RESPONSE TO INTERVENTION: INCREASING FLUENCY, RATE, AND ACCURACY FOR STUDENTS AT RISK FOR READING FAILURE

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ABSTRACT

In recent years, with the advent of NCLB, the U S Department of Education established new guidelines for the identification of students with learning disabilities. In an effort to meet these new guidelines, many districts have implemented a Response to Intervention (RTI) model. This model has been implemented in conjunction with, or in place of the previously common IQ-achievement discrepancy model that emphasized IQ in the identification process. This quasi-experimental study examined the effectiveness of RTI by measurement of the impact of specialized instruction on the reading fluency of identified fourth grade children at risk of failure. The results of the study indicated that student achievement significantly increases when RTI is effectively implemented.

Introduction

The IQ-achievement discrepancy model was developed in 1977 as part of a federally mandated definition of learning disability and is based on the theory that "achievement predicts intelligence, intelligence is a static characteristic, and intelligence serves as a measure of learning capacity" (O'Malley et al., 2002, p. 32). In other words, this model asserts that any child who has been determined to have a low IQ with commensurate achievement is performing up to his or her learning potential, and therefore is not capable of achieving greater success through learning interventions.

Consequently, using this model has caused many students who are at risk for failure to be denied services to increase achievement (Restori, Gresham, & Cook, 2008).

The IQ-achievement discrepancy model has been used to identify learning disabilities (LD) throughout the United States since that time and in recent years has become a controversial issue in education (Machek & Nelson, 2007). Many researchers have argued that IQ is the most critical aspect of identifying children with LD (Johnson, Mellard, & Byrd, 2005; Kavale, 2005) while others have suggested that IQ is just a small piece of the puzzle, and more focus should be placed on dynamic assessments and responsiveness to intervention (Cooter & Cooter, 2004; Fletcher, Francis, Morris, & Lyon, 2005; Hettleman, 2003; National Joint Committee on Learning Disabilities, 2005; Fusch et al. 2003).

Because of this conflict, many researchers have investigated different models of identifying LD, which spurred the U.S. Department of Education (USDOE) to create new guidelines in the identification process. In 2004, President George W. Bush signed a reauthorization of the Individuals with Disabilities Education Act (IDEA) that stated:

> A state must adopt, consistent with 34 CFR 300.309, criteria for determining whether a child has a specific learning disability as defined in 34 CFR 300.8(c)(10). In addition, the criteria adopted by the State: 1) Must not require the use of a severe discrepancy between intellectual ability and achievement for determining whether a child has a specific learning disability, as defined in 34 CFR 300.8(c)(10); 2) Must permit the use of a process based on the child's response to scientific, research-based intervention; and 3) May permit the use of other alternative research-based procedures for determining whether a child has a specific learning disability, as defined in 34 CFR 300.8(c)(10). (U.S. Department of Education, 2008, ¶ 2)

After this reauthorization, school systems across the country began implementing a response to intervention (RTI) model to use in lieu of or in conjunction with the IQ-achievement discrepancy model. However, because this newer method of identification is still optional, many school systems continue to use the discrepancy model (Restori, Gresham, & Cook, 2008).

The purpose of this study was to investigate the effect of RTI by determining the impact of specialized instruction on reading fluency skills with students in Grade 4 who were identified as at risk for reading failure. These students have been struggling to achieve academic success throughout their educational careers and some have not been given the opportunity to learn through nontraditional means. Many reading interventions have been used with students with LD to increase achievement; however, students who have been identified as slow learners or non-learning disabled based on the IQ-achievement discrepancy model have not been able to participate in such interventions (Cooter & Cooter, 2004; Kavale, 2005; Kavale, Holdnack, & Mostert, 2005). This study attempted to determine if a group of students who are at risk for reading failure was able to increase reading achievement using an evidence-based reading intervention. Because reading rate and accuracy are so closely related to reading fluency, these areas were also explored in this study.

Theoretical Framework

Part of the theoretical framework for this study is the intelligence theory, which asserts that intelligence, or IQ, predicts an individual's ability to learn. This theory, developed by Spearman (1904), is also known as the theory of general intelligence or Spearman's g and is based on the assumption that intelligence is an unchanging characteristic that determines learning capacity (Lubinski, 2004; O'Malley et al., 2002). The theory of general intelligence has been the basis for how the special education system has operated for more than 30 years (Fletcher, Francis, Morris, & Lyon, 2005; Francis

et al., 2005; Fuchs et al., 2003). Because the IQ-achievement discrepancy model is based on this theory, it served as part of the theoretical framework for this study

Additionally, the theory of dual discrepancies presented by Fuchs, Fuchs, and Speece (2002) also constituted the theoretical framework for this study. This theory states that "when a low-performing child fails to manifest growth in a situation where others are thriving, alternative instructional methods must be tested to address the apparent mismatch between the student's learning requirements and those represented in the conventional instructional program" (p. 35). This theory, essentially, is the foundation for the RTI model, which was implemented in this study. Both the intelligence theory and the dual discrepancies theory played vital roles in this study.

Methodology

This quasi-experimental quantitative study, using a pretest and posttest control group design, investigated the impact of a research based reading intervention on reading fluency, rate, and accuracy skills among fourth-grade students who were at risk for reading failure, as evidenced by the students' DIBELS Oral Reading Fluency scores. This study attempted to answer the following research questions:

1. Is there a significant difference in the reading fluency growth based on pretest and posttest scores between the control group and the quasi-experimental group?
2. Is there a significant difference in the reading rate growth based on pretest and posttest scores between the control group and the quasi-experimental group?
3. Is there a significant difference in the reading accuracy growth based on pretest and posttest scores between the control group and the quasi-experimental group?

Research Design

A quasi-experimental, quantitative, pretest and posttest control group design was chosen due to the nature of the research questions. According to Creswell (2003), "If the problem is identifying factors that influence an outcome, the utility of an intervention, or understanding the best predictors of outcomes, then a quantitative approach is best" (p. 21). Creswell also indicated that "In quasi-experiments, the investigator uses control and experimental groups" (p. 167). The pre and posttests enabled the researcher to determine each group's progress in reading fluency, rate, and accuracy to draw conclusions about the effect of the intervention.

Participants and Setting

This study took place in an elementary school in a large urban district in the northeastern region of the United States. This study used a convenience sample to identify potential participants. A convenience sample was used because the researcher needed to identify participants based on current data, more specifically, the most current fourth-grade DIBELS Oral Reading Fluency scores. The sample consisted of fourth-grade students who placed in the at risk category based on their most recent DIBELS Oral Reading Fluency scores. Fourth-graders were chosen as the targeted population because research shows that many times, reading disabilities often do not present themselves and are not diagnosed until fourth-grade (Lipka, Lesaux, & Siegel, 2006). The National Center for Education Statistics (NCES) found that 40% of fourth graders did not meet the basic requirements set forth by the National Assessment of Educational Progress in Reading (NCES, 2006).

Twenty participants were chosen from the sample based on the following eligibility criteria: (a) students must have been in the fourth-grade, (b) students must have been in the at-risk category in reading based on DIBELS Oral Reading Fluency scores, (c) students

must not have been identified as having a specific learning disability in the area of reading, and (d) students must not have been receiving supplemental reading instruction outside of the general education classroom. The decision to use 20 participants was derived based on the relatively small sample size according to current DIBELS Oral Reading Fluency data. The relatively small number of participants allowed the researcher to synthesize and analyze the data for each student in depth to draw sound conclusions about their response to the intervention provided.

Participants' Rights

In order to protect participants' rights, each participant in this study and their legal guardians were provided with a detailed written description of the study including the purpose of the study, details regarding the reading intervention program, potential benefits, and the minimal potential risks. Legal guardians were provided with a letter of consent that they were required to sign if they chose to have their child participate in the study. The form contained contact information regarding where and when the researcher could be reached to field any questions the guardians or the participants may have had regarding the study. Legal guardians and their children's participation were voluntary, and they could have removed their child from the study at any time. Personal information was not used in this study; each student's information was coded to maintain confidentiality, and students' names were changed as well. All student data were stored on the researcher's computer, which required a password to access to protect the participants.

Limitations and Boundaries

This study had limitations that make it difficult to generalize the results to the general population. One important limitation was the relatively small sample size used in this study. The goal of any

research study is to generalize the results from a selected sample back to the entire population (Gravetter & Wallnau, 2005). However, because this study used a sample of only 20 students, additional research corroborating the results would be beneficial in generalizing the results to the population.

Another limitation of this study was that it focused solely on reading fluency and its related components. In order to truly determine if RTI is effective, other areas of learning should be investigated. Moreover, this study was limited to fourth grade students. If this study had used participants from other grade levels the results may have been different. To validate the effects of RTI, interventions should be implemented and studied with students from various grade levels. Also, this study only used one reading intervention. The results may have been different if a variety of reading interventions were used. Consequently, it is necessary to investigate other reading programs to determine if RTI is effective using various interventions.

In addition to the limitations posed by the design of the study, the researcher also could not account for the behavior of the participants in this study. The participants had varying levels of motivation, and therefore they each demonstrated varying amounts of effort and dedication to improving their reading fluency skills. Some students were highly motivated and were extremely focused when participating in the intervention while other students were disinterested and simply went through the motions. Also, it is unknown how much time students in the study practiced reading outside of the allotted time, which may have impacted some of the student's posttest scores.

Data Collection

Following random assignment to either the control group or the quasi-experimental group, each participant was tested (pretest) using form A of the GORT-4 to assess reading fluency, rate, and accuracy. Following the pretest, the students in the control group received

reading instruction using the general education curriculum within the regular education classrooms, and the experimental group received supplementary reading instruction, in addition to the general education reading instruction, using the Read Naturally reading intervention program outside of the regular education setting 4 days per week for 30 minutes across 10 weeks. Following the 10-week period, all participants were retested using form B of the GORT-4 to assess reading fluency (posttest).

Data Analysis

Following the posttest, an independent measures *t* test was used to evaluate the mean difference between the experimental group's growth in the area of fluency, rate, and accuracy based on pretest and posttest scores and the control group's growth in the area of fluency, rate, and accuracy based on pretest and posttest scores. Because the independent measures *t* test only measures the treatment effect, the percentage of variance accounted for by the treatment was also calculated. According to Gravetter and Wallnau (2005), this measure examines whether the treatment causes the scores to vary. In addition, Hartley's F-max test was also used to satisfy the homogeneity of variances assumption, which indicates that the two populations that are being compared have the same variances. Gravetter and Wallnau (2005) indicated that this is an important calculation because if the assumption is not met, the data cannot be interpreted meaningfully from an independent measures experiment.

Fluency

The following hypotheses were tested using an independent measures *t* test.

*Ho*₁: There is no significant difference in the reading fluency growth based on pretest and posttest scores between the control group and the quasi-experimental group.

*Ha*₁: There is a significant difference in the reading fluency growth based on pretest and posttest scores between the control group and the quasi-experimental group.

In a one-tailed independent measures *t* test with an alpha level of .05 and a *df* of 18, any *t* score value greater than +1.734 is considered to be within the critical region. A *t* score value for the sample mean of 2.29 was obtained, which falls within the critical region. Because the *t* score value fell within the critical region, the null hypothesis was rejected. The conclusion is that the growth based on pretest and posttest scores of the experimental group is significantly higher than the growth based on pretest and posttest scores of the control group. Figure 1 shows the fluency pretest and posttest scores for each student in the control group, and Figure 2 shows the fluency growth based on pretest and posttest scores for each student in the control group.
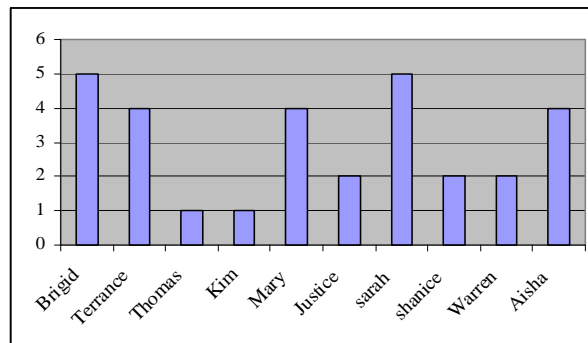

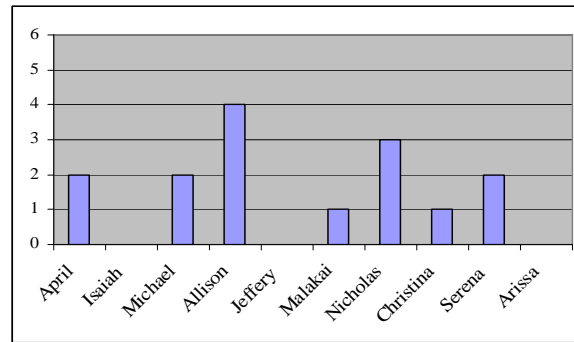Figure 1: *Experimental group fluency growth*

Figure 2: *Control group fluency growth*

The sample size of the pretest and posttest was $n = 10$ for each group. The students in the experimental group had a $M = 3.00$ with a $SD = 1.56$ between pretest and posttest scores. The students in the control group had a $M = 1.50$ with a $SD = 1.35$ between pretest and posttest scores. This difference was significant, $t(18) = 2.29$, $p < .05$, $r^2 = .23$, which indicates that the 10-week reading intervention using the Read Naturally program had a medium effect on the students' reading fluency scores.

The F-max (1.55) calculated for the individual samples fell below the critical value of 4.03. Therefore, the data suggest that the population variances are similar and the homogeneity assumption is reasonable.

Rate

The following hypotheses were tested using an independent measures *t* test.

Ho_1: There is no significant difference in the reading rate growth based on pretest and posttest scores between the control group and the quasi-experimental group.

Ha$_1$: There is a significant difference in the reading rate growth based on pretest and posttest scores between the control group and the quasi-experimental group.

In a one-tailed independent measures *t* test with an alpha level of .05 and a *df* of 18, any *t* score value greater than +1.734 is considered to be within the critical region. A *t* score value for the sample mean of 2.51 was obtained, which fell within the critical region. Because the *t* score value fell within the critical region, the null hypothesis was rejected. The conclusion is that the growth based on pretest and posttest rate scores of the experimental group is significantly higher than the growth based on pretest and posttest rate scores of the control group. Figure 3 shows the rate pretest and posttest scores for each student in the control group, and Figure 4 shows the rate growth based on pretest and posttest scores for each student in the control group.
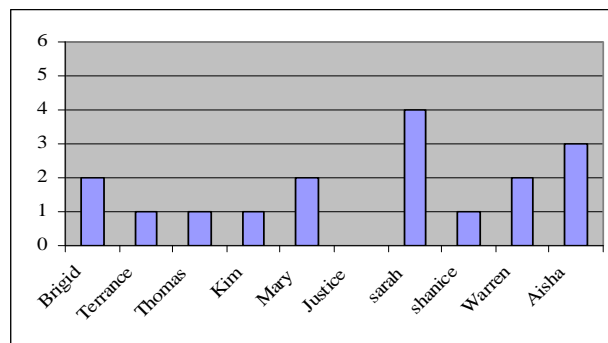
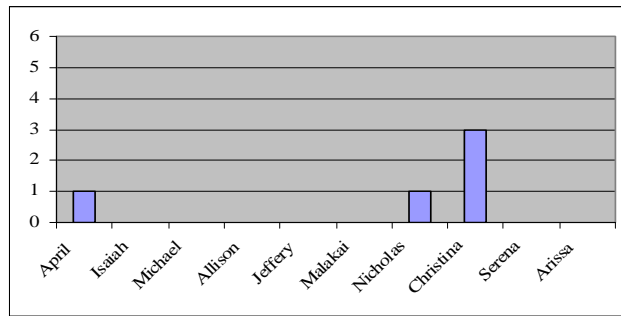

Figure 3: Experimental group rate growth

Figure 4: Control group rate growth

The sample size of the pretest and posttest was $n = 10$ for each group. The students in the experimental group had a M = 1.70 with a SD = 1.16 between pretest and posttest scores. The students in the control group had a M = 0.50 with a SD = 0.97 between pretest and posttest scores. This difference was significant, $t(18) = 2.51$, $p < .05$, $r^2 = .26$, which indicates that the 10-week reading intervention using the Read Naturally program had a large effect on students' reading rate scores.

The F-max (1.43) calculated for the individual samples fell below the critical value of 4.03. Therefore, the data suggest that the population variances are similar and the homogeneity assumption is reasonable.

Accuracy

The following hypotheses were tested using an independent measures *t* test.

> Ho_1: There is no significant difference in the reading accuracy growth based on pretest and posttest scores between the control group and the quasi-experimental group.

*Ha*₁: There is a significant difference in the reading accuracy growth based on pretest and posttest scores between the control group and the quasi-experimental group.

In a one-tailed independent measures *t* test with an alpha level of .05 and a *df* of 18, any *t* score value greater than +1.734 is considered to be within the critical region. A *t* score value for the sample mean of 2.89 was obtained, which fell within the critical region. Because the *t* score value fell within the critical region the null hypothesis was rejected. The conclusion is that the growth based on pretest and posttest rate scores of the experimental group is significantly higher than the growth based on pretest and posttest rate scores of the control group. Figure 5 shows the accuracy pretest and posttest scores for each student in the control group, and Figure 6 shows the accuracy growth based on pretest and posttest scores for each student in the control group.
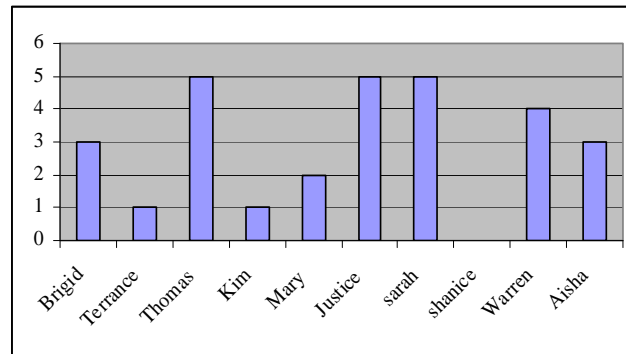

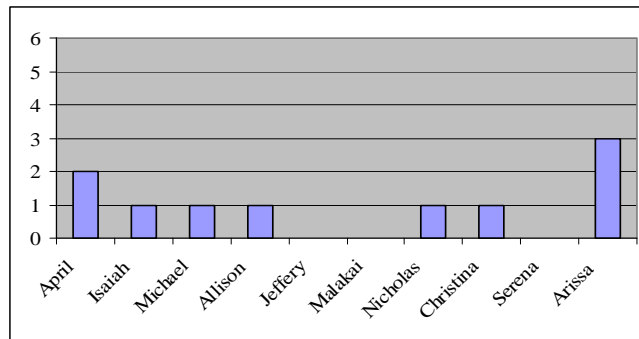*Figure 5: Experimental group accuracy growth*

Figure 6: Control group accuracy growth

The sample size of the pretest and posttest was $n = 10$ for each group. The students in the experimental group had a M = 2.90 with a SD = 1.85 between pretest and posttest scores. The students in the control group had a M = 1.00 with a SD = 0.94 between pretest and posttest scores. This information is found on Table 11. This difference was significant, t(18) = 2.89, p < .05, r² = .32, which indicates that the 10-week reading intervention using the Read Naturally program had a large effect on the students' reading rate scores.

The F-max (3.49) calculated for the individual samples fell below the critical value of 4.03. Therefore, the data suggest that the population variances are similar and the homogeneity assumption is reasonable.

Summary

According to the independent measures *t* tests that were conducted, the difference between the experimental group's growth and the control group's growth is significant in all three areas that were examined. Pretest and posttest results indicate that students in the experimental group significantly improved their fluency, rate, and accuracy following the 10-week reading intervention. Although the control group also improved in these areas, the improvement was not

considered to be significant. The null hypotheses, which stated that there is no significant difference in the reading fluency, rate, and accuracy growth based on pretest and posttest scores between the control group and the quasi-experimental group, were rejected. Therefore, the answers to the research questions are yes: There is a significant difference in the reading fluency, rate, and accuracy growth based on pretest and posttest scores between the control group and the quasi-experimental group.

Recommendations

Implementing the suggestions presented earlier regarding future research could allow the educational system to make sound resolutions on the best way to increase student achievement and identify students with special needs. It will also provide educational systems with the impetus to adopt this method. Administrators in special education departments who determine qualifications for specialized instruction should pay careful attention to research in this area to aid in making decisions regarding the use of RTI. Bergstrom (2008) argued that successfully adopting and implementing RTI goes far beyond progress monitoring and scientifically based interventions; it requires a comprehensive school wide system reform. According to Berkeley, Bender, Peaster, and Saunders (2009), only 15 states have fully developed and are utilizing RTI models. Therefore, the USDOE should look at the results of this study as well as future research to aid in determining the most effective method of identifying learning disabilities, and ultimately implementing new special education standards for all school systems.

The data from this study support RTI as an effective way to improve student achievement. Educators who have students who are at risk for reading failure should also pay attention to the results of this study as well as future research to assist in determining methods of instruction and development of lesson plans and curriculum. The results from this study could be shared with teachers and other faculty

members through professional development to provide educators with a concrete example of how valuable this approach can be with struggling students.

In order for this method to be implemented effectively, educators must develop a deep understanding of and belief in this process. Furthermore, providing teachers and other faculty with the appropriate training will allow them to build confidence in their ability to use RTI with their students. Bergstrom (2008) asserted that in order for RTI to be successful, one of the most important pieces in the reform is professional development geared towards educating teachers about the process. Without the appropriate professional development, the execution of such a program would be impossible.

Conclusion

As stated earlier, the USDOE has created new guidelines for identifying learning disabilities that allow school systems to adopt the RTI method in lieu of or to use in conjunction with the IQ-achievement discrepancy model. Although RTI has been implemented in some school systems throughout the United States, Carney and Stifel (2008) pointed out that "While RTI has come to schools through federal legislation, it has been left to educators and researchers to interpret and investigate the best means of operationalizing this intent to ensure that students difficulties do not stem from instructional deficiencies" (p. 61). In other words, the vague wording of the changes in IDEA leave it open to interpretation. It is up to individual school systems to make decisions on how to structure RTI and ensure students who are at risk are provided with opportunities to become successful. This study, along with future research, will allow the Department of Education, school administrators, and other educational leaders to evaluate the RTI process and establish a protocol for its use in schools across the country to improve student achievement, ultimately effecting social change.

Without relevant research on RTI, many school systems would continue to use the IQ-achievement discrepancy model and perpetuate the ongoing problem of students who do not qualify for special education services falling through the cracks. These students may not be given the chance to increase their achievement skills, even though they struggle with the curriculum simply because they do not qualify to receive specialized instruction (Ukrainetz, 2006). Implementing RTI in schools across the country will allow all students the opportunity to participate in interventions geared towards their specific learning needs. With this targeted instruction, students may be able to improve very precise areas of deficit to advance their overall educational performance, which in turn will afford them greater opportunities in the future.

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