



Texas Mathematics Teacher

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... in a replica of Stonehenge

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photos by Mary Alice Hatchett

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Supporting Students' Algebra Readiness: A Response to Intervention Approach

In this article, we describe a Response to Intervention (RTI) approach for supporting students' algebra readiness. Although we provide a general description of the components of RTI, we highlight specific efforts made by the Texas Legislature and Texas Education Agency (TEA) to implement RTI within middle-school mathematics. As a result of these initiatives, teachers and administrators have access to the tools and knowledge necessary to provide quality mathematics instruction to all students in grades 5–8.

Middle-school mathematics achievement in Texas

Middle-school mathematics serves as a steppingstone to success in Algebra and future mathematics courses. Numerous topics in high school mathematics rely heavily on the procedural and conceptual understandings of content covered in middle school, including rational numbers and proportionality. However, current student achievement in middle-school mathematics in Texas suggests that not all students are adequately prepared for Algebra.

On the 2011 mathematics Texas Assessment of Knowledge and Skills (TAKS), 80% of eighth grade students met standard on the first administration (TEA, 2011). While 80% meeting standard appears to be an acceptable passing rate, an examination of subgroup scores tells a different story. Just 46% of students receiving special education services, 55% of students classified as Limited English Proficient (LEP), and 73% of economically disadvantaged students met standard on the same test. Results in the grade levels leading up to 8th grade show a steady decline in performance for these groups (See Table 1). Because content linked with algebra-readiness is heavily emphasized in middle and elementary school curriculum standards, these data suggest that students are not gaining proficiency with critical algebra-readiness skills.

Table 1.
2011 TAKS Passing Rates

Sample	Grade 6 TAKS	Grade 7 TAKS	Grade 8 TAKS
All students	83%	81%	80%
Special education	52%	48%	46%
LEP	68%	61%	55%
Economically disadvantaged	77%	74%	73%

Looking through a different lens, the National Assessment of Educational Progress (NAEP) reveals a similar picture. In 2011, only 40% of 8th grade students in Texas were deemed Proficient or Advanced, meaning 60% were performing at a Basic or Below Basic level (National Center for Education Statistics, 2011). Students with a disability and students identified as LEP fared considerably worse with only 15% and 10% performing at Proficient or Advanced levels, respectively. Just 28% percent of students eligible for the National School Lunch Program, an indicator of economic disadvantage, received Proficient or Advanced distinctions.

Because Algebra has long been considered a gateway to success in future mathematics courses and college, it is imperative that middle schools equip students with the knowledge and skills necessary to be successful in Algebra. To achieve this aim, initiatives should concentrate on improving student achievement by providing quality instruction for all students, as well as implementing focused interventions for students who are struggling.

Response to Intervention

One such initiative that is being implemented across the country and within Texas is RTI. RTI was first implemented in public health in the 1960s but has since transferred to other domains such as education (Simeonsson, 1994). In educational settings, RTI is a systemic three-tiered approach to instructional design and delivery that is intended to prevent

failure or reduce already identified difficulties. RTI requires a coordinated system for identifying students' needs and aligning those needs with evidence-based instructional practices. Routine monitoring of students' progress provides teachers and administrators with timely information needed to make instructional adjustments for individual students as well as groups of students. Although administrators make some decisions within the RTI process, the classroom mathematics teacher is primarily responsible for identifying and responding to students' instructional needs.

The tiers within the RTI process begin with high quality core instruction in the general education classroom, which is considered Tier 1. All students receive Tier 1 core instruction regardless of supplemental intervention they may receive from additional tiers. Students who experience difficulty and need assistance beyond core instruction receive Tier 2 support, which often takes the form of small-group instruction. Tier 3, the most intensive level of support, is provided for students who have been identified as having considerable difficulty with the content. Instruction in Tier 3 is often individualized for specific students' needs. This three-tiered approach improves schools' effectiveness in responding to students' learning needs.

Three principles provide the foundation for RTI. First, teachers must have access to instructional practices that are based on high-quality research. In middle-school mathematics, the research base on effective instructional practices is growing. In 2009, the Institute of Education Sciences (IES) published a Practice Guide that summarized the research on mathematics instruction and intervention practices that support struggling K–8 students (Gersten et al., 2009). This publication noted positive achievement gains for struggling students when they received interventions that used explicit and systematic instruction, instruction on the underlying structure of word problems, visual representations of mathematical concepts, and practice building procedural fluency. Additional mathematics resources published by IES include a Practice Guide on instructional practices for improving students' understanding of fractions as well as reports evaluating the effectiveness of selected curricular and

intervention programs.

Second, schools need a comprehensive assessment system that allows teachers and administrators to make timely decisions to support student learning. Formative assessments such as screening, diagnostic, and progress monitoring tests provide information to guide instruction during the learning process. Screening tests are used to identify students' risk status for achieving instructional goals and are administered to all students prior to instruction. Diagnostic tests provide specific information about students' strengths and deficits within an instructional domain. Progress monitoring tests allow teachers to evaluate students' response to instruction and their rate of growth over time. To maximize efficiency, diagnostic tests and progress monitoring tests should be administered to students who are at-risk for not meeting instructional goals and are subsequently receiving interventions.

The third principle underlying implementation of RTI is systemic decision making guided by effective leaders. In simplest terms, implementation of RTI requires systems of data management, responsive instructional supports to address individual needs, and flexible and coordinated use of resources. As strong instructional leaders, principals can support implementation of RTI by cultivating a culture of shared responsibility for the success of each student. Leading this culture includes allotting time to plan instruction and assess learning; creating structures that engage students in discussions about their data; providing mechanisms for students, parents, and teachers to communicate about learning; and participating in reflective conversations about teacher practices related to Tier 1 and Tier 2 instruction. Systems of communication and decision-making are needed in which all educators evaluate and respond to student performance data. Only through management by effective school leaders can RTI be implemented with fidelity and integrity.

Stories of successful implementation of RTI are emerging in the professional literature. Nationwide, schools are implementing RTI in reading with success in improving reading achievement as well as reducing the number of students identified as having learning disabilities (Tacket, Roberts, Baker, & Scammacca, 2009). In mathematics, however, fewer

schools have taken on the challenge of implementing RTI, especially at the middle-school level. Several reasons exist that contribute to this trend. First, although emerging, limited empirical research is available on the effectiveness of instructional practices and curricular programs for supporting student achievement. Second, few assessment systems provide technically adequate information for screening, diagnosing, and monitoring students' progress in middle-school mathematics curriculum. And, finally, many principals are unaware or under-prepared to lead a system-wide initiative that requires reorganization of priorities and resources. However, through legislative actions and directed efforts, the state of Texas is changing this trend.

Texas efforts to support and sustain RTI

The Texas Legislature and TEA are making a concerted effort to increase student achievement in middle school and Algebra by integrating the key components of RTI into statewide mathematics projects. Focusing on grades 5–8, the Middle-school Students in Texas: Algebra Ready (MSTAR) initiative equips teachers and administrators with the tools and knowledge necessary to provide quality mathematics instruction to all students and to support as well as sustain the implementation of RTI within Texas schools and classrooms.

As noted above, an integral step in the RTI process is screening all students. The MSTAR Universal Screener is a computer-based formative assessment system designed to support instructional decision-making in grades 5–8 mathematics. Based on algebra-readiness content from the Texas Response to the Curriculum Focal Points (TxRCFP), the MSTAR Universal Screener assists teachers in identifying students as on-track or at-risk for meeting algebra-readiness expectations. The MSTAR Universal Screener also suggests the level of supplemental support and intervention (minimal, strategic, or intensive) needed for each student. Because comparable forms are given in the fall, winter, and spring, teachers can monitor students' progress and risk status throughout the year.

After using the MSTAR Universal Screener to identify students' risk status, the MSTAR Diagnostic Assessment can be administered to students at-risk

for not meeting algebra-readiness expectations to identify why students are struggling instead of just what they are struggling with. The MSTAR Diagnostic Assessment is a computer-based assessment that will be available Spring 2013. This tool assists teachers in determining students' current level of understanding of mathematical concepts as well as students' misconceptions. Results from this assessment can be used to plan supplemental instruction to target gaps in student understanding and remediate misconceptions. The content of the MSTAR Diagnostic Assessment is grounded in the MSTAR Learning Progressions, research-based sequences of how students learn mathematics.

However, assessing students using the MSTAR Universal Screener and MSTAR Diagnostic Assessment will not singlehandedly increase student achievement or learning. Improved instructional methods and intervention strategies must accompany the information gathered from these assessment tools. Seeking to do just that, the MSTAR Math Academies offer professional development opportunities created to equip Texas teachers with strategies to increase students' preparedness for Algebra.

With separate trainings for grades 5–6 and grades 7–8 teachers, MSTAR Academy I focuses participants' attention on strategies for teaching the knowledge and skills identified as critical for success in Algebra, such as rational numbers and proportionality (National Mathematics Advisory Panel, 2008). These trainings emphasize the importance of creating quality Tier 1 instruction for all students and allow participants to experience examples of student-centered lessons addressing the Texas Essential Knowledge and Skills (TEKS), English Language Proficiency Standards (ELPS), and College and Career Readiness Standards (CCRS).

Realizing the need to provide continuous and ongoing training, TEA developed and is continuing to create online professional development opportunities on the Project Share platform. Through online coursework and face-to-face opportunities, MSTAR Academy I Part B highlights the use of the MSTAR Lesson Study Tool to plan and refine Tier 1 instruction. Utilizing multiple pieces of data, including student work, to make data-driven decisions is also emphasized.

Even with quality Tier 1 instruction, some students will need supplemental support and intervention to be successful. MSTAR Academy II prepares teachers to identify students in need of supplemental support and to implement evidence-based practices during Tier 2 intervention. This training highlights recommendations from the IES Practice Guide, *Assisting Struggling Students with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools* (Gersten et al., 2009). Teachers can explore these recommendations at a deeper level in the MSTAR Implementation Tools training. This training builds upon MSTAR Academy II and prepares teachers to make instructional decisions based on student data and apply Tier 2 strategies within their classrooms. MSTAR Implementation Tools also introduces participants to the MSTAR Diagnostic Assessment. Additional training on the MSTAR Diagnostic Assessment and the MSTAR Learning Progressions will be available on Project Share during the 2012-2013 school year.

To support conversations between campus leadership and classroom teachers, TEA will offer a course within Project Share that focuses on leadership decisions supporting the implementation of the strategies and learning resulting from the MSTAR professional development offerings. This course also describes how the MSTAR content relates to the End of Course (EOC) Success offerings as well as the newly developed Elementary Students in Texas: Algebra Ready (ESTAR) offerings. Suggestions for “look-fors” and “listen-fors” are also included so that classroom visits may inform progress related to the themes of the MSTAR Academies.

Three common themes are threaded through all MSTAR professional development academies: implementing high-quality instruction focusing on the big ideas in middle-school mathematics; supporting all students with evidence-based instructional practices; and utilizing data, particularly from the MSTAR Universal Screener and MSTAR Diagnostic Assessment, to assist in instructional decision making. Campus and district leadership can support these themes by having informed conversations with teachers about the components of algebra readiness, supporting the use of the MSTAR Universal Screener and MSTAR Diagnostic Assessment to inform re-

teaching efforts, and communicating that the vision of Algebra success for all students is achievable. The building blocks of strong Tier 1 and Tier 2 instruction, strategies to reach all learners, and quality data tools have been placed within reach. Through collaborative efforts between teachers, students, parents, and leaders, the building blocks can be positioned to form the foundation for Algebra success for all students.

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