Thank you for your request to our REL Reference Desk regarding evidence-based information about Response to Intervention (RTI) for reading and math for students in grades K-3. Ask A REL is a collaborative reference desk service provided by the ten regional educational laboratories (REL) that, by design, functions much in the same way as a technical reference library. It provides references, referrals, and brief responses in the form of citations on research based education questions.

The information below represents the most rigorous research available. Researchers consider the type of methodology and give priority to research reports that employ well described and thorough methods. The resources were also selected based on the date of the publication with a preference for research from the last ten years. Additional criteria for inclusion include the source and funder of the resource.

**Question:** What research supports the implementation of RTI for reading and math in grades K-3?

**Search Process**

**Key words and search strings used in the search:** primary grades AND response to intervention AND reading OR math; RTI AND math; RTI AND reading

**Search databases and websites:**

2. JSTOR: [http://www.jstor.org/action/showAdvancedSearch](http://www.jstor.org/action/showAdvancedSearch) 
3. Google Scholar:  [www.google.com/scholar](http://www.google.com/scholar) 

**Sample Citations Retrieved:**


**Abstract/Summary:** Response to Intervention (RTI) is being implemented as a new initiative in PK-12 schools with increasing frequency. However, the model must be sustained at the school level, which is potentially difficult due to a number of challenges brought about by systems change. This article applied the Stokes and Baer (1977) framework for programming for generalization and maintenance of behavior change to suggest specific activities in which schools could engage to better ensure RTI sustainability. We specifically discussed ways to (1)
introduce to natural maintaining contingencies, (2) train with sufficient exemplars, (3) train loosely, (4) program common stimuli, (5) mediate generalization, and (6) train to generalize. Directions for future research are included.

**RTI for Reading**

**Abstract/Summary:** Using a case study of three elementary schools involved in a Response to Intervention (RTI) model demonstration project, the authors examine the features critical to successful RTI implementation. Preliminary findings suggest that access to and use of sensitive progress monitoring assessments and a willingness to use the data provided by those assessments are key features of successful implementation efforts. The authors draw from a year's worth of student performance data, field observations, and interview and focus group transcripts to document both successes and challenges associated with using school wide RTI to close the achievement gap in reading.


**Abstract/Summary:** The purpose of this article is to describe the current research base and identify research needs related to response to intervention (RTI) frameworks in primary-grade reading. Research is reviewed on early reading instruction and intervention, the implementation of multitiered reading interventions, and the determination of intervention responsiveness. Areas identified as in need of research include (a) the conditions under which early reading interventions are most effective in RTI contexts, (b) multitiered interventions for students with limited English proficiency, (c) reading instruction for students who make limited progress in Tier 3 intensive interventions, (d) criteria for determining intervention responsiveness, and (e) the effects of fully implemented RTI frameworks. Although RTI research may be expensive and difficult to implement, it may contribute to improved reading outcomes for many students who are otherwise at risk of serious negative life consequences.

Abstract/Summary: Response to Intervention (RTI) has emerged as a method for providing early academic assistance to students with difficulty learning. This brief outlines the tiered structure of RTI and how it can be implemented as an effective technique for teaching English learners who are having difficulty making academic progress. It touches on methods of assessment and instructional considerations, and it guides educators in tailoring this technique to fit the needs of English learners.


Abstract/Summary: This article addresses the advantages and challenges of service delivery models based on student response to intervention (RTI) for preventing and remediating academic difficulties and as data sources for identification for special education services. The primary goal of RTI models is improved academic and behavioral outcomes for all students. The evidence is reviewed for the processes underlying RTI, including screening and progress monitoring assessments, evidence-based interventions, and schoolwide coordination of multitiered instruction. We also discuss the secondary goal of RTI, which is to provide data for identification of learning disabilities (LDs). Incorporating instructional response into identification represents a controversial shift away from discrepancies in cognitive skills that have traditionally been a primary basis for LD identification. RTI processes potentially integrate general and special education and suggest new directions for research and public policy related to LDs, but the scaling issues in schools are significant and more research is needed on the use of RTI data for identification.


Abstract/Summary: For nearly 10 years, the response-to-intervention (RTI) policy initiative has engendered enthusiasm at federal, state, and local levels and among various stakeholders. Nevertheless, there are basic and important disagreements about its nature and purpose. The authors describe two groups with contrasting perspectives on RTI in an effort to examine its multiple meanings, to argue that neither group has a credible plan to educate children and youth with severe learning needs, and to encourage all interested parties to think productively about what they want to accomplish in the name of RTI.

**Abstract/Summary:** Responsiveness-to-intervention (RTI) is a method for both preventing and helping to identify learning disabilities. An important feature is its multi-tier structure: "primary intervention" (tier 1) refers to classroom instruction; "secondary intervention" (tier 2) usually involves more intensive pullout, small-group instruction; and "tertiary intervention" (tier 3) typically denotes most intensive special education. Despite RTI's popularity and promise, there are many questions about how to implement it effectively and efficiently. So, in 2001, the Office of Special Education Programs in the U.S. Department of Education funded the National Research Center on Learning Disabilities to conduct two large-scale, field-based, longitudinal, and experimental RTI studies. Both studies, one in reading and one in math, were conducted at first grade, with annual follow up for 3 years in the reading study and 2 years in the math study. This article summarizes findings from the reading study, which was designed to answer three basic questions about RTI's pivotal secondary intervention: Who should participate in it? What instruction should be conducted to decrease the prevalence of reading disabilities? How should responsiveness and non-responsiveness be defined?


**Abstract/Summary:** This guide offers five specific recommendations to help educators identify struggling readers and implement evidence-based strategies to promote their reading achievement. Teachers and reading specialists can utilize these strategies to implement RTI and multi-tier intervention methods and frameworks at the classroom or school level. Recommendations cover how to screen students for reading problems, design a multi-tier intervention program, adjust instruction to help struggling readers, and monitor student progress.

Abstract/Summary: This article describes how a purposeful sample of 62 elementary schools from 17 states implemented a Response to Intervention (RTI) framework for reading. School informants answered surveys and were interviewed about differentiated instruction in Tier 1, screening/benchmarking, where Tier 2 interventions were located, typical group size and the minutes/day of intervention in Tiers 2 and 3 groups, and how students with individualized educational programs (IEPs) in reading were served in the school's RTI model. Schools reported using differentiated instruction in Tier 1, favored curriculum-based measures for screening/benchmarking and progress monitoring, reported more intensive interventions and more progress monitoring in Tier 3, and used a wide variety of models for serving students with IEPs within the schools' RTI models.


Abstract/Summary: This article explores whether struggling readers from different primary language backgrounds differ in response to phonologically based remediation. Following random assignment to one of three reading interventions or to a special education reading control program, reading and reading-related outcomes of 166 struggling readers were assessed before, during, and following 105 intervention hours. Struggling readers met criteria for reading disability, were below average in oral language and verbal skills, and varied in English as a first language (EFL) versus English-language learner (ELL) status. The research-based interventions proved superior to the special education control on both reading outcomes and rate of growth. No differences were revealed for children of EFL or ELL status in intervention outcomes or growth during intervention. Oral language abilities at entry were highly predictive of final outcomes and of reading growth during intervention, with greater language impairment being associated with greater growth.


Abstract/Summary: American Institutes for Research (AIR) has developed a series of Pocket Guides that provide research-based information to support state and district leaders in implementing ESEA flexibility plans. This particular Pocket Guide focuses on the implementation of reforms that feature applications of a research-based framework for response to intervention (RTI) to address the flexibility plan.

**Abstract/Summary:** In this study, response to intervention and stability of reading performance of 41 kindergarten children identified as at risk of reading difficulty were evaluated from kindergarten through third grade. All students were assessed in the fall of each academic year to evaluate need for intervention, and students who fell below the 30th percentile on criterion measures received small-group supplemental intervention. Measures included a combination of commercial normative referenced measures and specific skill and construct measures to assess growth or change in reading risk status relative to 30th percentile benchmarks. Results indicated that consistent with the findings of prior research involving students with comparable entry-level performance, the majority of children identified as at risk in the beginning of kindergarten responded early and positively to intervention. On average, absolute performance levels at the end of kindergarten positioned students for trajectories of later reading performance that exceeded the 50th percentile on the majority of measures. Moreover, changes in risk status that occurred early were generally sustained over time. Only oral reading fluency performance failed to exceed the 30th percentile for the majority of students.


**Abstract/Summary:** Entry-level kindergartners in classrooms from five middle class school districts were given a test of letter identification and children who scored at or below the 30th percentile on the test were classified as "at risk" for early reading difficulties. Half of these children were randomly assigned to a project-based intervention condition where they received supplementary intervention in small groups until the end of their kindergarten year. The other half received whatever remedial services were available at their home schools and literacy skills development in both groups was tracked throughout kindergarten. All available at-risk children were again assessed at the beginning of first grade and dichotomized into a "continued-risk" group and a "no-longer-at-risk" group using a composite measure of basic word level skills. Normal reader controls were also identified using the same measure. Children in the continued-risk group received either project-based intervention (one-to-one tutoring 30 min daily) or school-based intervention throughout first grade. Intervention for project treatment children was discontinued at the end of first grade and literacy development in all groups was tracked until the
end of third grade. The present study focused on literacy development in children who received only project-based kindergarten intervention or both (project-based) kindergarten and first grade intervention, relative to the normal reader controls. Of special interest was the question of whether measures of response to intervention would more effectively distinguish between continued-risk and no-longer-at-risk children than would kindergarten screening measures, measures of intelligence, or measures of reading-related cognitive abilities. Results indicated that the RTI measures more effectively and more consistently distinguished between these two groups than did the psychometric measures.

**RTI for Math**

**Abstract/Summary:** The purpose of this study was to determine the effects of an early numeracy preventative Tier 2 intervention on the mathematics performance of first-grade students with mathematics difficulties. Researchers used a pretest-posttest control group design with randomized assignment of 139 students to the Tier 2 treatment condition and 65 students to the comparison condition. Systematic instruction, visual representations of mathematical concepts, purposeful and meaningful practice opportunities, and frequent progress monitoring were used to develop understanding in early numeracy skills and concepts. Researchers used progress-monitoring measures and a standardized assessment measure to test the effects of the intervention. Findings showed that students in the treatment group outperformed students in the comparison group on the progress-monitoring measures of mathematics performance and the measures that focused on whole-number computation. There were no differences between groups on the problem-solving measures.


**Abstract/Summary:** Responsiveness to intervention (RTI) is an innovative approach to the identification of learning disabilities (LD). The central assumption is that RTI can differentiate between two explanations for low achievement: poor instruction versus disability. If the child responds poorly to validated instruction, then the assessment eliminates instructional quality as a viable explanation for poor academic growth and instead provides evidence of a disability. For children who do respond nicely, RTI serves a critical prevention function. Most of RTI research has been focused on early reading. In this article, we describe two ongoing programs of research
on RTI in the area of mathematics: one on a comprehensive mathematics curriculum at first grade and the other focused on word problems at third grade. For each research program, we describe the sample, explain how students are identified as at risk for mathematics disability, provide an overview of the interventions to which responsiveness is gauged, and describe some results to date.


Abstract/Summary: In this article, the authors consider the power and limitations of responsiveness-to-intervention (RTI) for reducing the need for ongoing and intensive services for the segment of the school population traditionally identified as having a learning disability in mathematics. To assess the robustness of RTI, the authors describe four studies with strong demonstrations of efficacy, as they considered the percentage of students who failed to respond, the post-tutoring achievement gap between tutored and not-at-risk students, and the extent of transfer across components of the mathematics curriculum. The authors then discuss implications and additional research questions pertaining to mathematics intervention generally and within the context of RTI. They conclude with a proposal for an expanded conceptualization of RTI.


Abstract/Summary: Taking early action may be key to helping students struggling with mathematics. The eight recommendations in this guide are designed to help teachers, principals, and administrators use Response to Intervention for the early detection, prevention, and support of students struggling with mathematics.

Abstract/Summary: This summary of nine studies provides information about evidence-based practices for Tier 2 interventions and how to use RTI in mathematics. This annotated bibliography identifies and describes the most current research available on the use of RTI to help students struggling to learn math. This document supports using RTI to assist students struggling in mathematics for implementation of School Improvement Grants (SIG) requirements.


Abstract/Summary: The purpose of the present study was to explore the 3rd-grade cognitive predictors of 5th-grade computational skill with rational numbers and how those are similar to and different from the cognitive predictors of whole-number computational skill. Students (n=688) were assessed on incoming whole-number calculation skill, language, nonverbal reasoning, concept formation, processing speed, and working memory in the fall of 3rd grade. Students were followed longitudinally and assessed on calculation skill with whole numbers and with rational numbers in the spring of 5th grade. The unique predictors of skill with whole-number computation were incoming whole-number calculation skill, nonverbal reasoning, concept formation, and working memory (numerical executive control). In addition to these cognitive abilities, language emerged as a unique predictor of rational-number computational skill.

Referrals

Organizations:

- RTI, International Reading Association: [http://www.reading.org/Resources/ResourcesByTopic/ResponseToIntervention/Overview.aspx](http://www.reading.org/Resources/ResourcesByTopic/ResponseToIntervention/Overview.aspx)
- Reading is Fundamental: [http://www.rif.org](http://www.rif.org)
- The Meadows Center for Preventing Educational Risk: [http://www.meadowscenter.org](http://www.meadowscenter.org)
- The IRIS Center: [http://iris.peabody.vanderbilt.edu](http://iris.peabody.vanderbilt.edu)
- National Council of Teachers of Mathematics: [http://www.nctm.org](http://www.nctm.org)
• The National Center on Learning Disabilities – www.nclld.org
• The Center on Learning Disabilities – www.ldonline.org
• National Dissemination Center for Children with Disabilities – www.nichcy.org
• Florida Center for Reading Research: http://www.fcrr.org
• Center on Instruction: http://www.centeroninstruction.org
• Reading Rockets: http://www.pbs.org/launchingreaders/
• National Center on Response to Intervention: http://www.rti4success.org

• Institute of Education Sciences (IES), public search engine available at: http://ies.ed.gov/pubsearch/

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