understand and engage in their child's learning from the National Center for Learning Disabilities.
Informing Parents of Their Child's Needs: MTSS Parent Letter | A letter you can use write your own message to inform parents of their child's needs and how the school will address them from the P. K. Yonge Developmental Research School.
RTI Fact Sheet for Parents | Helps parents learn more about RTI with this FAQ from the Pennsylvania Department of Education.

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Understanding Growth Mindset

Academic Tenacity – Mindsets and Skills that Promote Long-Term Learning | A Gates Foundation research report summarizing non-academic factors that support achievement.

Developing a Growth Mindset | A video featuring Carol Dweck speaks about "the power of yet versus the tyranny of now."

"Growth Mindset: Clearing Up Some Common Confusions" | from KQED's MindShift from Edutopia.

Recognizing and Overcoming False Growth Mindset | Clarify some common misconceptions about growth mindset.

Growth Mindset & Math

Growth Mindset and Math | A short course from Stanford University about practices that promote growth mindset within the context of a math class.

Growth Mindset From YouCubed | Resources to deal with math beliefs about math, including a free poster to download.

Research Shows How Children Can Enjoy and Succeed in Math | Math anxiety reduction strategies from Stanford University.

Resources to Transform Math Mindset | Resources from WithMathICan.org.

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ABOUT THERA PEARCE

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Learn more about creating RtI programs and how continuous formative assessment closes achievement gaps.
Visit www.dreambox.com/math-intervention