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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 4-8. 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 4-8?*

### **Search Process**

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

### **Search databases and websites:**

1. ERIC: <http://www.eric.ed.gov/>
2. JSTOR: <http://www.jstor.org/action/showAdvancedSearch>
3. Google Scholar: [www.google.com/scholar](http://www.google.com/scholar)
4. Institute of Education Sciences (IES) Resources: <http://ies.ed.gov>
5. What Works Clearinghouse: <http://ies.ed.gov/ncee/wwc/>

### **Sample Citations Retrieved:**

Burns, M.K., Egan, A.M., Kunkel, A.K., McComas, J., Peterson, M.M., Rahn, N.L., & Wilson, J. (2013). Training for generalization and maintenance in RTI implementation: Frontloading for sustainability. *Learning Disabilities Research & Practice*, 28, 81-88. doi: 10.1111/ldrp.12009

**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

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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**

Echevarria, J., & Hasbrouk, J. (2009). *Response to intervention and English learners*. Houston, TX: Center for Research on the Educational Achievement and Teaching of English Language Learners (CREATE). Retrieved from <http://www.cal.org/create/publications/briefs/pdfs/response-to-intervention-and-english-learners.pdf>

**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.

Faggella-Luby, M., & Wardwell, M. (2011). RTI in a middle school: Findings and practical implications of a tier 2 reading comprehension study. *Learning Disability Quarterly*, 34, 35-49.

**Abstract/Summary:** Response to intervention (RTI) has received considerable attention from both researchers and practitioners as a school wide model for service delivery. However, research is limited on RTI applications in middle and high schools. The purpose of this article is to describe the outcomes of an experimental examination of a secondary (Tier 2) literacy intervention for at risk fifth- and sixth-grade students in an urban middle school assigned to one of three conditions: Story Structure (SS), Typical Practice delivered by reading specialists (TP), and Sustained Silent Reading(SSR). Results indicated a statistically significant difference between the mean posttest cloze scores of the SSR group and both the SS and TP conditions. Study findings support the growing body of research indicating that at-risk students need intensive and explicit instruction in addition to opportunities to practice reading.

Fuchs, D., Fuchs, L.S., Stecker, P.M. (2010). The “Blurring” of Special Education in a New Continuum of General Education Placements and Services. *Exceptional Children*, 76, 301-323.

**Abstract/Summary:** For nearly 10 years, the response-to-intervention (RTI) policy initiative has

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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.

Graves, A. W., Brandon, R., Duesbery, L., McIntosh, A., & Pyle, N. B. (2011). The effects of tier 2 literacy instruction in sixth grade: Toward the development of a response-to-intervention model in middle school. *Learning Disability Quarterly*, 34, 73-86.

**Abstract/Summary:** The purpose of this quasi-experimental study was to (a) compare Tier 2 evidence-based intensive reading instruction to business-as-usual instruction for sixth graders with and without learning disabilities who were "far below" or "below" basic level in literacy and (b) explore the development of a response-to-intervention model in middle school. The study took place in a large inner-city urban setting, where 100% of students received free or reduced-price lunch and 90% of the students were considered English learners at some point in their school history. Intervention students received intensive small-group instruction for 30 hours across 10 weeks. Credential candidates in special education provided the small-group instruction in the treatment condition. Results on oral reading fluency, less so for Maze reading comprehension measures, indicated greater improvements for treatment students, and students with learning disabilities benefited as much or more than the other struggling sixth graders. Educational implications and recommendations for future research are discussed.

McInerney, M. & Elledge, A. (2013). *Using a response to intervention (RTI) framework to improve student learning: A pocket guide for state and district leaders*. Washington, DC: American Institutes for Research. Retrieved from [http://www.air.org/files/Response to Intervention Pocket Guide 2.pdf](http://www.air.org/files/Response%20to%20Intervention%20Pocket%20Guide%202.pdf)

**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.

Pyle, N., & Vaughn, S. (2012). Remediating reading difficulties in a response to intervention model with secondary students. *Psychology in the Schools*, 49, 273-284. doi: 10.1002/pits.21593

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**Abstract/Summary:** The research on Response to Intervention (RTI) with secondary students is scant; however, a recently conducted, multiyear, large-scale implementation of RTI with middle-school students provides findings that inform practices and future directions for research. This article provides an overview of the findings from each of the 3 years of an intensive, tiered reading intervention with middle-school students. In Year 1, students were provided with a Tier 1 and Tier 2 intervention. In Year 2, minimal responders were provided with another year of intervention (Tier 3), and again in Year 3, minimal responders to the 2-year intervention were provided with a third year of intervention (Tier 4). Using students' responsiveness to intervention as a prerequisite for a subsequent year of intensive instruction, minimal responders received a total of up to 3 years of intervention. The efficacy of an enhanced primary (Tier 1), secondary (Tier 2), and tertiary (Tier 3) intervention, and an individualized, intensive reading intervention (Tier 4) are discussed, as well as the logistics of implementing an RTI model with secondary students.

Swanson, E. A., Solis, M., Ciullo, S., & McKenna, J. W. (2012). Special education teachers' perceptions and instructional practices in response to intervention implementation. *Learning Disability Quarterly, 35*, 115 – 126. doi: 10.1177/0731948711432510

**Abstract/Summary:** This study reports on the perceptions and instructional practices of Grades 3 through 5 special education teachers in a school district that implemented a multitiered response to intervention (RTI) framework for the previous 5 years. The authors used focus groups and interviews to examine special education teachers' perceptions of RTI. In addition, the authors observed the mathematics and reading instruction that these teachers provided. This study contributes to the literature by presenting a qualitative, in-depth description of special education teachers' perceptions related to RTI implementation at the upper elementary level.

Vaughn, S., Cirino, P. T., Wanzek, J., Wexler, J., Fletcher, J. M., Denton, C. D., . . . Francis, D. J. (2010). Response to intervention for middle school students with reading difficulties: Effects of a primary and secondary intervention. *School Psychology Review, 39*, 3-21.

**Abstract/Summary:** This study examined the effectiveness of a yearlong, researcher-provided, Tier 2 (secondary) intervention with a group of sixth-graders. The intervention emphasized word recognition, vocabulary, fluency, and comprehension. Participants scored below a proficiency level on their state accountability test and were compared to a similar group of struggling readers receiving school-provided instruction. All students received the benefits of content area teachers who participated in researcher-provided professional development designed to integrate vocabulary and comprehension practices throughout the school day (Tier 1). Students who participated in the Tier 2 intervention showed gains on measures of decoding, fluency, and

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comprehension, but differences relative to students in the comparison group were small (median  $d = +0.16$ ). Students who received the researcher-provided intervention scored significantly higher than students who received comparison intervention on measures of word attack, spelling, the state accountability measure, passage comprehension, and phonemic decoding efficiency, although most often in particular subgroups.

Vaughn, S., & Fletcher, J. M. (2012). Response to intervention with secondary school students with reading difficulties. *Journal of Learning Disabilities, 45*, 244-256. doi: 10.1177/0022219412442157

**Abstract/Summary:** The authors summarize evidence from a multiyear study with secondary students with reading difficulties on (a) the potential efficacy of primary-level (Tier 1), secondary-level (Tier 2), and tertiary-level (Tier 3) interventions in remediating reading difficulties with middle school students, (b) the likelihood of resolving reading disabilities with older students with intractable reading disabilities, (c) the reliability, validity, and use of screening and progress monitoring measures with middle school students, and (d) the implications of implementing response to intervention (RTI) practices at the middle school level. The authors provide guidance about prevailing questions about remediating reading difficulties with secondary students and discuss future directions for research using RTI frameworks for students at the secondary level.

Vaughn, S., Fletcher, J. M., Francis, D. J., Denton, C. A., Wanzek, J., Wexler, J., . . . Romain, M. A. (2008). Response to intervention with older students with reading difficulties. *Learning and Individual Differences, 18*, 338-345. doi:10.1016/j.lindif.2008.05.001

**Abstract/Summary:** Addressing the literacy needs of secondary school students involves efforts to raise the achievement levels of all students and to address specifically the needs of struggling readers. One approach to this problem is to consider the application of a Response to Intervention (RTI) model with older students. We describe an approach to enhanced literacy instruction for middle school students that includes the essential components of any RTI model: universal screening, progress monitoring, and multitiered instructional service delivery. We use screening and progress-monitoring tools specifically tied to state accountability tests and a multitiered instructional framework that addresses the literacy needs of all middle school students, including struggling readers. Presently a large-scale, multi-site randomized trial is under way to evaluate the feasibility and effectiveness of this RTI model for middle school students.

### **Math**

Anderson, D., Lai, C., Alonzo, J., & Tindal, G. (2011). Examining a grade-level math CBM

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designed for persistently low-performing students. *Educational Assessment*, 16, 15-34.  
doi: 10.1080/10627197.2011.551084

**Abstract/Summary** Students with disabilities participate in two major measurement systems. The Individuals with Disabilities Education Act emphasizes working within a Response to Intervention (RTI) framework to identify and monitor the progress of low-performing students. Persistent low-performing students also may be eligible for some form of an alternate assessment for accountability purposes. Working within these two systems, educators need technically sound measures to inform decision making. This study presents scaling results from a Curriculum Based Measurement tool designed within an RTI framework and specifically for persistently low-performing students. We use the phrase "persistently low-performing students" to refer to a specific group of students who have been identified with a nonsevere learning disability and who perform well below grade-level expectations. Key findings indicate that items appear to function well in the lower tail of the distribution of students' estimated ability level. Further, the distribution of items is positively skewed, resulting in many accessible items that are most informative for low-performing students. Results provide initial validity evidence for the measurements as one source of data for progress monitoring within an RTI framework and the identification of persistent low-performing students who may be eligible for a large-scale assessment option other than the general grade-level assessment.

Fuchs, L. S., Fuchs, D., & Compton, D. L. (2012). The early prevention of mathematics difficulty: Its power and limitations. *Journal of Learning Disabilities*, 45, 257-269. doi: 10.1177/0022219412442167

**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.

Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). *Assisting students struggling with mathematics: Response to intervention (RTI) for elementary and middle schools* (NCEE 2009-4060). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>.

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**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.

Lembke, E. S., McMaster, K. L., & Stecker, P. M. (2010). The prevention science of reading research within a response-to-intervention model. *Psychology in the Schools, 47*, 22-35.

**Abstract/Summary** While implementation efforts using a Response to Intervention (RTI) model to increase reading instruction are becoming widely used, more administrators and teachers are looking to learn effective RTI practices to support learning in mathematics. This article explores some of the key elements of RTI practices in mathematics, including screening for identification of struggling learners and progress monitoring for gauging instructional effectiveness. In addition, several of the pressing needs regarding the importance of mathematics proficiency for all students are discussed. We describe some of the similarities and differences between RTI processes in reading and mathematics. The article addresses the use of diagnostic data and details the importance of "core" instructional practices that reflect the standards included in the National Council of Teachers of Mathematics standards and Common Core Mathematics standards, among others. The article concludes with a discussion of some evidence-based interventions in mathematics, and we provide an implementation checklist to assist educators as they begin to implement RTI in mathematics.

Newman-Gonchar, R., Clarke, B., & Gersten, R. (2009). A summary of nine key studies: Multi-tier intervention and response to interventions for students struggling in mathematics. Portsmouth, NH: RMC Research Corporation, Center on Instruction. Retrieved from <http://www.centeroninstruction.org/files/Summary%20of%209%20studies%20on%20RTI%20math%20and%20struggling%20math%20students.pdf>

**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.

Seethaler, P. M., Fuchs, L. S., Star, J. R., & Bryant, J. R. (2011). The cognitive predictors of computational skill with whole versus rational numbers: An exploratory study. *Learning and Individual Differences, 21*, 536–542. doi: 10.1016/j.lindif.2011.05.002

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**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 Action Network: <http://www.rtinetwork.org>
- International Reading Association: [www.reading.org/Resources/ResourcesByTopic/ResponseToIntervention/Overview.aspx](http://www.reading.org/Resources/ResourcesByTopic/ResponseToIntervention/Overview.aspx)
- Reading is Fundamental: <http://www.rif.org>
- The Meadows Center for Preventing Educational Risk: <http://www.meadowscenter.org>
- The IRIS Center: <http://iris.peabody.vanderbilt.edu>
- National Council of Teachers of Mathematics: <http://www.nctm.org>
- The National Center on Learning Disabilities – [www.nclld.org](http://www.nclld.org)
- The Center on Learning Disabilities – [www.ldonline.org](http://www.ldonline.org)
- National Dissemination Center for Children with Disabilities – [www.nichcy.org](http://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):** <http://ies.ed.gov/pubsearch/>
- **What Works Clearinghouse:** <http://ies.ed.gov/ncee/wwc/>
- **Doing What Works:** [http://dww.ed.gov/Response-to-Intervention-Math/topic/index.cfm?T\\_ID=28](http://dww.ed.gov/Response-to-Intervention-Math/topic/index.cfm?T_ID=28)

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