

Preface

PURPOSE OF THIS BOOK

The purpose of this book is to introduce the overarching principles of an effective response to intervention (RTI) framework in mathematics with the primary focus on instructional recommendations for teachers to improve their day-to-day instruction in mathematics. More and more schools, school districts, and state departments of education continue to expand current RTI models in reading to mathematics to help struggling students. Teachers and administrators are seeking guidance on how best to teach mathematics to students who are struggling and/or have learning disabilities. The eventual result of any effective RTI model is to increase the number of students successful (e.g., increased proficiency) in the general education mathematics classroom, Tier 1. This book is designed to provide instructional recommendations for teaching mathematics effectively to students who have traditionally struggled and draws upon currently available research-based evidence for teaching mathematics.

The National Mathematics Advisory Panel's (NMAP) final report, *Foundations for Success* (2008), clearly states that effective mathematical programs must simultaneously develop (a) conceptual understanding, (b) computational fluency, (c) factual knowledge, and (d) problem-solving skills if students are to be successful in more advanced mathematics courses (e.g., algebra and geometry). Additionally, the NMAP (2008) specifically addresses the instructional needs of low-achieving students, students who struggle, and students with learning disabilities and provides instructional recommendations for teaching these groups of students. The Institute of Education Sciences (IES) released a Practice Guide, *Assisting Students Struggling With Mathematics: Response to Intervention (RTI) for Elementary and Middle Schools*, which puts forth nine recommendations to effectively deliver a math RTI model. Therefore, the recommendations contained in this book will address each of the areas highlighted in the NMAP's *Final Report* (2008) and the IES Practice Guide (2009) with the intent to provide instructionally relevant recommendations and assist educators who are responsible for improving the mathematics programs for students who are underperforming, struggling, and/or have learning disabilities.

TARGET AUDIENCE OF THIS BOOK

One only has to look at a publisher's catalog to see the overwhelming number of RTI books for teachers and administrators; the list may total in the hundreds. Not surprisingly, almost all the published materials focus exclusively on the process (e.g., procedures and assessment) of setting up and implementing RTI models in reading; mathematics, if addressed at all, is given a cursory mention. We certainly recognize the importance of reading, because if students are unable to read at a functional level, they will struggle in many academic areas, including mathematics. However, mathematics education deserves a reform focused on student performance. That said, this book is written for any educator charged with the responsibility of teaching mathematics, particularly those who teach struggling students.

With the emergence of RTI at all levels, school accountability, and emphasis on preparing more students for algebra, the primary responsibility for addressing the instructional needs of *all* students is placed squarely on the shoulders of general education mathematics teachers: elementary and secondary. We contend that if the instructional strategies and recommendations contained in this book are systematically incorporated into the general education mathematics day-to-day classroom instruction, the more likely *all* students will be successful.

We are certainly aware of the realities of the education system and recognize that much of the responsibility of teaching struggling learners within an RTI model often falls at the feet of special educators, curriculum coaches, interventionists, and even school psychologists. This book is also written for those of you who act in the capacity of supporting the general education teacher (e.g., coteaching, resource teachers, tutors) and/or delivering targeted interventions. Additionally, parents of young children are now both experiencing firsthand the shortfalls within their children's elementary mathematics programs and having to address these shortfalls with their children. We hope many parents who read this book find the information helpful as they research ideas to support their children's mathematical development.

WHY IS THE BOOK NEEDED?

Teaching mathematics effectively requires skillful planning and a deep understanding of not only mathematical concepts but also effective instructional pedagogy, especially when teaching students who are low achievers, struggling, and/or have learning disabilities. The NMAP's *Final Report* (2008) states unequivocally that research over many years clearly indicates that students who are low achievers and struggling to learn mathematics and/or have learning disabilities require regular access to explicit methods of instruction available on a regular basis. This conclusion, although evidenced by data, has been scrutinized by some people in education. As more and more students with learning disabilities and other significant instructional needs are being included in the general education mathematics classroom, general education teachers are being required to more effectively meet struggling students' many and varied needs in

the context of their daily instructional lessons. As researchers, we support the implementation of evidence-supported practices to the maximum extent possible and focus our recommendations in this book accordingly. As parents, we applaud the teachers who do the same in their classrooms.

Response to Intervention in Math provides educators with an understanding of the components of effective instructional design and delivery for students with diverse needs in the area of mathematics. Specifically, readers will learn procedures for teaching mathematics using systematic and explicit instruction as an approach to assessment, instructional planning, and evaluation. The instructional recommendations found in this book are aligned with the recommendations put forth by the NMAP's *Final Report* (2008; www.ed.gov/mathpanel), the IES Practice Guide written by Gersten and Colleagues (2009), and the research base on effective mathematics instruction, albeit relatively small compared to research available for reading.

The authors would also like to note that there is no one “thing” or “waving of a magic mathematics wand” that will address the many and varied issues impacting the learning or lack of learning in mathematics. Specific student differences are so widely diverse and often very complex, it is unlikely that the ideas in this book will address every student issue appearing in classrooms. As such, none of the recommendations in this book should be interpreted as “absolutes,” but rather as starting points for consideration in the context of your mathematics program and specific characteristics of your students. Moreover, we advocate that only a concerted effort at all levels and by all educators, both general and special education teachers, is an effective and efficient approach that will ultimately capitalize on efforts to improve your school's curriculum and instruction in the area of mathematics. Without unilateral support for student learning and improvements in mathematics, an RTI math effort is premature.

CHAPTER OVERVIEW

Chapter 1, “What Is RTI, and Why Is It Important?” provides an overview of response to intervention (RTI) in general and how it specifically relates to teaching mathematics. Topics covered in this chapter include an overview and description of RTI practices and procedures and common components in models of RTI, and it concludes with a brief overview of key research supporting RTI in mathematics.

Chapter 2, “The RTI Process for Math,” provides a description of the essential components to consider when designing and implementing an RTI model in math, more detailed description of the standard protocol model and problem-solving model, progress monitoring, and the importance of the core mathematics program.

Chapter 3, “A Tiered Approach to More Effective Mathematics Instruction,” differentiates different levels of instruction and intervention necessary for implementing RTI. Additionally, through a series of detailed self-studies of curriculum, instructional delivery, and interventions along with some classroom examples, it becomes evident whether a school or district is ready to initiate RTI in mathematics.

Chapter 4, “Mathematics Interventions Overview,” describes who requires interventions and how to define the necessary interventions per each student’s needs. Details about building an appropriate environment for interventions as well as choosing effective curriculum and instructional delivery are explained as well as setting the time frame for intervention and developing interventions. The chapter includes a list of mathematics interventions and programs to consider.

Chapter 5, “Number Sense and Initial Math Skills,” details the basic components of number sense and early numeracy as defined by educational programs and related assessments. More important, from number recognition, to magnitude, to counting strategies for basic facts, instruction delivery and interventions are described, with illustrations that may be used to teach number sense to students who are struggling in mathematics.

Chapter 6, “Building Students’ Proficiency With Whole Numbers,” provides a rationale for the importance of teaching students to proficiency with basic whole number operations. Instructional strategies will be provided for building understanding, relationships, and fluency with whole numbers. Peer-assisted learning strategies (PALS) in math are also described for kindergarten and Grades 2–6.

Chapter 7, “Fractions and Decimals,” acknowledges the major struggles that students have with fractions, decimals, and percents. These struggles are worse for those with math difficulties. The failure to succeed in fractions has an ill effect on performance in secondary mathematics, particularly algebra. In this chapter, grade-level expectations are set along with illustrated ways on how to instruct and intervene with the teaching of fractions.

Chapter 8, “Teaching Problem Solving Strategically,” will present teaching problem solving strategically through three problem-solving programs that have been used as Tier 2 instructional programs.

Chapter 9, “The Importance of Teaching Mathematical Vocabulary,” focuses exclusively on mathematical vocabulary and how it influences mathematical proficiency. Five general guidelines for teaching vocabulary and seven math-specific recommendations for teaching mathematical vocabulary are described. Additionally, five instructional activities to facilitate deeper understanding are described and how to assess student’s vocabulary knowledge.

Chapter 10, “Next Steps in the RTI Process,” explores the next steps as models continue to be refined and expanded to secondary settings, other student groups such as gifted and talented, and implications for changing systems. Additionally, an alternative approach to Tier 1 instructional programs is described for future consideration.