REVIEWING THE ROOTS OF RESPONSE TO INTERVENTION: IS THERE ENOUGH RESEARCH TO SUPPORT THE PROMISE?

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In the United States, Response to Intervention (RtI) is used to promote the use of evidence-based instruction in educational institutions, with the goal of supporting general and specialized educators and enabling these professionals to work together in a comprehensive, integrated manner. In doing so, RtI provides a protocol for identifying students with specific academic deficits and who demonstrate the need for individualized forms of instruction. Specifically, professional educators utilize quantitative data accumulated from common student assessment scores, which is thought to reflect a student's response to instruction in the general classroom, in addition to his or her response to more targeted forms of intervention. This article presents a conceptual overview of RtI and discusses key dimensions most salient to its development and implementation within the United States, while carefully reviewing the research supporting the effectiveness of this multi-tiered framework. As RtI gains prominence in other countries, this article serves to educate others on what may well become a more universal response to intervention.

Keywords: Response to Intervention, Special Education, Reading, RtI, education

While, heavily touted in the United States as an effective alternative method of addressing a variety of issues confronting the education of students with special needs, there is a dearth of research substantiating the effectiveness of Response to Intervention (RtI; Sugai & Horner, 2009). Despite limited empirical evidence, RtI is gaining acceptance in the educational sector because the approach is theoretically grounded in research-based practices. This foundation has been aligned with recent educational legislation such as the Individuals with Disabilities Education Act (IDEA) of 2004 (this act is the reauthorization of federal legislation mandating the types and breadth of services offered in educating students with special needs), which authorizes the evaluation and identification of specific learning disabilities (LD) through a student's response to evidence-based instruction and intervention (IDEA, 2004; Sugai & Horner, 2009). This article presents a conceptual overview of RtI and discusses key dimensions most salient to development and implementation, while carefully reviewing the research supporting the effectiveness of a multi-tiered framework. If RtI is successful in meeting the needs of students with disabilities by adequately addressing least restrictive environment, the continuum of services, and the overidentification of specific learning disabilities, then this model could have international implications.

Similar to the United States, an achievement gap exists in Canadian schools, and while this gap is smaller than that in schools in the U.S., it is noteworthy (Levin, 2007). Westheimer (2008) examined historical trends in education and concluded that Canadians should expect educational policy trends from the U.S. to "arrive – perhaps in diluted form" (p. 8). Westheimer (2008) also argued that Canadians may be less politically knowledgeable and warns that educational policies in the U.S. could affect the Canadian education system. Since RtI serves as a mechanism to address current educational policies in the U.S., the RtI movement may indirectly impact the Canadian educational system.

This article outlines the framework of RtI and addresses the limited empirical base available regarding educational effectiveness. Specifically, this article explores the following questions:

- What is the fundamental framework of Response to Intervention?

- Are the principal components of Response to Intervention built on a solid empirical foundation?
- What is the promise of Response to Intervention?
- Is the empirical foundation enough to support the promise of Response to Intervention?

WHAT IS THE FUNDAMENTAL FRAMEWORK OF RESPONSE TO INTERVENTION?

A MULTI-TIERED APPROACH

According to Yell, Shriner, and Katsiyannis, (2006), "A response to intervention model is designed to identify students who are having academic problems when the problems first become apparent, and then matching evidence-based instruction to their educational needs" (p. 13). The Response to Intervention design is a multi-tiered approach to providing individualized instructional services and interventions to students at increasing levels of intensity, based on careful monitoring of student progress and data analysis (Batsche et al., 2006). The rate of improvement demonstrated over time is used to make important educational decisions, including possible determination of eligibility for specialized educational services (Fuchs & Fuchs, 2006). Although the comprehensive instruction and targeted interventions included within the RtI framework may encompass many different levels of intensity and individualization, interventions are generally situated into three broad classes or tiers.

Primary Tier

Primary intervention is available to the entire student body in a general education environment and consists of high-quality, research based instruction (Bradley, Danielson, & Doolittle, 2007). When a universal screening instrument or progress monitoring reveals that a student is not performing at normative academic levels, the student is eligible to receive additional, individualized instruction, which is provided by the general education teacher in the general education classroom (Ardoin, Witt, Connel, & Koeing, 2005). If a student demonstrates little to no academic progress after continued progress monitoring, despite the documented implementation of individualized interventions, the classroom teacher should consult with the school's multi-disciplinary team, which is generally comprised of school administrators, intervention specialists, counselors, and general and specialized educators (VanDerHeyden, Witt, & Gilbertson, 2007). Together, this multi-disciplinary team should utilize the data collected to determine the most appropriate method of meeting the diverse needs of a student who has not demonstrated measurable academic gains at the primary tier.

Secondary Tier

Second tier interventions are more intense, individualized approaches that supplement core instruction and are provided in combination with the existing primary tier interventions (Hoover & Patton, 2008). To maintain the fluidity of the RtI framework, secondary interventions typically range between 8 and 12 weeks (Bradley et al., 2007) for 30 to 50 minutes per day (Burns, 2008). Secondary tier interventions often include small group instruction (Bollman, Silber-glitt, & Gibbons, 2007; Fuchs & Fuchs, 2006). These small group interventions allow for more response opportunities and increased teacher-student interactions, which provide increased opportunities for immediate feedback

While the location and service provider of secondary tier interventions may vary, these interventions should include comprehensive tracking and progress monitoring of each student (Johnson & Smith, 2004). For example, the service provider may administer a fluency battery biweekly. The service provider should utilize these data to monitor student progress over the course for several weeks, and a determination of progress by the multi-disciplinary team should be made by analyzing these data. If these secondary tier interventions prove beneficial for the student and he/she demonstrates substantial gains in academic outcomes, this more intense instruction may no longer be necessary. If the multi-disciplinary team makes the decision to discontinue secondary tier services, the classroom teacher should carefully monitor the student's progress in order to confirm that these gains generalize and are maintained (Fuchs, Mock, Morgan, & Young, 2003).

If a student still does not demonstrate measureable gains, even after several weeks of intensive secondary tier instruction, the service provider and multi-disciplinary team should consult with the student's parents to determine an alternative course of action. Depending on the individual situation and the specific needs of the student, it may be

most beneficial to continue with secondary tier instruction using an alternative type of intervention or instructional approach. On the other hand, the service provider, multi-disciplinary team, and the student's parents may decide that more individualized instruction is necessary and recommend more intense tertiary services (Fuchs & Deshler, 2007).

Tertiary Tier

The intensity of instructional services again increases in the tertiary tier because the service provider is generally only working with one or two students at a time. Furthermore, this individualized instruction results in a greater number of teacher-student interactions (Fairbanks, Sugai, Guardino, & Lathrop, 2007). Instruction can be tailored specifically to the needs of each student. Progress is again monitored frequently in the tertiary tier for the purposes of tracking academic gains and data-based decision making (Bruns, 2008; Sugai & Horner, 2009). While continuously monitoring improvement, the service provider may determine that the student requires more individualized instructional time or needs specific interventions using a varied instructional method (Cummings, Atkins, Allison, & Cole, 2008; Johnson & Smith, 2008). If measurable academic progress is achieved through tertiary tier instruction, the service provider, multi-disciplinary team, and parents should determine the best educational plan to promote and maintain student success. This determination may also include a discussion of special education eligibility because the RtI model can serve as a vehicle for special education identification (Fuchs & Fuchs, 2006; Hoover & Patton, 2008). Therefore, information about a student's individualized instruction and comprehensive progress during tiered instruction can be very helpful in determining whether the student demonstrates deeper deficits that could be better characterized through formal special education evaluations (Vaughn, Linan-Thompson, & Hickman, 2003).

EXPANDING OUR UNDERSTANDING

The remainder of this article will address the following questions:

- Are the principal components of RtI built on a solid foundation of credible research?

- What is the promise of Response to Intervention?

- Is there enough research to support the promise of Response to Intervention?

Database Search Procedures

The authors employed a two-step search procedure for the purpose of identifying RtI field studies. A precedence criterion for inclusion was initially established and incorporated the following:

- The field study must have been published in a scholarly, peer-reviewed journal;

- The RtI intervention method studied by researchers must have included a multi-tier approach to instruction;

- The rationale of the academic or behavioral intervention must have targeted students who were experiencing behavioral or academic difficulties; and

- Descriptive procedures of data collection and analysis of quantitative outcome measures must have been reported by researchers.

Next, the authors compiled a list of key words and phrases associated with the elements, theoretical framework, history, and implementation of Response to Intervention. Overall, the search of the Google Scholar, ERIC, JSTOR, EBSCO Host, and Professional Development Collection databases was successful and established eleven studies that matched the precedence criterion for inclusion.

ARE THE PRINCIPAL COMPONENTS OF RESPONSE TO INTERVENTION BUILT ON A SOLID FOUNDATION OF CREDIBLE RESEARCH?

Several components of RtI, including high quality classroom instruction, research based instruction, common assessments, universal screening, continuous progress monitoring, fidelity, professional development, and variations of implementation of RtI, have been examined to determine the credibility of the multi-tier methodology. While each

component has an empirical foundation, the multi-tier approach utilizes attempts to combine these components to meet the diverse needs of students. Therefore, within RtI, these components do not function independently, and this combination of components serves as a vehicle for providing students with the most appropriate academic services.

High Quality Classroom Instruction

One significant component of Response to Intervention pertains to the emphasis on high-quality classroom instruction. Although the term "high-quality" serves as an optimistic descriptor for "instruction," attempts to discover a comprehensive definition were rather disheartening. According to Pianta, Belsky, Houts, and Morrison (2007), in one of the first large-scale efforts to assess the quality of instruction in elementary school classrooms, the quality of instruction in nearly all American elementary schools combines high levels of basic skills seatwork with mediocre instruction, where these practices are not indicative of specific indicators, such as teacher qualifications. Through an extensive review of the literature, Darling-Hammond (2009) explained, "teacher quality might be thought of as the bundle of personal traits, skills, and understanding an individual brings to teaching, including dispositions to behavior in certain ways" (p. 2). These characteristics include strong general intelligence and verbal ability, strong content knowledge, pedagogical dexterity, an understanding of assessment and scaffolding techniques, and adaptive expertise (Darling-Hammond, 2009). While many of these attributes are difficult to quantify, teaching quality is instrumental in achieving increased student outcomes.

Response to Intervention advocates consistently emphasize the importance of high-quality instruction in the general education setting. For instance, Callender (2007) advocated that before students are selected to receive specialized intervention, it must be determined that instruction in the general classroom is considered "high-quality" and individuals in a decision-making position must also ensure that any student in question has been given an adequate opportunity to learn. Furthermore, it may be argued that the "quality" of instruction can be assessed quantitatively by comparing student outcomes across classrooms at the same grade level or qualitatively through formal and informal observation and/or interviews (Callender, 2007).

Research-Based Instruction

The current No Child Left Behind (NCLB; 2002) legislation requires educational institutions to utilize research-based reading programs. According to Wright and Wright (2003),

A primary focus of this law is the requirement that school districts and individual schools use effective research-based reading remediation programs so all children are reading at grade level by the end of third grade. The law authorizes funds to provide assistance to State educational agencies and local educational agencies in establishing reading programs for students in kindergarten through grade 3 that are based on scientifically based reading research, to ensure that every student can read at grade level or above no later than the end of grade three. (p. 73)

Fuchs and Fuchs (2006) argued that the focus on research-based reading programs is not accidental, and in fact, the RtI policy makers also conceptualized Reading First, which is a fundamental component of NCLB (2002). The direct focus on research-based reading programs is understandable because reading fluency and comprehension are major factors in increased academic outcomes throughout the core curriculum.

While the law requires research-based programs, common classroom methodologies and academic curricula vary in efficacy; therefore, assuring that instructional methodologies and/or instructional curricula have exhibited legitimacy is fundamental. Researchers affirm that it is relatively difficult to determine if a student's limited academic gains are independent of classroom experiences when the research-based requisite is not implemented (Wright & Wright, 2003). When universal screening results or progress monitoring data reveal a specific learning deficit, an appropriate instructional intervention should be implemented. Particularly, appropriate interventions may consist of a uniquely designed instructional package or a standardized treatment that has been empirically validated (Cummings et al., 2008; Johnson & Smith, 2008; Vaughn et al., 2008). Furthermore, educators are expected to implement unambiguous, research-based interventions when facilitating the needs of students indicative of identified academic deficits (Wright & Wright, 2003). These interventions might include repetition of the classroom instruction presented utilizing a different instructional method. It is essential to note that these interventions are not adaptations of the current curricula or accommodations to the content or expected learning outcome. These individualized research-based inter-

ventions should be implemented in 8 to 12 week increments and are designed to intensify and accelerate learning, based on the student's specific learning needs (Vaughn et al., 2003).

Common Assessments

Within the RtI framework, general education professionals and specialized school personnel assume an active role in student assessments. This element emphasizes the critical role that educators play in designing and administering common assessments, rather than relying on externally developed measures of student success (Deno, Fuchs, Marston, & Shinn, 2001.) The design of common assessments can be resourceful when aligning the curriculum with academic standards, for reaching consensus on priorities for instruction and assessment, and for generating dialogue and building common language among educators and students (Deno, 2002). Common local assessments can also be beneficial when preparing for standardized statewide assessments and can provide a clear context for reporting student performance. Additionally, these instruments can be used to assess prior student learning and to make initial decisions related to academic content, grouping, pacing, and individual instructional strategies (Deno, 2002). These assessments are typically administered at the outset of the school year or unit of study.

Common assessments should include both formative and summative measures. Common formative assessments provide essential data used to drive instruction during the teaching/learning process and can then be employed for the purposes of differentiating instruction. Formative assessments are typically embedded in instruction and may take the form of specifically-focused measures, providing immediate feedback on narrowly defined standards and/or curriculum (Deno, 1985). Common summative assessments provide data regarding individual student performance and offer key information used for both program placement purposes and for program evaluation. These evaluation tools are typically designed to be administered at the end of a unit, end of quarter or semester, or end of course (Deno et al., 2001).

Universal Screening

Universal screeners are a type of measurement that is characterized by the administration of quick, low-cost, repeatable assessment of age-appropriate skills, which are used to establish the effectiveness of a specific curricula, classroom instruction, and to determine a pupil's level of proficiency in essential academic areas. Generally, screeners are administered to all students at the beginning, middle, and end of each academic school year (NRCLD, 2006). Screening data are organized in a format that allows for the inspection of both group performance and individual student performance on specific skills (NRCLD. 2006). The quantitative data derived from universal screening provide two useful pieces of information. In particular, the collected data highlight the effectiveness of the core curriculum and Tier I instruction. Specifically, in a multi-tiered model of school support, about 80% of the student population should demonstrate adequate academic progress in a particular academic or curricular area (NASDSE, 2005). However, if greater than 20% of the student population does not demonstrate acceptable academic progress in a particular content area, it may be necessary to make adjustments to the core curriculum and/or the manner in which the curriculum is delivered (NASDSE, 2005). Furthermore, quantitative universal screening data identify individual learners who are demonstrating academic deficits in comparison to their same-age peer group. These learners may require additional intervention, either in small groups or on an individual basis (NASDSE, 2005).

Continuous Progress Monitoring

One of the most important components of the RtI is the collection of data that allows staff to evaluate treatment effectiveness. In RtI, consistent monitoring of student progress is necessary to identify learners who are not meeting stated goals. Norm Reference Tests (NRT) may may not be the most appropriate wayof progress monitoring for several reasons. First, many of the NRTs do not provide adequate information necessary for driving instruction (Thurlow and Ysseldyke, 1980). Additionally, most NRTs are not sensitive to measuring growth or academic change over a short period of time. Carver (1974) argues that educators should also make use of edumetric tests, or measurements that are valid for monitoring individual academic growth. Furthermore, NRTs typically can only be administered one or two times per year, which is problematic because teachers need more immediate feedback in order to drive instructional decisions. Curriculum-Based Measurements (CBM), however, were designed to measure individual academic progress. Specifically, several comprehensive studies have documented the validity and reliability of CBM (Deno,

1985; Fuchs, Deno, & Mirkin, 1984) as well as the utility in evaluating student growth and guiding instructional changes (Fuchs et al., 1984). Therefore, for the purposes of consistent progress monitoring, CBM may be a superior measure in comparison to NRTs.

Fidelity

Fidelity of program implementation is essential and specifically refers to the delivery of instruction (Gresham, MacMillan, Boebe-Fran¬kenberger, & Bocian, 2000). Program fidelity is an important component of RtI, and is imperative at both the campus and classroom levels. For valid placement consideration purposes, a designated di¬agnostic team of intervention specialists should always be able to verify that a student in the primary tier has received appropriate and adequate instruction in the general education classroom. Therefore, implementing instruc¬tion with fidelity is essential when measuring outcomes of both the core curricula and individualized interventions. Additionally, adequate program fidelity satisfies one of the legal re¬quirements for appropriate instruction as indicated in the Individuals with Disabilities Education Act (NJCLD, 2005). This is supported by extensive research, confirming the importance of program fidelity to maximize student outcome (Foorman & Moats, 2004; Foorman & Schatschneider, 2003; Gresham et al., 2000; Kova¬leski, Gickling, Morrow, & Swank, 1999; Telzrow, McNamara, & Hollinger, 2000).

Professional Development

Regardless of the appeal of each of the aforementioned components, successful implementation of RtI is heavily dependent on both general and specialized educators. The reliability and validity with which an RtI model is employed will be determined to a great extent by the quality of professional development and educational support offered to these educators. Ideally, these methods of staff training should be used to translate research into practice. The Council of Administrators of Special Education (CASE) and Spectrum K12 School Solutions (2010) educators asserted that the biggest obstacle in regards to the implementation to RtI was lack of adequate staff education and training. Furthermore, adequate, on-going professional development, focusing on the framework, essential components, and proper implementation, is crucial to the fidelity and effective implementation of RtI within an educational institution.

Variations of RtI Model Implementation

The implementation of an RtI approach may vary from school to school, depending on resources and the individual needs of the student body. The following examples illustrate the different approaches utilized for the implementation of RtI. In Texas, a three-tier RtI model approach known as the University of Texas Model was implemented for elementary students who demonstrated below average competencies in reading (Vaughn et al., 2003). This study focused on the performance of 45 second grade students placed in the secondary tier. Students, who did not respond to the core reading instruction in the primary tier, received intense, individualized intervention that addressed the five essential reading components outlined by the National Reading Panel. Students who responded positively to secondary tier interventions and met the exit criteria were able to return to the primary tier. Vaughn et al. (2003) concluded that the majority of students who reach the secondary tier required a minimum of 20 weeks of intervention before the team determines whether or not a tertiary intervention was necessary.

David Tilley of the Iowa State Department of Special Education (2003) examined the implementation of a multi-tiered intervention "problem-solving" model across a large number of school districts. The Iowa Model consists of four problem-solving levels. Each level represents an increase in the intensity of the problem and the amount of resources needed to address the problem. Level I entails cooperative correlation and open dialogue between teachers and parents in order to address specific student concerns. Level II includes the targeted use of specific interventions and/or resources that exist within the educational institution. Consultation with a specialized problem-solving team is the focus of Level III. Level IV involves specialized placement options and consideration of special education eligibility.

The Minneapolis Public Schools employ an RtI approach known as the Minneapolis Model (Marston, 2001; Marston, Muyskens, Lau, & Canter, 2003). In this three-stage process, student interventions are monitored and RtI data are used to determine whether students are eligible for special education services. Classroom Interventions are implemented at Stage 1. After determining that a student qualifies for additional instructional support, the service provider begins to collect frequent student-level data and initiates a modification in the instructional approach. If the student does not respond to this intervention, he or she receives secondary tier services. At Stage 2, the school's Problem Solving

Team, comprised of general education teachers, specialized personnel, and school administrators, review each individual case of concern. The objective of this review is to identify individualized resources that can be implemented to target the specific needs of the student. Frequent data are collected, and if the student does not respond to the interventions at in Stage 2, the student receives tertiary services, which include a special education evaluation.

WHAT IS THE PROMISE OF RESPONSE TO INTERVENTION?

The RtI Coordination Council of Texas (RICC; 2008) maintains that the RtI holds the promise of ensuring that all children have access to high quality instruction, struggling learners will be identified early, and these students will be adequately supported with appropriate academic interventions. Furthermore, the RICC (2008) emphasizes that the implementation of RtI in Texas schools should result in effective classroom instruction, individualized student intervention, and increased collaboration among professional educators, and should contribute to an overall improvement of Texas schools due to the data-driven foundation of RtI. RtI advocates have recommended the use of multi-tiered strategies to help reduce the achievement gap among learners from diverse and economically disadvantaged backgrounds (Ikeda, Tilly, Stumme, Volmer, & Allison, 1996). The National Research Council on Learning Disabilities (NRCLD, 2006) recommended using RtI techniques to increase achievement, decrease problem behaviors, and reduce the disproportional representation of students from minority backgrounds in special education. Unfortunately, there is a limited empirical base to substantiate these claims, justifying the need for a comprehensive analysis on the effectiveness of RtI as it pertains to measurable student outcomes.

IS THERE ENOUGH RESEARCH TO SUPPORT THE PROMISES OF RESPONSE TO INTERVENTION?

With few exceptions, the research reviewed in regards to RtI has focused largely on the efficacy of each individual component in the model, but not on the value of the RtI process as an integrated whole. Consequently the question of whether the overall process is effective must also be adequately addressed (VanDerHeyden et al., 2007). Based on this concern, we have included a review of 11 published field studies focusing on the efficacy of a multi-tier model. Overall, seven of the studies can be classified as problem-solving models, three are classified as standard protocol models, and one is identified as a combination model (See Table 1). For clarification purposes, a problem-solving model includes individually tailored interventions, usually selected by a multi-disciplinary team, designed to address student deficits (Callender, 2007). A standard protocol model refers to preselected interventions that are implemented after a multi-disciplinary team has determined that the current level of intervention is not producing adequate student outcomes (Fuchs & Fuchs, 2006). Overall the reviewed studies included students ranging from kindergarten to eighth grade. While the focus of these studies ranged from special education placement to specific core academic gains, all of the studies explored the effectiveness of RtI.

In addition to the variation in primary focus, the methodological design varied between the selected studies. Three of the field studies utilized an A-B single-case methodology. This design is employed by first examining baseline data and then implementing a specific intervention to determine if student performance increases. The fundamental problem with this procedure is that it does not demonstrate experimental control by exploring outcome variations when intervention is removed, making it difficult to infer causality. Additionally, this method does not provide any explanation for why the targeted behavior changed (Shadish, Cook, & Campbell, 2002). Three studies made use of a Historical Contrast Design (HCD), comparing post-test data collected from the treatment group with a similar group of participants from the past. Specifically, quantitative data revealing measurement outcomes for student participants were collected for students exposed to RtI for a specified period of time and compared with other student participants within the same district who were not exposed to an RtI. The HCD design is also considered weak in establishing causality due to uncontrolled extraneous variables (Shadish, Cook, & Campbell, 2002). Additionally, three studies employed the Quasi-Experimental Design (QED). The QED is a grouping design that does make use of a control group, but is considered less rigorous when compared to other designs, such as Randomized Control Trials, because it does not employ randomization procedures. Researchers suggest that this limitation can be compensated for if baseline data indicates that the experimental and control groups were equivalent based on all measured variables (Shadish et al., 2002).

Table 1 (Part 1 of 2)
Overview of the Studies included in this Review

Multi-Tier Intervention Model Name	Article Author(s)	Researcher(s)	Participant(s)	Research Design/ Protocol	Measured Outcome(s)
St. Croix River Education District Model	Bollman, et al. (2007)	Teacher	K-8 # of schools & participants not reported	Descriptive QED and HCD/Problem-Solving	Reading-Spec. Ed Placements
Idaho Results-Based Model	Callender (2007)	Educator	K-8 150 schools 1400 students	Deceptive and QED/Standard Protocol & Problem-Solving	Reading Spec. Ed Placements
Tiers of Reading Intervention	O'Connor et al. (2005)	Researcher/ Educator	K-3 2 schools 22 students	HCD/Problem-Solving	Reading-Words, word identification, word attack, passage comprehension, fluency, Spec. Ed Placement
Standard Protocol Mathematics Model	Ardoin et al. (2005)	Researcher	4th grade 1 school 14 students	A-B/Standard Protocol	Mathematics-Fluency, Calculation
System to Enhance Educational Performance	VanDer-Heyden et al. (2007)	Educator	1-5 5 schools 3,101 students	MB Across Schools/ Standard Protocol	Spec. Ed referrals
Pennsylvania instructional Support Teams	Kovaleski et al. (1999)	Educator	1-4 117 schools 492 students	QED/Problem-Solving	Implementation of academics
Minneapolis Problem-Solving Model	Marston et al. (2003)	Educator	k-12 Schools not reported 121 students	HCD/Problem-Solving	Placement Rates, achievement, referral rates

Table 1 (Part 2 of 2)

Overview of the Studies included in this Review

Multi-Tier Intervention Model Name	Article Author(s)	Researcher(s)	Participant(s)	Research Design/ Protocol	Measured Outcome(s)
Illinois Flexible Service Delivery System Model	Peterson et al. (2007)	Educator	K-8 26 schools 556 students	Descriptive/ Problem-Solving	Referral Rates, Spec. Ed Placements, Parent and Staff Satisfaction
Ohio intervention-Based Assessment	Telzrow et al. (2000)	Educator	1-6 227 Schools # of students not reported	Correlational and Descriptive/ Problem-Solving	Implementation fidelity, student goals and fidelity correlation

Special Education Referral/Placement Outcomes

Overall, six studies focused on the effects of RtI on special education referral and/or placement rates. Peterson, Prasse, Shinn, and Swerdlik (2007) indicated that special education referrals and placements remained stable over time after the implementation of a RtI. Bollman et al. (2007) studied the impact of RtI on special education identification rates and reported that placement rates dropped from 4.5% to 2.5% over a ten year period. Callendar (2007) indicated that special education placement rates decreased by 3% for schools that implemented RtI, where the state rate decreased by 1%. In addition, Marston et al. (2003) reported that special education placement rates remained constant for schools implementing an RtI model.

Focused specifically on placement rates, O'Connor, Harty, and Fulmer (2005) determined that during the four year time-span of RtI implementation, special education placement rates fell to 8%, compared to 15% for the historical contrast group. Finally, VanDerHeyden et al. (2007) indicated a decrease in the number of special education referrals, but an increase in the number of special education placements. Based on these studies, it is difficult to discern whether RtI serves as a vehicle for significant decreases in special education placement.

Reading Outcomes

Based on the emphasis of evidence-based reading programs in NCLB (2002), an increasing number of empirical explorations are investigating the link between RtI and reading outcomes. In the current investigation, four studies measured reading outcomes relative to an RtI model (Bollman et al., 2007; Callender, 2007; O'Connor et al., 2005; Vaughn et al., 2003). Bollman et al. (2007) suggested that students who were considered to be academically at-risk exhibited a steady improvement on curriculum-based measurements over a ten-year time span. A specific limitation of this study was the lack of a control group to compare these gradual gains, making it difficult to link improvement to the implementation of RtI. Utilizing a Historical Contrast Design, Bollman et al. (2007) compared past student performance to current achievement levels, using student scores from the Minnesota state assessment. Bollman et al. (2007) reported that the rate of students involved in the RtI program reached grade-level standards earlier than students who were not exposed to multi-tiered instruction. These findings were replicated by Callendar (2007), who

found that students in the Idaho RtI program with individualized reading intervention plans demonstrated higher reading outcomes than their peers without individualized plans. Similarly, O'Connor et al. (2005) determined that students who were exposed to multi-tiered reading interventions at the secondary and tertiary tiers performed higher on standardized reading measures when compared to a historical contrast group.

While implementing a tiered intervention program for 45 students, Vaughn et al. (2003) provided supplemental instruction five times per week, in 35-minute intervals. She reported that all students exhibited significant gains on reading measures, where 10 students exited after 10 weeks of instruction, 14 after 20 weeks, and 10 more after 30 weeks. While demonstrating significant reading gains, 11 students did not meet exit criteria after 30 weeks. However, it was determined that approximately one-third of students exiting the program failed to maintain those academic gains after returning to the general education classroom. Therefore, these students required additional supplemental instruction shortly after they were exited from the program (Vaughn et al., 2003).

Math Outcomes

Interestingly, only one study that met inclusion criteria explored outcomes related to mathematics. Ardoin et al. (2005) implemented an RtI model to explore the effectiveness of secondary and tertiary interventions, consisting of individualized instruction and peer tutoring, of 15 fourth graders who were struggling in mathematics. Ardoin et al. (2005) determined that one-third of the student participants did not demonstrate satisfactory gains when provided with secondary tier interventions. These students were provided with more individualized tertiary instruction. Following the tertiary intervention, only one student did not demonstrate expected gains at tier 3 (Ardoin et al., 2005).

Other Targeted Outcomes

For the purpose of analyzing the academic behaviors associated with time on task and task completion, Kovaleski et al. (1999) wanted to determine if student participants who were exposed to a multi-tiered intervention model performed better on these academically-related tasks when compared to students at other schools that did not employ an RtI model. Kovaleski et al. (1999) determined that students who were exposed to multi-tier interventions outperformed the comparison group on all measured variables (Kovaleski et al., 1999). While limited, this study demonstrates the promise of a multi-tiered model for addressing academic related behaviors.

CONCLUSION

Based on the analysis of the discussed studies, several conclusions and observations about these findings can be determined. Specifically, the majority of studies that examined the impact of RtI on academic achievement or student performance resulted in some level of notable improvement, thereby suggesting that a multi-tiered intervention approach can improve the academic outcomes for students at risk of academic failure. However, limitations exist due to the use of particular research designs and procedures that deter the degree to which the measured outcomes can be associated with the intervention approach (Burns, Appleton, & Stehouwer, 2005; Fuchs et al, 2003; VanDerHeyden et al., 2007). Furthermore, while evidence suggests, to a certain degree, that the implementation of the RtI model improves academic performance, this generalization relates primarily to early literacy skills, which may only apply to students at the elementary level. Implication for future research should include more comprehensive designs that focus on higher level cognitive and literacy skills, content area instruction, core curriculum, and teacher efficacy. These studies will serve as the foundation of the emerging, yet promising, model.

In addition to academic outcomes, a direct relationship between RtI implementation and special education placement rates exists, where the selected studies determined that special education referral rates either declined or remained constant. A concern regarding RtI is that the model is used to identify learners who are not responding to normative levels of instruction. O'Connor et al. (2005) addressed this concern, where it was observed that a number of student participants, once identified as non-responders in the early elementary grades, did not meet the qualifications for secondary or tertiary interventions in the later elementary grades. Conversely, some students who were responding adequately to primary tier intervention in the early elementary grades demonstrated difficulties in the later elementary grades (O'Connor et al., 2005). However, it should be noted that the consistent progress monitoring in RtI allows for the fluidity between tiers, and specific tier interventions should be needs driven.

The research base for establishing the impact of the various RtI approaches on students' learning is obviously emerging. It is without question that the verdict is still out on the actual benefits of RtI. Additionally, more comprehensive research is needed in order to determine if the RtI approach is an effective intervention method for all learners, ultimately contributing to positive outcomes regarding special education referral and placement rates. However, with the national push for research-based multi-tiered interventions in the U.S., an increasing number of schools and school districts are beginning to utilize the RtI approach. Effectiveness of these programs may be viewed internationally, because educational legislation in the U.S. may indirectly influence international policy. Therefore, given the promise of RtI models in the U.S., multi-tiered interventions may become commonplace for special education identification and increasing academic outcomes for students throughout the world.

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