



META ANALYSIS OF THE EFFECTIVNESS OF RESPONSE TO INTERVENTION MODELS IN SPECIAL EDUCATION AND IMPLICATIONS FOR INTERNATIONAL IMPLEMENTATIONS

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Abstract

Response to Intervention (RTI) has been shown to be an effective process for intervention in the United States. Numerous meta-analyses have been conducted to demonstrate that overall effect sizes are strong with regard to RTI research. Because of the effectiveness in the United States, RTI is now being adopted for use in other countries and individual research efforts have shown promising results. The purpose of this meta-analysis was to evaluate the effectiveness of RTI in other countries and the use of RTI with individuals who speak English as a second language. The results of this study provide evidence that RTI can be adopted effectively in other countries.

Recommendations are made for the use of RTI in Saudi Arabia.

Key Words: Response to Intervention , Intervention in Special Education, RTI for ESL Students.



Introduction

Response to Intervention (RTI) has become one of the most important intervention models in the United States education system. There have been many research efforts aimed at studying the effects of RTI models recently (Burns, 2010). Based on a preponderance of the research evidence, RTI is a strong approach to addressing a range of student issues. Because the research efforts have been extensive, it is important to develop an understanding of the various results. One way to capture a picture of the overall research is through meta-analysis. There have been numerous meta-analytic studies done on the effects of RTI since it was implemented as a model in the United States. This meta-analysis will explore the effectiveness of RTI by examining research and evidence-based models of practice developed between 2006 and 2013. The second purpose of this meta-analysis is to determine the feasibility of implemented models of response to intervention internationally and, more specifically, in Saudi Arabia. The third purpose is to determine a best practice model to improve special education services from assessment to intervention.

Brief History of Response to Intervention (RTI)

Response to intervention is a form of pre-referral intervention that began in 1997. The Individuals with Disability Education Act of 2004 (IDEA) mandated that more efforts be made to provide intervention to children with academic delays before referral for special education placement (Nevin & Thousand, 1987; Slonski-Fowler & Truscott, 2004). The goal of these mandates was to integrate special education with the general classroom and to reduce special education placement. The pre-referral intervention services were mentioned but were not required by the federal government as part of the special education legislation (Fuchs & Fuchs, 1989; Graden, 1989; Slonski-Fowler & Truscott, 2004).

The concept of RTI was conceived as a prevention framework providing early intervention to students at risk of reading failure. Special educators and others soon began



to see that RTI frameworks could contribute important information to the identification of specific learning disabilities. In 2004, IDEA removed the requirement of determining a discrepancy between intelligence and achievement tests scores for learning disability classification, and required that the states must permit districts to instead adopt alternative models including the response to interventions (Wedl, 2005). The 2004 reauthorization described and supported using the response to intervention methods of identifying students with learning disabilities (Mellard, Stern, & Woods, 2011).

The RTI idea continued to grow, with application made to not just reading but all academic content areas as well as behavior (Rogers, 2010). The 2004 reauthorization of the Individuals with Disabilities Act (IDEA) and No Child Left Behind Act of 2001 (NCLB) stressed the importance of evidence-based practices, evaluations of progress, and data-based decision-making (Yell, Shriener, & Katsiyannis, 2006). Rogers (2010) asserted that as the first federal law it emphasized the use of instructional practices and evidence based practice derived from research. The NCLB required three-tiered of intervention in teaching. According to Rogers (2010), tiered interventions were responsive to the need for promotion of intervening services to young students.

The RTI process is now extended beyond early intervention in a bid to determine a child's special education eligibility. The President's Commission on Special Education determined that intelligence quotient (IQ) tests are not an effective technique of assessing the need for special education (Rogers, 2010). The process of identifying struggling learners over the years has typically been a three-step process of refer-test-place (Bradley, Danielson, & Doolittle, 2007; Gresham, 2004; Hoover, 2010). The extended periods of time struggling learners wait to receive the needed support often results in problems becoming more significant. According to Dunn (2005), the wait-to-fail model contributes to increased severity of academic difficulties for students in older grades. RTI provides an alternative to the wait-to-fail approach that has been prevalent throughout the U.S. education system.



Response to Intervention also offers the promise of creating better readers by providing differentiated instruction based on data from on-going assessment and an array of data of all students' grades. Therefore, through RTI, all students acquire empirically tested instructions and by doing so, struggling students receive extra attention in class. In short, RTI avoids the wait-to-fail scenario with early intervention and prevention (Pierangelo & Giuliani, 2012). RTI is being strongly considered as a part of the Specific Learning Disability (SLD) identification process because it has the potential to address areas of the SLD definition and construct that are adequately assessed with current approaches (Pierangelo & Giuliani, 2012). RTI provides early intervention assistance for children without discrimination (Lose, 2007). RTI advantages for intervention services include: improved academic performance for weak students, schools and reduced misidentification of weak students by teacher (Merrell, Ervin, & Gimpel, 2006).

The RTI model continues to grow in popularity, as it was not only a new model for struggling students but also for the general education, which includes gifted students. RTI adopts a continuum framework of service provision to provide students at risk with more intensive services and to cater for all their needs (Bianco, 2010; Glover & Diperna, 2007). Bianco (2010) and Glover and Diperna (2007) suggested that gifted students, like special education, are not without problems. The RTI model holds promise for better preparing teachers to meet the needs of all learners. Thus, response to intervention continues to grow in popularity in a new generation of education, providing assistance to all students.

Response to Intervention Framework

What is the response to intervention model? Response to intervention is a new generation of education that holds a promising structure for early intervention and prevention, provides high quality instruction and assessment to increase the possibility of the student's achievement outcome. The National Center on Response to Intervention (2010) defined RTI as a method that integrates assessment and intervention within a



multi-level prevention system to maximize student achievement and to reduce behavioral problems. With RTI, schools use data to identify students at risk for poor learning outcomes; monitor student progress; provide evidence-based interventions and adjust the intensity and nature of those interventions depending on a student's responsiveness; and identify students with learning disabilities or other disabilities. The National Center on RTI concentrates its efforts on improving all students' performance including those struggling learners and students at risk the schools.

Fundamental components of RTI. Response to intervention framework implementations includes four elements. These elements are a multi-tiered prevention system, universal screening, progress monitoring, and data based decision-making.

Significance of the Study

Response to intervention continues to be one of the most useful models for improving the identification of special education students and for providing different assistance for struggling students in the United States. The evolution of RTI helps all students in classroom and improves their performance. Application of RTI has also been shown to improve learning outcomes for all students including at-risk populations. In the United States, general education teachers, administrators, and specialists are still learning how to effectively implement RTI. However, there are many countries that have yet to adopt best practices in identification and placement of children for special education services. The lack of appropriate identification most certainly leads to inappropriate intervention. In order to understand current trends in RTI, this meta-analysis will explore the effectiveness of RTI from 2006-2013 and will specifically focus on studies that have results that may be important for the adoption of RTI outside of the U.S. In order to increase the relevance of this meta-analysis throughout the world, studies that include students who speak English as a Second Language (ESL) and studies that are conducted



in countries outside the U.S. will be examined. By using these studies in the sample, the results may help to determine the possibility of implementing RTI internationally.

Research Questions

1. How effective are RTI models currently in practice as compared to those developed and studied in research settings?
2. Does RTI lead to improvement in the education system and student outcomes?
3. Is RTI effective for ESL students?
4. Can RTI be implemented internationally for special education students (LD)?

Methodology

This meta-analysis is being conducted to determine the effectiveness of RTI for ESL students and the feasibilities of implementing RTI internationally. The studies for the meta-analysis were located by searching academic databases for articles between October 2nd and 5th, 2013. The search was limited to recent articles written in the last 6 years. The following terms were searched for articles published from 2006-2013, with the following limiters listed in parentheses: (response to intervention (RTI) and international (322 hits); response to intervention (and international and special education (11hits); RTI special education (176 hits); RTI and (ELL) (32hits); RTI and (ESL) (11hits); RTI for diverse students (14hits)

It was found during the search the terms that RTI is used in another field than education and in different topics. For instance, Vitamin D and Respiratory Tract Infections: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. The term is used in the medical field and means respiratory tract infections (RTIs). Also, other articles illustrated RTI in road traffic such as the national burden of road traffic injuries (RTI) in Argentina. It can be clearly seen that the term RTI is used in different subjects internationally.



Articles that did not directly address RTI for ELS and ELL were eliminated, leaving (23) total articles. The search was limited to recent articles written in last 7 years. Next, the references lists of the relevant studies were reviewed for other related articles and pertinent information. The criteria expanded the likely pool to (24) articles.

Finally, articles were classified throughout the search and references lists. To be included in this meta-analysis, each article had to meet the following criteria:

1. The study implemented response to intervention models or systemic intervention with children experiencing academic difficulties or identified as learning disabled.
2. Articles were published from 2006 to 2013.
3. Sample included ESL or ELL.
4. The studies contain linguistically and culturally diverse individuals such as Hispanic.
5. The study provided measures of either individual students' learning, such as post intervention and growth assessments, or systemic outcome (e.g. number of children identified as LD).
6. The study used a unit of analysis that was either the individual s students or school buildings. Thus, studies that provided school district or statewide data were not used unless the data could be converted to the school building unit level.
7. The study included at least one between-group comparison and/ or at least one within-group comparison of the outcome.
8. The study included quantitative data that employed in the analysis to compute the effect sizes. Of crucial importance were post and pre-implementation, and standard deviation and mean for the control and experimental groups. Nevertheless studies that incorporated sufficient data



for statistical analysis for the computation of effect size, standard deviation and means were included.

9. The study was written in English.

Of the articles found through various investigate mechanisms and by checking reference lists, (19) met the inclusion criteria and were included in meta-analysis. After identifying studies that met the inclusion criteria, a search of the references from those articles was conducted to identify any additional studies that may have been missed. The review did not result in any additional articles and the total remained of at 19 studies, The 20 studies examined the effectiveness of response to intervention for ESL or ELLs implementation in different area such as reading, writing, behavior, and special education identification.

Categorization of Studies Coding

Articles were classified according to three criteria. First, studies were categorized as either descriptive of one of the two (standard protocol and the problem solving), RTI models already in practice or of an intervention model developed and implemented for research purposes. Approximately (11) studies addressed one of the existing RTI models. The remaining (9) studies examined interventions implemented for research purposes.

A research study by Burns and Symington (2002) employing systemic outcomes with several students established that pre-referral groups were greatly impacted by the use of group solving models. This relevance is critical in that the two categories were employed in the categorization of contemporary studies into two. Students outcomes group incorporated observations of time on task, academic proficiency, analysis of particular skill development, task completion times which were also related to academic interventions. Systemic aspects incorporated variables such as number of learners left behind, time spent by a learner in special education, and placements/referrals in special education. Burns et al., (2005) asserted the importance of noting that some studies studied



more than one effect. Thus, some studies received more than one label, which resulted in (9) being classified as student outcomes and (10) as system outcomes.

Doctoral candidates and school psychology were involved in the inter rater consistency assessments that adopted a meta-analysis framework. A performance management tool which compares responses of a control group against a standard is referred to as an inter rater reliability study/assessment (McQuillian, 2001). Inter-rater reliability refers to the level of agreement between two or more raters and is derived from the correlation of different raters' judgments (McQuillian, 2001). The reason for conducting an inter-rater reliability study is to measure how well raters agree with a standard. Therefore, the entire number of studies divided the number of studies that were placed into the same category by both coders. The consequence of this computation showed 100% agreement. Ultimately, 19 studies have met the criteria, and were coded in the following variables:

- 1) Focus of intervention, systemic outcome and assessment for ESLs and ELLs.
- 2) All Ages grade level of participants.
- 3) Type of participation all with learning disabilities, struggling learner and all students.
- 4) Sample must include ELL, ESL or linguistically and culturally diverse (e.g. Hispanic).

Effect Size Calculation

The effect size statistic represents the size and direction of the relationships among variables of interest in a study (Lipsey & Wilson, 2001). In this study, effect size were specified, which is Cohen's d $ES_{SM} = \frac{X_T - X_C}{s}$. Cohen's d means the standardized mean difference between groups, which measures the difference between the post-test means of the treatment and control groups divided by the pooled post-test standard deviation (Cohen, 1988). A positive ES in the present study represents the extent to which the intervention group exceeded the comparison group, in units of the post-test



outcome measure. In this Meta analysis the effect size was calculated through a university effect size calculators program from university of Colorado.

Results

The results obtainable in this meta-analysis of 20 studies are presented in Table 2 that offers information on the characteristic of each study participates in the Meta analysis. The entire effect size of the 20 studies calculated. The calculations were determined through using the effect size formula, which found that the overall effect size of this meta-analysis is ranged from (.053 to 1.12). The mean of ES is (0.47), the standard deviation is (SD= .39) and the median of the effect size is (0.47).

Table 3 shows standard deviation, median and mean of the effect of size and how they are correlated with other variables in the present study.

Table 2

Effect Size Calculations

Variable	Studies	Mean ES	Median ES	Standard deviation
Total ES	20	0.47	0.47	.39

The main findings of the Meta analysis are included in the next section. They are as follows according to the primary research questions:

Question One

How effective are RTI models currently in practice as compared to those developed and studied in research settings? Both field-based and university-based RTI models led to strong effects, with the former stronger than the latter, but larger effects were found for systemic rather than student outcomes (Burns et al., 2005) Burns et al. (2005) compared the four large-scale implementation of RTI in practice with the



university research, they found that RTI (field-based efforts consistently demonstrated stronger effects than university research-based efforts). The effect size were included 25 effect sizes were computed. These effect sizes ranged from 0.18 to 6.71, with a mean ES of 1.49(SD= 1.43) and a median ES of 1.09.

Currently, this meta-analysis compare various models that in practice nationally and internationally with research, which has shown that RTI has improved since the previous research. The overall effect size was calculated from 19 effect sizes ranging from .053 to 1.12 with a mean ES of .47, SD of .39 and a median ES of .47. The concept of RTI develops rapidly to include all students. The research holds an array of promises for RTI, which still remain to grow from identifying LD students to provide intervention to meet the student needs in education. Response to Intervention has been gaining momentum throughout U.S. and throughout the world.

Question Two

Does RTI lead to improve the education system and student outcomes? The findings illustrate that RTI plays a very important role in the promotion of the education system through the use of different methods of intervention, teaching strategies, and collaboration with teams. The effect size (ES= .47) suggests that RTI is very beneficial for the education system. Furthermore, the result of this study offers a significant improvement in the students' outcome for those who participate in the studies (ES=.47). It has been noted that the RTI still has strong outcomes even after the development of the model.

Question Three

Is RTI effective for ESL students? RTI models provide a significant improvement in most of education areas. Response to Intervention is designed to solve problems especially for ESL student or other students from culturally and linguistically diverse backgrounds. This meta analysis concentrates on ESL students. The effect size (ES=.47), the mean (M=.47), the standard deviation (SD=.39) show that RTI is effective with



diverse populations. It was obvious most of these studies discuss different part of implementation of RTI, which was able to solve their problem and reduce the placement of the students in special education especially in reading for students at academic risk (Linan-Thompson et al., 2006)

RTI was effective for Hispanic students, most of students who participate in this meta-analysis benefit from implementing the RTI model. Response to Intervention supports those students to improve their achievement in school. Actually, those students were very high percentage under learning disability as well as at academic risk. RTI was influential for them. However, most articles stated that RTI assisted them to reduce their high percentage of learning disability and benefit for intervention model. Further, approximately (94%) of ESL students with diverse cultural backgrounds in this meta analysis showed development in their reading and reductions in other academic problems. The finding shows that ($ES=.47$) RTI helps those students effectively.

Hence, the response to intervention method expands its applicability to groups that are not native English speakers. RTI has the potential to improve the outcome of the students and reduces the representation of students with cultural and language needs in special education (Wyoming Department of Education, 2011; Burn, 2005). Most of the studies that participate of this Meta analysis showed that RTI is effective to provide evidence-based intervention to ESL.

Question Four

Can RTI be implemented internationally for special education students? Response to Intervention (RTI) is an approach that aims at giving reprieve to students with learning disabilities. The model holds considerable promise by the fact that slow learning students are given validated research interventions, which will be used to monitor their academic progress. It is therefore easy to ascertain whether the student has caught up with his or her peers. A student portrays a Learning Disability if he or she does not show significant



improvement even after administration of properly structured and implemented interventions.

This meta analysis demonstrated that students from ESL backgrounds benefited from RTI ($ES=.47$) and that similar results are found in studies outside the US. RTI does not aim at increasing the number of students receiving special education. Instead, it aims at reducing those numbers (Burn at el., 2005). Effectively, RTI could reduce the percentage of students with disability (LD) from ESL backgrounds and in countries other than the United States.

Discussion

This meta-analysis study was conducted to provide practical knowledge of the effectiveness of the response to intervention model and the feasibility of adapting the model internationally. Response to intervention, most definitions encompass common factors: scientific, research-based instruction; the use of learning rate and level as the basis for determining effectiveness of intervention; and decisions about intensity and duration of interventions based on a student's response to interventions across multiple tiers of service. The RTI is designed to reduce the number of students referred for special education services and, at least, lessen the number of students wrongfully placed in special education program. This research has focused mostly in effectiveness of the RTI model for diverse students. The result is most of the articles that participate in this meta-analysis benefit from RTI model. Importantly, RTI is highly recommended to improve the education system not only for special education but also for all students. Typically, RTI is very efficient and successful model.

Conclusion

Response to intervention is one of the hottest topics in the education recently. The concept of Response to Intervention (RTI) is changing the landscape for assessment professionals and opening new avenues for teachers to help guide students on the path to success every step of the way. Response to intervention shift the philosophy of teaching



student, shifting what do we think that help the students to solve their problem and how to think. It is not only for students who have disabilities and at risk students. It will assist the entire student in the classroom.

The roots of the concept of Responsiveness to Intervention or RTI are attempts to find the best way to educate children who are struggling or having disabilities, through adjusting pedagogical strategies based on student response patterns (Grigorenko, 2009). Fortunately, RTI was very effective method for various environments in different countries. So, it is rational to adapted internationally specially in Saudi Arabia to assist them improve the special education services which include early intervention and assessment. The effect size of the present meta-analysis supported the pervious meta-analysis that is reminding consistence not only with U.S. population but also with international ESL students. Basically it based on this finding RTI should be implemented in Saudi Arabia. Finally, this meta-analysis will provide a foundation for the first phase of implementing RTI that might help any country seeks to adapt RTI model based in the U.S. model.

Recommendation and Future Research

This study reminds us repeatedly that early intervention is paramount to student achievement. Response to intervention model is one of the most significant models that helps special education (SLD) and other students' success in their live. This paper recommended implementing RTI model immediately in Saudi Arabia to reduce LD students because of the absence of identifying disabilities. Provides one clear RTI model to Implement nationally. Furthermore, training should be provided to teacher on multitier intervention and support the collaboration between special education and general teachers.

Future research should further investigate the feasibility of implementing RTI in Saudi Arabia. Specifically, action research should be done in RTI model. Research should focus on current evidence-based interventions to validate their use with all student



populations, especially special education students.



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