

Research-Informed Answers for Mathematics Education Leaders

Improving Student Achievement by Infusing Highly Effective Instructional Strategies into RtI Tier I Instruction

Teaching our students mathematics is one thing.

Teaching students to think mathematically with understanding is another.

Gresham, 2012

Our Position

It is the position of the National Council of Supervisors of Mathematics (NCSM) that intervention is an essential component to any K–12 mathematics program and that intervention practices within the Response to Intervention/ Instruction (RtI) framework require high quality core instruction that includes observing, assessing, analyzing, and reflecting on what is working and not working. RtI is a systematic, data based method for identifying, defining, and resolving students' academic difficulties using collaborative, school-wide, problem-solving approaches. Most RtI models are three tiers. Tier 1 is the mathematics instruction that all students receive with universal screening measures. Tier 2 is the provision of additional assistance to small groups of students who demonstrate difficulties on screening measures or who demonstrate inadequate progress. Tier 3 entails one-on-one tutoring along with a mix of appropriate interventions. Some models have special education services included in Tier 3, while other models consider it to be an additional tier. The focus of this position paper is on Tier 1.

Within an RtI framework and effective planning and instruction, 80–90% of students will find mathematics success within Tier 1, if instruction is broad enough to meet their mathematical needs within *and* beyond the grade-level curriculum (Gresham & Little, 2013; Little, 2013). Tier 1 places emphasis on a high-quality general curriculum in which specific interventions are implemented. The focus of Tier 1 is to ensure instruction of the core curriculum using evidence-based practices taught with fidelity so that all students are mastering the curriculum.

The NCSM Improving Student Achievement Series is a set of position papers designed to provide research-based practices for school and district mathematics education leaders.

This position can be accomplished when leaders help teachers:

- Realize the mathematics classroom teacher is an integral part of Tier 1 core instruction;
- Use universal screening assessment data, usually collected from all students by the school or district, to provide initial assessment information important for instructional planning;
- Immerse students into mathematics content using the Standards for Mathematical Practice with flexible grouping, task scaffolding, accessibility strategies, and differentiated instruction;
- Use formative assessment and progress monitoring to evaluate students' learning and collect frequent data to guide the instructional decision-making process; and
- Assess student learning formally and informally to determine the level of impact from the intervention and determine what instructional changes are needed for individual student success.

There are three important aspects of RtI: instruction, intervention, and assessment (Gresham & Little, 2013). The adoption of the Common Core State Standards (CCSS) has changed the depth of mathematics concept requirements. Additionally, the Standards for Mathematical Practice emphasize that instruction in mathematics must help students make sense of problems and persevere in solving them; reason abstractly and quantitatively; construct viable arguments and critiques; use modeling strategies; and choose appropriate tools strategically while attending to mathematics precision. The goal is to assure that lesson and unit plans are meeting the academic and behavioral needs for all students. Leaders and teachers use extensive knowledge and skills of teaching and subject matter when considering the multiple

instructional variables available to enhance, adapt, and intensify instruction.

Research That Supports Our Position

Current federal and state requirements have increased the emphasis on accountability for improved achievement in mathematics for all students. The National Council of Teachers of Mathematics (NCTM) stated that all students' instructional needs can be met by knowledgeable teachers who use evidence-based instructional practices and strategies designed to increase student achievement (NCTM, 2007). However, much of the instruction we see in today's classrooms could be characterized as highly procedural rather than offering students a carefully sequenced balance of conceptual and skill based instruction. Furthermore, existing instructional tools and textbooks often do a poor job of adhering to important instructional principles for learning in mathematics (National Mathematics Advisory Panel, 2008). Therefore, continuous intervention in Tier 1 should seek to repair deficits early, prevent future problems and build on students' strengths, interests, motivations, and learning styles (Clements & Sarama, 2007; Fuchs & Fuchs, 2005; Gresham, 2009; Gresham & Little, 2012; Griffin & Case, 1997). Effective teachers must examine and assess student performance, both formally and informally, throughout the Tier 1 process. This is needed in order to develop mathematical thinking, clarify and redirect mathematical misconceptions or mathematical error patterns, and/or to provide additional practice or alternate instruction to help struggling learners master the instructional goal in mathematics.

Mathematics leaders must help teachers maximize every student's experiences in Tier 1 core instruction. The appropriate instructional strategies rely on teacher team level instructional problem solving within classrooms and schools. Therefore, collaborative teams of educators must be proactive and prevention focused in order to develop dynamic instructional plans to address the academic and/or behavioral concerns of individual students. Instructional problem solving, informed by assessment data, is the continuous decision-making process used throughout Tier 1 core instruction. NCTM (2007) argues that the RtI process encourages schools to ensure that students receive high level of instruction in the general education classroom followed by close monitoring of students' academic progress in that setting. As students fall below state/district benchmarks, a determination is made for the appropriate intervention and support. This is done through the gathering of relevant pieces of formative and classroom data (Fuchs & Fuchs, 2005).

Such identification requires schools to develop and maintain a database for making instructional decisions for particular students. The responsiveness of students to such interventions provides a basis for determining the intensity and duration of additional instructional needs (NCTM, 2007).

To meet the CCSS, leaders and teachers will need to differentiate and scaffold instruction of abstract concepts so that students master mathematical problems (National Research Council, 2001). Teachers and leaders must review their primary responsibilities as mathematics educators within the context of the definitions, components, and goals of recent legislative mandates and revised curriculum standards in mathematics. Based upon student assessment results from state, school, and classroom data, teachers and other educators must make instructional decisions to assure that the instructional goals and standards in mathematics are achieved by each student (Gresham & Little, 2013). The goal is to assure that *all* students learn mathematics through high-quality instruction using evidence-based instructional/intervention methods, products, and practices.

How NCSM Members Can Implement Our Position

Mathematics leaders and teachers are the catalyst for maximizing the potential for student achievement. It is important to connect with colleagues and place emphasis and focus on interventions and instructional decision making. Mathematics leaders and teachers must recognize the need to build professional learning communities (PLCs) and collegial conversations that are centered on enhancing our multi-tiered lessons to set a cornerstone for continuous mathematical improvement within the RtI framework.

As leaders, NCSM members can:

- Determine goals of student learning and long term development;
- Relate existing curricula, standards, and resources to student interests and needs;
- Identify staff and available resources to coordinate activities and procedures for intervention;
- Continuously and collaboratively improve the use of evidence-based instructional practices and resources;
- Collect and document student performance data and learning accomplishments related to student, grade level, and/or school improvement plans;
- Encourage colleagues to collect, review, and act upon student assessment data during teacher meetings, PLCs, and/or action research;

- Discuss and systematically reflect on and analyze one's teaching practices within the PLC and share one's thoughts and ideas with other teachers;
- Encourage the use of accessibility strategies that include the use of manipulatives, color, multiple representations, a variety of student groupings, reading strategies, discourse strategies, and task scaffolding;
- Encourage colleagues to look at all evidence-based practices and strategies in differentiating and intensifying instruction and interventions to determine which are appropriate for which students; and
- Utilize collaborative inquiry structures such as lesson study for the focus of lesson planning, observing, and discussing lessons for the implications of teaching and learning.

Additionally, teachers should collaborate with each other to:

- Use differentiation, scaffolding, accommodations with increased intensity to produce conceptual understanding and mastery of critical skills;
- Work collaboratively to diagnose student misconceptions and conceptual understanding and share successful strategies to improve student understanding;
- Use Curriculum Based Measurement (CBM) assessments such as student portfolio samples, diagnostic assessments, formative assessments, and other authentic assessments;
- Use a variety of classroom methods and resources (such as demonstrations, manipulative materials, charts,

illustrations, diagrams, maps, and technology) to provide multiple visual representations;

- Use visuals, demonstrations, and media to provide informational redundancy;
- Relate instructional topics, examples, and vocabulary to prior knowledge, interests, and backgrounds of the students;
- Use drawings, writing, diagramming, and other representations to translate and visualize word problems;
- Develop multiple ways for students to demonstrate learning and visualize thinking (e.g., role play, write a movie script, illustrate the concepts);
- Provide highlighters, sticky notes, markers, and other resources (e.g., electronic dictionaries, calculators, instructional technologies) for student demonstration of learning and current understandings;
- Organize students in small work groups to maximize opportunities for peer-to-peer conversations;
- Utilize warm-up activities and reflection activities daily;
- Spiral content not previously mastered;
- Use modeling, guided practice, independent practice, and offer immediate feedback;
- Review daily abstract terms—illustrate through graphs, drawings, charts, tables, models, and representations; and
- Use technology to support the transition from basic to more advanced understanding of a concept.

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Mission Statement

The National Council of Supervisors of Mathematics (NCSM) is a mathematics leadership organization for educational leaders that provides professional learning opportunities necessary to support and sustain improved student achievement.

Vision Statement

NCSM envisions a professional and diverse learning community of educational leaders that ensures every student in every classroom has access to effective mathematics teachers, relevant curricula, culturally responsive pedagogy, and current technology.

To achieve our NCSM vision, we will:

- N: Network and collaborate with stakeholders in education, business, and government communities to ensure the growth and development of mathematics education leaders
- C: Communicate to mathematics leaders current and relevant research; and provide up-to-date information on issues, trends, programs, policies, best practices and technology in mathematics education
- S: Support and sustain improved student achievement through the development of leadership skills and relationships among current and future mathematics leaders
- M: Motivate mathematics leaders to maintain a life-long commitment to provide equity and access for all learners

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