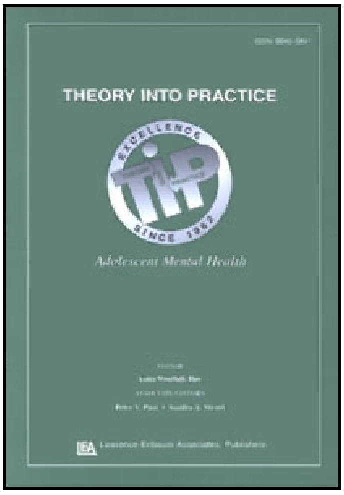

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Response to Intervention: A Research-Based Summary

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Response to Intervention: A Research-Based Summary

Response to Intervention (RTI) is an instructional framework through which schools can provide early intervention for students experiencing academic and behavioral difficulties. It is also promoted as an alternative to the IQ-discrepancy model for identifying students with learning disabilities. Most states have developed, or are developing, models of RTI that can be used by school systems and the topic of RTI is frequently written about in educational journals and spoken about at professional conferences. The purpose of this article is to provide the reader with a summary of the research base related to the typical components of the RTI process, as well as the evidence base for RTI when implemented in its entirety.

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A RESPONSE TO INTERVENTION (RTI) model is a multitiered approach to help struggling learners. Student progress is closely monitored at each tier of intervention to determine the need for progressively intense instruction. RTI has also been proposed as an alternative to the IQ-discrepancy method for identification of learning disabilities (LD) and special language was incorporated into the 2004 revision of IDEA (Pub. L. No. 108-446 §614, 118 Stat. 2706, 2004), allowing RTI as part of disability identification procedures. As a result of the incorporation of this special language into legislation, states are increasingly moving toward RTI implementation. In their national survey, Berkeley, Bender, Peaster, and Saunders (2009) found 47 of the 50 states have developed an RTI model or are in the process of doing so.

Table 1
RTI Components

Tier	Core Instruction	All Students
Tier 1	Universal screening (3 times per year)	All students
	Monthly progress monitoring	At-risk students (∼25%)
Tier 2	Specialized interventions	∼10–20% of students
	Weekly progress monitoring	∼10–20% of students
Tier 3	More intensive interventions and progress monitoring	∼5–10% of students
	Special education referral	∼2–7% of students

The purpose of this article is to describe the major components of an RTI model and current best practice for their implementation based on the research. These components include: (a) scientifically-based core curriculum; (b) universal screening; (c) progress monitoring; and (d) decisions about adequate progress in subsequent tiers. We also briefly examine research on attempts to implement full RTI models in the field (i.e., models that include all or most of the major RTI components). The components of a typical RTI model are presented in Table 1.

Examples in this article will focus on early reading. Even though there is considerable literature describing RTI for reading, there is much less that focuses on writing, mathematics, science, and social studies.

What Is a "Scientifically Based" Core Curriculum?

One of the cornerstones of an RTI model is that scientific, evidence-based Tier 1 instruction effectively eliminates inappropriate instruction as a reason for inadequate progress (Hughes & Dexter, 2008a). This is in response to the 2001 President's Commission on Excellence in Special Education report, in which it was posited that many students "who are placed into special education are instructional casualties and not students with disabilities" (p. 26). The Commission took the position that many problems affecting students identified with LD are not related to deficits in the student, but rather due to inappropriate and/or ineffective instruction (Yell & Drasgow, 2007). Thus, Tier 1 instruction, sometimes referred to as the "core" curriculum, must be grounded in scientifically based research.

For early reading instruction, for example, a scientifically-based core curriculum should be, in part, based on the National Reading Panel (NRP, 2000) report. The NRP reports that although there are no simple answers or solutions for improving reading achievement, an extensive body of knowledge now exists delineating the skills children must learn to read well. These skills supply the foundation for sound curriculum decisions and instructional strategies. The five components of effective early reading (e.g., grades K–3) instruction, as reported by the NRP, are:

1. *Phonemic awareness*—the understanding that the sounds of spoken language work together to make words;
2. *Phonics*—the relationship between the letters of written language and individual sounds of spoken language;
3. *Fluency*—the ability to read text accurately and quickly;
4. *Vocabulary*—the words one must know to communicate effectively; and
5. *Text comprehension*—understanding what one is reading.

Even armed with this knowledge, it may be difficult for practitioners to select appropriate curricula for early reading. In light of this fact, the U.S. Department of Education supports a

Web site and funds three technical assistance centers to help states, districts, and schools implement the scientifically based research requirements of the No Child Left Behind (NCLB) Act.

- *What Works Clearinghouse (www.whatworks.ed.gov).* The What Works Clearinghouse features evidence-based studies of the effects of curriculum on students' achievement outcomes (Foorman, 2007). Currently, the Web site includes effectiveness ratings for 24 specific beginning reading programs across four domains: (a) alphabetics; (b) fluency; (c) comprehension; and (d) general reading achievement.
- *Technical assistance centers.* The U.S. Department of Education funds technical assistance centers in Oregon and Florida. Two practical tools were developed through these centers. Simmons and Kame'enui (2003) created "A consumer's guide to evaluating a core reading program grades K–3: A critical elements analysis" (http://reading.uoregon.edu/appendices/con_guide_3.1.03.pdf) at the Oregon Center, and researchers at the Florida center created a scoring rubric for evaluating potential core reading programs. The Florida Center's rubric consists of answering the following questions:
  1. Are all five components from the NRP present and prominent?
  2. Is instruction within each component explicit and systematic?
  3. Is the sequence for instruction organized sequentially?
  4. Is student material coordinated with the teacher guide?
  5. Is instruction across components clearly linked?

Using Oregon's consumer guide and Florida's rubric for selecting core reading programs as their basis, Al Otaiba, Kosanovich-Grek, Torgesen, Hassler, and Wahl (2005) reported that effective core reading programs aligned with Reading First share three important features:

1. a clearly articulated statement of scientifically based research;
2. explicit instructional strategies; and
3. consistent organizational and instructional routines.

What Is Universal Screening?

Universal screening is the first step in identifying students at risk for learning difficulties. It is the mechanism for targeting students who struggle to learn even when provided a scientific, evidence-based general education (Jenkins, Hudson, & Johnson, 2007). Universal screening is typically conducted three times per school year, in the fall, winter, and spring. Universal screening measures consist of brief assessments focused on target skills (e.g., phonological awareness) that are highly predictive of future outcomes (Jenkins, 2003).

Although most research on universal screening is in the area of reading, there is also research support for the utility of universal screening in the areas of writing, math, and behavior (Jenkins et al., 2007). In a typical RTI model, all students are screened in one or more academic areas, and those identified as at risk for learning or behavior difficulties are provided additional evidence-based interventions in that area. Fuchs et al. (2007) recommended identifying the *risk pool* early (e.g., kindergarten or first grade) to allow participation in prevention services before the onset of substantial academic deficits. The goal of early identification of potential problems is to increase the likelihood of at-risk students developing adequate academic competence. However, screening students early in the learning process lends itself to at least two common errors: false positives and false negatives. False positives are students deemed at risk, who, in fact, are not. False negatives are students deemed not at risk, but who perform poorly on a future criterion measure (Jenkins, 2003). "For a prevention system to work effectively, procedures for determining risk must yield a high percentage of true positives while identifying a manageable risk pool by limiting false positives" (Fuchs et al., 2007, p. 312).

As noted previously, most of the RTI research is focused in the area of reading and, accordingly, most of the universal screening measures are in the area of reading. When behavior is included in an RTI model, school or local norms for behavior rates are used as the screening measure for at risk status. The National Center on Response to Intervention (www.rti4success.org) provides a resource to assist practitioners in selection of universal screening measures. The center reviewed screening tools and rated the level of evidence across several important domains (e.g., classification accuracy, reliability, validity, efficiency).

At present, there is no clear consensus on what criteria (e.g., cut-scores, percentile ranks) should be used for identifying students who are at risk in Tier 1 of an RTI model (McMaster & Wagner, 2007). Using a relative normative approach, some researchers establish a percentile criterion whereby students performing below criterion are considered at-risk (Hintze, 2007). For example, all students scoring below the 25th percentile on a screening assessment may be considered at-risk. According to Torgesen (2000), a "potential problem with such a normative approach is that, by definition, there will always be students who fall in the lowest quartile and thus will always appear to be at risk, regardless of their performance level" (p. 59).

Universal screening is paramount in identifying students at risk for academic difficulty in an RTI model. Correct identification of at-risk students is especially important so the right students receive appropriate tiered interventions. Unfortunately, based on the different conventions of cut-scores, severity, and levels of risk, it is very difficult to generalize percentages of at-risk students across measures and samples. This makes comparison of screening measures extremely difficult.

What Is Progress Monitoring?

Progress monitoring is used to assess student progress or performance in at-risk areas (e.g., reading, mathematics, social behavior) identified by universal screening (Dexter & Hughes, 2009). It is the method by which teachers or other school personnel determine if students are benefitting appropriately from the typical instructional program, identify students who are not making adequate progress, and help guide the construction of effective intervention programs for students who are not profiting from typical instruction (Fuchs & Stecker, 2003).

As soon as a student is identified as at risk by the universal screening measure, that student's progress is monitored in relation to Tier 1 instruction (Fletcher, Lyon, Fuchs, & Barnes, 2007). Progress should be monitored frequently, at least monthly, but ideally weekly or biweekly (Fuchs & Fuchs, 2006). A student's progress is measured by comparing his expected rate of learning (e.g., local or national norms) and actual rate of learning (Fuchs, Fuchs, & Zumeta, 2008). A teacher can use these measurements to gauge the effectiveness of teaching and to adjust instructional techniques to meet the needs of the individual student. A student who is not responding adequately to Tier 1 instruction moves on to Tier 2's increasingly intensive levels of intervention and instruction (e.g., small group instruction and additional instruction), as well as more frequent progress monitoring. The current recommended time period for measuring response to Tier 1 instruction is 8–10 weeks (McMaster & Wagner, 2007) and nonresponsiveness is typically determined by a percentile cut score on a norm-referenced test (e.g., <20th percentile).

According to the National Center on Student Progress Monitoring (www.studentprogress.org), possible benefits of progress monitoring when implemented correctly include: (a) faster student learning because students are receiving more appropriate instruction; (b) more informed instructional decisions; (c) documentation of student progress for accountability purposes; (d) more efficient communication with families and professionals about student progress; (e) higher expectations for students by teachers; and, possibly, (f) fewer special education referrals. The interpretation of this assessment data is vital when making decisions about the adequacy of student progress and in the formulation of effective instructional programs (Fuchs et al., 2007). Effective progress monitoring measures should be short and easily administered (Fuchs & Stecker, 2003). According to Fletcher et al. (2007), there is much research to support the use of short, fluency-based probes in deficit areas such as word reading fluency and accuracy, mathematics, and spelling. However, for areas such as reading comprehension and composition, there is less research support. This is because these domains demonstrate less rapid change and methods for assessing progress over longer periods of time will be necessary (Fletcher et al., 2007; McMaster & Wagner, 2007).

Progress monitoring can be done using a variety of methods. A number of progress monitoring measures have been reviewed by the National Center on Response to Intervention and the National Center for Student Progress Monitoring and vary considerably in reliability, validity, and other key progress monitoring standards. One approach to progress monitoring, curriculum-based measurement (CBM), includes the most well-supported measures in the research base on progress monitoring. According to Fuchs and Fuchs (2006):

> More than 200 empirical studies published in peer-review journals (a) provide evidence of CBM's reliability and validity for assessing the development of competence in reading, spelling, and mathematics, and (b) document CBM's capacity to help teachers improve student outcomes at the elementary grades. (p. 1)

CBM is a form of classroom assessment for: (a) describing academic competence in reading, spelling, and/or mathematics; (b) tracking academic development; and (c) improving student achievement (Fuchs & Stecker, 2003). It can be used with all students to determine if they are benefitting from typical instruction and with failing students to enhance educational programs.

How Do You Make Decisions About Adequate Progress in Tier 2?

Although there is general consensus among researchers for measuring response to Tier 1 instruction (e.g., 8–10 weeks of progress monitoring; below cut score on CBM), there is less consensus for measuring response to Tier 2 instruction and when to begin Tier 3 (i.e., students who are not adequately responding to Tier 2 instruction). As some researchers associate Tier 3 interventions with special education services (Fuchs, Fuchs, & Compton, 2004; Fuchs et al., 2007), nonresponsiveness to Tier 2 interventions is key in LD identification. Fuchs and Deshler (2007) estimate students, based on the assumption of normality, who are non-responsive to these more intensive Tier 2 interventions and are designated LD should fall between 2% and 7% of the general population. However, there is no clear methodological definition of how or when a student should be identified as a nonresponder to intervention. This lack of clarity poses a problem for RTI as an identification tool because of the potential for inconsistent identification of LD (e.g., under 2%, over 7%). At least six methods are currently used in the identification of nonresponders to Tier 2. Fuchs and Deshler defined five of these methods: (a) dual discrepancy; (b) median split; (c) final normalization; (d) final benchmark; and (e) slope discrepancy. Vaughn, Linan-Thompson, and Hickman (2003) described a sixth method of identifying non-responders to Tier 2 intervention as exit groups.

Depending on which method is employed, there is potential for variation in the number of students identified as nonresponders. According to McKenzie (2009), the substantial variability between RTI models may produce threats to validity, measurement error, and inaccuracy in identification. This is best illustrated in the work of Fuchs, Compton, Fuchs, and Bryant (2008) who, in a longitudinal reading study of first graders, found considerable variation between percentage of nonresponders identified based on method used (i.e., dual discrepancy, 8.6%; median split, 9.8%; final normalization, 4.2%; final benchmark, 8.7%; slope discrepancy, 7.6%). Fuchs et al. also made the point that sensitivity (e.g., true positives) and specificity (e.g., true negatives) are extremely important when selecting a measure and method to identify non-responders to Tier 2 interventions. They reported three promising measures that result in acceptable prevalence, sensitivity, and specificity: (a) final normalization using TOWRE Sight Word Efficiency; (b) Slope Discrepancy using CBM Word Identification Fluency; and (c) dual discrepancy using CBM Passage Reading Fluency for level and CBM Word Identification Fluency for slope.

Field Studies Examining Efficacy of RTI

Thus far, we have discussed research and practice related to individual components of RTI programs. However, support for individual components does not necessarily result in support for the program as a whole. An examination of published studies on the effectiveness of entire RTI models is warranted. These studies, often referred to as field studies, are examinations of the impact of multi-tier and multi-component RTI models (Hughes & Dexter, 2008b).

We reviewed a total of 13 published field studies. To be included in our review, the study must have (a) been published in a peer-reviewed journal or edited textbook, (b) employed instruction or intervention in at least two tiers of an RTI model for students experiencing academic or behavioral difficulties, and (c) provided quantifiable measures of student academic/behavioral outcomes and/or systemic outcomes (e.g., special education referrals). Each of the 13 RTI programs included in our review was either a problem-solving or standard protocol form of RTI. A problem-solving model uses interventions that are tailored to an individual student by an instructional group or team (e.g., teacher, school psychologist, etc.). A standard protocol model uses preselected, research-based interventions that are used when an intervention has not led to the desired response by the student (Fuchs & Fuchs, 2006). Of the 13 studies, seven used problem-solving models, five used standard protocol models, and one used a combination of both. All of the studies were conducted at the elementary school level, with four extending into Grade 8 or above.

Nine of the 13 studies measured variables related to academic achievement: four studies measured reading outcomes, three studies reported math outcomes, one study focused on academically related behaviors (e.g., time on task, task completion, task comprehension), and one study focused on general academic performance (e.g., level and rate on statewide achievement test). Six of the 13 studies included variables related to special education referral and placement rates. A more detailed description of the field studies can be found at www.rtinetwork.org.

We also examined the type and quality of the research designs used. The designs included single-case (i.e., A-B design), historical control, quasi-experimental with no baseline equivalency, and descriptive. None of these designs control for threats to internal or external validity and thus minimize confidence in the results.

General Outcomes

Our evaluation of these studies led to several overall conclusions and observations about the findings. First, all of the studies examining the impact of an RTI program on academic achievement or performance reported some level of improvement. However, these findings must be tempered by the use of research designs that clearly establish a causal relationship between the RTI program and outcomes.

Second, the outcomes mentioned earlierrelate primarily to early reading and math skills. Few, if any, of the studies examined the impact of RTI on higher-level reading or math skills, writing, or in content areas such as science or social studies. Also, the use of RTI at the middle and high school was not investigated.

Third, with regard to impact of RTI programs on special education referral and placement rates, it appears that overall rates remained fairly constant, with few studies showing slight decreases. However, firm conclusions about referral/placement rates are difficult to make because many studies did not clearly identify how they identified nonresponders, as well as the issues related to research design noted above.

Finally, although not the focus of our review, several supporting factors appeared necessary for scalability of RTI programs. These factors, constant in most of the studies, included: extensive and ongoing professional development, administrative support, teacher buy-in, and adequate meeting time for coordination.

In summary, we characterize the research base for establishing the impact of various RTI models as emerging. More longitudinal efficacy research is needed, as well as examination of factors necessary for developing and sustaining RTI, to assist educators as they consider adoption of this approach.

References

Al Otaiba, S., Kosanovich-Grek, M. L., Torgesen, J. K., Hassler, L., & Wahl, M. (2005). Reviewing core kindergarten and first-grade reading programs in light of No Child Left Behind: An exploratory study. *Reading and Writing Quarterly*, *21*, 377–400.

Berkeley, S., Bender, W. N., Peaster, L. G., & Saunders, L. (2009). Implementation of response to intervention: A snapshot of progress. *Journal of Learning Disabilities, 42*, 85–95.

Dexter, D. D., & Hughes, C. A. (2009). *Progress monitoring within a response-to-intervention model.* Retrieved March 10, 2010 from http://www.rtinetwork.org

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2007). *Learning disabilities: From identification to intervention.* New York: Guilford.

Foorman, B. R. (2007). Primary prevention in classroom reading instruction. *Teaching Exceptional Children, 39*, 24–30.

Fuchs, D., Compton, D. L., Fuchs, L. S., & Bryant, J. (2008). Making "secondary intervention" work in a three-tier responsiveness-to-intervention model: Findings from the first-grade longitudinal reading study at the National Research Center on Learning Disabilities. *Reading and Writing: An Interdisciplinary Journal, 21*, 413–436.

Fuchs, D., & Deshler, D. D. (2007). What we need to know about responsiveness to intervention (and shouldn't be afraid to ask). *Learning Disabilities Research & Practice, 22*, 129–136.

Fuchs, D., & Fuchs, L. S. (2006). Introduction to responsiveness-to-intervention: What, why, and how valid is it? *Reading Research Quarterly, 4*, 93–99.

Fuchs, D., Fuchs, L. S., & Compton, D. L. (2004). Identifying reading disabilities by responsiveness-to-instruction: Specifying measures and criteria. *Learning Disability Quarterly, 27*, 216–227.

Fuchs, L. S., Fuchs, D., Compton, D. L., Bryant, J. D., Hamlett, C. L., & Seethaler, P. M. (2007). Mathematics screening and progress monitoring at first grade: Implications for responsiveness to intervention. *Exceptional Children, 73*, 311–330.

Fuchs, L. S., Fuchs, D., & Zumeta, R. O. (2008). A curricular-sampling approach to progress monitoring: Mathematics concepts and applications. *Assessment for Effective Intervention, 33*, 225–233.

Fuchs, L. S., & Stecker, P. M. (2003). *Scientifically based progress monitoring.* Washington, DC: National Center on Student Progress Monitoring.

Hintze, J. M. (2007, September). *Conceptual & empirical issues related to developing a response-to-intervention framework*. Paper presented at National Center on Student Progress Monitoring, Washington, DC. Retrieved May 26, 2008 from http://studentprogress.org/doc/Hintze2008ConceptualandEmpiricalIssuesofRTI.doc.

Hughes, C. A., & Dexter, D. D. (2008a). *Selecting a scientifically based core curriculum for Tier 1.* Retrieved March 10, 2010 from http://www.rtinetwork.org

Hughes, C. A., & Dexter, D. D. (2008b). *Response to Intervention: A Research Review.* Retrieved March 10, 2010 from http://www.rtinetwork.org

Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. §1400 et seq. (2004).

Jenkins, J. R. (2003, December). *Candidate measures for screening at-risk students.* Paper presented at the National Research Center on Learning Disabilities Responsiveness-to-Intervention symposium, Kansas City, MO. Retrieved May 15, 2008 from http://www.nrcld.org/symposium2003/jenkins/index.html.

Jenkins, J. R., Hudson, R. F., & Johnson, E. S. (2007). Screening for at-risk readers in a response to intervention framework. *School Psychology Review, 36*, 582–600.

McKenzie, R. G. (2009). Obscuring vital distinctions: The oversimplification of learning disabilities within RTI. *Learning Disabilities Quarterly, 32*, 203–215.

McMaster, K. L., & Wagner, D. (2007). Monitoring response to general education instruction. In S. R. Jimerson, M. K. Burns, & A. M. VanDerHeyden (Eds.). *Handbook of response to intervention: The science and practice of assessment and intervention* (pp. 223–233). New York: Springer.

National Reading Panel. (2000). *Report of the National Reading Panel: Teaching children to read (NIH Publication No. 00-4654)*. Bethesda, MD: National Institute of Child Health and Human Development, National Institutes of Health.

Simmons, D. C., & Kame'enui, K. J. (2003). *A consumer's guide to evaluating a core reading program grades K–3: A critical elements analysis*. Retrieved March 1, 2008 from http://iris.peabody.vanderbilt.edu/rti03_reading/cons_guide_instr.pdf.

Torgesen, J. K. (2000). Individual differences in response to early interventions in reading: The lingering problem of treatment resisters. *Learning Disabilities Research and Practice, 15*, 55–64.

Vaughn, S., Linan-Thompson, S., & Hickman, P. (2003). Response to instruction as a means of identifying students with reading/learning disabilities. *Exceptional Children, 69*, 391–409.

Yell, M. L., & Drasgow, E. (2007). Assessment for eligibility under IDEIA and the 2006 regulations. *Assessment for Effective Intervention, 32*, 202–213.