RESPONSE-TO-INTERVENTION: USE OF CURRICULUM-BASED MEASUREMENTS TO FACILITATE STUDENT ACHIEVEMENT FOR LEARNERS AT-RISK OF ACADEMIC FAILURE IN READING AT THE MIDDLE SCHOOL LEVEL

by

DANNY DALE MCFAY

(Under the Direction of Cecil Fore, III)

ABSTRACT

The purpose of this study was to investigate the validity and effectiveness of curriculum-based measurements (CBM) as an instrument to collect response data for the Response to Intervention (RTI) process in conjunction with a researched based instructional reading strategy known as Peer Assisted Learning Strategies (PALS) for middle grade students with and without disabilities. The goal of RTI is identify and assist in making appropriate instructional modification decisions based upon research based assessment data. Students were at risk if they scored one standard deviation below the group mean. The treatment group (N=25) received traditional standards based instruction with the PALS intervention and the control group (N=25) only received traditional standards based instruction. The study ran for nine weeks during the first semester of 2008. A One-Way Analysis of Covariance (ANCOVA) was used to assess the effect size of the treatment. Computation of effect size of treatment indicated that curriculum based measurements together with a researched based instructional intervention was effective. Results of this investigation are discussed along with limitations and implications for future research.

INDEX WORDS: Response to Intervention, Curriculum Based Measurement, Peer Assisted Learning Strategies, Reading instruction

RESPONSE-TO-INTERVENTION: USE OF CURRICULUM-BASED MEASUREMENTS TO FACILITATE STUDENT ACHIEVEMENT FOR LEARNERS AT-RISK OF ACADEMIC FAILURE IN READING AT THE MIDDLE SCHOOL LEVEL

by

DANNY DALE MCFAY

B.A., Valdosta State University, 1984

M.Ed., Georgia Southwestern University, 1990

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPY

ATHENS, GEORGIA

2008

RESPONSE-TO-INTERVENTION: USE OF CURRICULUM-BASED MEASUREMENTS TO FACILITATE STUDENT ACHIEVEMENT FOR LEARNERS AT-RISK OF ACADEMIC FAILURE IN READING AT THE MIDDLE SCHOOL LEVEL

by

DANNY DALE MCFAY

Major Professor: Cecil Fore, III

Committee: Richard Boon
Yolanda Keller-Bell
John Dayton

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2008

DEDICATION

I dedicate this work to Delma, Mildred, Susan, Wayne, Lauren and Hannah and Iralynn

ACKNOWLEDGEMENTS

Something that is worth doing is seldom done alone. This journey began many years ago. Without the love and support from my mother and father, I would not have started this journey. Without the love and support of my two daughters Lauren and Hannah, the journey would have been without purpose. Without the wisdom, friendship and constant reminders from Dr. Cecil Fore and Dr. Richard Boon that the journey was too valuable to abandon, I come not to the end of my journey, but to the first steps of a new journey. I am grateful to my brother Wayne who has always supported me. I cannot forget Jana Willis who was so patient with me while conducting this research. So, thank you Jana for making this journey special and not kicking me out of the room. To all my friends such as John, Garrett, Zack, Kim, Joy, Cheryl, and Matt who tolerated my stress with so much understanding. I am especially grateful to the administration, teachers and staff at Kings Bridge Middle School. If not for their cooperation and understanding, this would not have been possible. I am most grateful to the wonderful students that worked so hard on this project.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Research in the area of reading instruction at the middle school level is not as prevalent as elementary reading instruction research because of the current perception that "learning to read" is the primary purpose of reading instruction at the elementary level. In contrast, at the middle school level the primary objective is "reading to learn" (Fuchs & Fuchs, 2006). For students that need additional reading instruction or remediation at the middle school level, there is limited research into methods and strategies that can identify prerequisite reading skills and appropriately place these students in differentiated tiers of instructional intervention. Response to Intervention (RTI) is one instructional model that relies on precise performance assessments and instructional level placement to assist students who are at different points along the continuum of "learning to read" to "reading to learn". This approach attempts to match an appropriate level of instruction with each student's learning deficits to improve their reading achievement and reduce their risk of failure. To facilitate student achievement and the RTI process, it is critical that performance assessment instruments be valid and reliable as so to accurately identify what reading skills are present and to identify the deficits that need to be remediated. Current research focusing on Curriculum Based Measurements (CBM) (Deno,1985) as an instrument to facilitate the response to intervention (RTI) process for students who are at the middle school level is rather limited (Fuchs & Fuchs, 2006). The majority of the research has focused primarily on the elementary school level where early reading interventions are thought to be most effective (Fuchs & Fuchs, 2006). To address this break in the research, additional investigations ought to

be launched to study the effectiveness of utilizing curriculum based measurements as a response data source for the RTI process at the middle school level (Fuchs & Deshler, 2007). Utilizing curriculum based measurements within the RTI process and coupling it with researched based reading interventions such as Peer Assisted Learning Strategies (PALS) may provide a valuable assessment and instructional approach which may lead to increased achievement outcomes for middle grade students with and without learning disabilities who are at risk in reading (Fuchs, Fuchs, Kazdan, & Allen, 1999; Mathes & Babyak, 2001; Mathes, Howard, Allen, & Fuchs, 1998; and Mathes, Torgesen, Clancy-Menchetti, Santi, Nicholas, Robinson, & Grek, 2003). This increased attention regarding RTI methodology has prompted the United States Department of Education's National Center for Special Education Research to seek proposals from researchers to examine many dimensions of response to intervention, including how the process would work for different academic subjects, how RTI can be implemented effectively at the school and district levels, and how precisely the approach can be used to predict a student's learning disability (Samuels, 2006).

The National Joint Committee on Learning Disabilities (NJCLD, 2005) has summarized response to intervention (RTI) as a problem-solving based procedure of corrective interventions that can support the production of data to help guide instruction and categorize students who may require remedial instruction or special education services. Important concepts within the process are (1) application of scientific, research-based interventions in general education; (2) measurement of student responses to the interventions; and (3) use of the response data to change the intensity or type of successive intervention. The committee also defined the tasks of the general education and special education teachers within the process. The general education teacher and special education teacher must collect relevant assessment data through continuous

progress monitoring and respond effectively to the results (NJCLD, 2005). Research that determines the efficiency of curriculum based measurement as a progress monitoring component and its success for making appropriate instructional decisions for at risk middle grade students in the area of reading fluency and comprehension will hopefully increase the validity of the RTI process and support the central concepts defined by The National Joint Committee on Learning Disabilities (2005).

There is extensive research on the reliability of CBM as a progress monitoring instrument within the RTI process (Fuchs & Fuchs, 1997). According to the National Association of State Directors of Special Education (NASDSE, 2006) and the Council of Administrators of Special Education (CASE, 2006), the purpose of assessment in RTI is to identify at-risk students as soon as possible, to collect applicable data to support educational decision making and to help direct what the teacher is doing to improve achievement. The arrangement of assessments used must be progressively more sensitive to differentiate small changes in achievement in student performance as assessments move from early identification to diagnostics and then to progress monitoring. Research on Curriculum Based Measurement (CBM) is especially appropriate to RTI as a problem-solving model (NASDSE, CASE, 2006).

Curriculum-based measurements within the RTI process was designed to provide frequent response data to modify the intensity or type of resulting intervention that can be applied through a curriculum or to distinguish a child's performance from his/her peer group and determine appropriate interventions. This type of data is a central concept of the RTI process (NJCLD, 2005). Curriculum-based measurements can be used to conduct collective screening of all children in a school and as a way to detect problems early and to begin intervention for children who are at-risk for academic failure (Donovan & Cross, 2002). Curriculum-based measures

refer to specific standard procedures (e.g., technical adequacy, standard tasks, prescriptive materials, administering and scoring, performance sampling, multiple samples, and time efficiency). The material for use in curriculum-based measurement may be obtained from instructional reading materials used by local schools (Begeny, J. C., & Martens, B. K., 2006). The selection of materials, along with the standardization of the procedures, is essential to maintain reliability and utility of the data for individual and group comparisons (Shinn, 1995). It is also noted that curriculum-based measurement evaluates academic performance through the use of direct evaluation procedures. All of the results from curriculum-based measurement are attained by evaluating the number of correct and incorrect responses made in a specific period of time (Deno, 2003). Another important aspect of curriculum-based measurement is that performance is repeatedly measured over time. Task difficulty is held constant and inferences can be drawn regarding the generalizations of student proficiency reading dissimilar but comparable text. Curriculum-based measurement is designed for efficiency, and the assessments are short in duration depending on the skills being assessed and the quantity of assessments needed to validate dependability. The use of CBM as a method of monitoring student progress and guiding instructional interventions that increase student achievement has been well researched (Fuchs, L. S., & Fuchs, D., 2005). There is limited research regarding the use of CBM in conjunction with the RTI process.

Rationale

The use of CBM as a method of monitoring student progress over time and guiding instructional interventions that increase student achievement has been well documented (Stecker, P. M., Fuchs, L. S., & Fuchs, D., 2005). Most of the research has focused on the elementary grades.

Few research articles exists that target the use of CBM as the primary response data component of RTI process for middle grade students who are at risk of academic failure in reading.

The No Child Left Behind Act (NCLB, 2002) mandates evidence-based instructional methods to be in place as well as efficient and valid assessment procedures for accountability purposes as well as similar requirements by The Individuals with Disabilities Education Improvement Act (IDEIA, 2004). The United States Department of Education's National Center for Special Education Research is actively engaged in promoting RTI research in all academic areas and advocates the use of curriculum based measurement as a vital component to the RTI process (McLane, 2007).

Given the increased accountability standards that mandate research based assessments as well as research based instructional practices (NCLB, 2002) and given the limited amount of research of RTI and CBM for students who are at risk of academic failure in the middle grades, an investigation in the effectiveness of CBM as a component of RTI to gather response data and subsequently modifying instructional interventions is a logical progression. Additional research is needed and is supported by the United States Department of Education's National Center for Special Education Research call for additional research in the area of RTI methodology (Samuels, 2006).

Purpose

The purpose of this study is to investigate the validity and effectiveness of curriculum-based measurements as a means to collect response data for use in the response to intervention process when coupled with a researched based instructional strategy. The goal of RTI is to assist in making appropriate instructional modification decisions based upon assessment data that are researched based. This investigation will focus on middle grade students with and without

disabilities who are at risk of academic failure due to skill deficits in reading. This investigation will hopefully provide meaningful information regarding the use of CBM and RTI strategies at the middle grade level for students who have significant deficits in reading comprehension and fluency.

Research Questions

Researching the effectiveness and validity of using curriculum-based measurements as a component of RTI requires careful examination of the research. The literature reviewed provides a foundation for an examination of curriculum-based measurements as a response data source and subsequently modifying instructional interventions methods and their use with students in a middle school setting. The following research questions are significant in that they will have direct implications toward improving the instruction for students at the middle grades level.

The following questions that will be addressed by this study:

1. Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?
2. Are there any significant differences between group mean scores in reading comprehension as measured by Maze CBM when coupled with the PALS intervention?
3. Are there any significant correlations between CBM and CRCT test that could identify an appropriate intervention level for students that are at risk?

CHAPTER 2

REVIEW OF THE LITERATURE

Search Methods

The review of literature was conducted initially by locating existing research by a series of computer searches on the general topics of response to intervention, curriculum based measurements, instructional interventions, and other relevant subjects. More specifically, these computer based searches were narrowed to locate research articles regarding the use of curriculum based measurements as response data to be utilized within the response to intervention process for at risk readers at the middle school level. When the search was narrowed to seek out research that included curriculum based measurements in conjunction with research based reading strategies, the results were more difficult to locate. To mediate the lack of research articles specifically on the precise topic of this study, a number of peripheral research articles were found to support the key components of this study. A computerized search was conducted through the Galileo search system of the University of Georgia using key words or key word combinations on the topics of response to intervention, curriculum based measurements, instructional interventions and oral reading fluency. Additional searches were conducted in applicable research journals from 1982 to 2007, including the *Exceptional Children, Journal of Special Education, Learning Disabilities, Research and Practice, American Educational Research Journal, Scientific Studies of Reading, Journal of School Psychology, Reading Research Quarterly, Journal of Psychoeducational Assessment and School Psychology Review.*

Research articles that were not located by a series of computer searches were done manually. This review also includes sections that give background information and definitions of the key concepts associated with this study.

Background of Curriculum Based Measurements

The use of curriculum based measurements as a technique of monitoring student progress which subsequently alters the instructional interventions that increase student achievement has been well documented (Stecker, Fuchs, & Fuchs, 2005; Fuchs & Fuchs, 1986; Deno, 1986). The United States Department of Education's National Center for Special Education Research is encouraging ongoing RTI research in all academic areas and advocates the use of curriculum based measurement as a vital component to the RTI process (McLane, 2007). A clear understanding of the range and purpose of the curriculum-based measurement as a response data collection instrument within the RTI process begins with a broad analysis of the CBM process. There is a general conclusion that the teachers' use of CBM for student progress monitoring does help increase student achievement under explicit conditions (Stecker, Fuchs, & Fuchs, 2005).

Variations of curriculum based assessment or measurements have been used across a variety of assessment activities including, screening, pre-referral evaluation, placement in remedial and special education programs, formative evaluation, and evaluation of reintegration and inclusion (Deno, 2003). Procedures for measurement that are drawn directly from the instructional materials used by the classroom teacher are referred to as curriculum-based. Data has shown that the same procedures can be used successfully with materials drawn from other generic sources that are commonly referred to as general outcome procedures (Fuchs & Deno, 1994), or dynamic indicators of basic skills (Shinn 1998). In contrast to curriculum-based assessment, which has been used to refer to a wide range of informal assessment procedures,

curriculum-based measures refer to specific standard procedures. The reliability and validity of curriculum-based measurement have been achieved through using consistent procedures for sampling performance on reading, writing, and math skills. The standard tasks identified for use in curriculum-based measurement involve reading aloud from text and selecting words deleted from text (maze) in reading, writing word sequences when given a story starter or picture in writing, writing letter sequences, and writing correct answers/digits in solving problems in math calculation (Deno, 2003). The materials for use in curriculum-based measurement may be obtained from instructional materials used by local school system to increase the utility of the procedures for making instructional decisions (Shinn, 1989).

Curriculum-based measurement procedures include specifics regarding the sample, task duration, administration, student directions, and evaluation procedures. The prescriptive assortment of materials along with the standardization of the procedures is necessary to ensure dependability and usefulness of the data for individual and group comparisons (Shinn, 1995). Most often, curriculum-based measurement monitors academic performance through the use of direct observation procedures. All of the scores for curriculum-based measurement are obtained by assessing the number of correct and incorrect responses made within a set time period (Deno, 2003). Another important feature of curriculum-based measurement is that performance is repeatedly sampled across time. Task difficulty is held constant and inferences can be drawn regarding the generalizations of student ability at reading unfamiliar but equivalent text. Finally, curriculum-based measurement is designed for efficiency and the samples are 1 to 3 minutes in duration depending on the skill being measured and the number of samples necessary to maximize reliability.

Curriculum-Based Measurement Maze Research

An investigation to examine the scientific competence of curriculum-based measurement for assessing students' growth over time using curriculum-based measurement was conducted by Shin, Deno, and Espin (2000).This study was conducted as part of a larger study on the use of technology for facilitating inclusion of students with mild disabilities in general classroom settings. Forty-three second graders (25 male and 18 female students) from three classes in a large urban school in the Midwest participated. Participants included 2 Native American, 12 African American, 2 Asian American, 2 Hispanic, and 25 Caucasian students. Eighteen students received additional support services in reading and mathematics; 1 student was identified as learning disabled, and 24 students did not receive any remedial educational services. All participants took the California Achievement Test (CAT; CTB/ McGraw-Hill, 1985) toward the end of second grade, in April 1996. Mean scaled scores on the reading and mathematics subtests for participants receiving remedial educational services were 652 and 648, corresponding to the 47th and 46th percentiles on the national norms, respectively. In contrast, mean scaled scores for students in general education were 704 and 703 on the reading and mathematics subtests, related to the 71st and 79th percentiles.

The procedures of their study included the assessment results from ten different maze passages were used over a school year to assess students' reading performance. Passages were randomly selected from general grade-level reading materials. To construct maze reading tests, every seventh word was deleted after the first sentence, and three alternatives were provided. One of the alternatives was a correct choice and the other two were distracters. Distracters were designed to be easily distinguished from the correct choice. The number of correct choices in the maze task was scored and used for the data analysis in the study. Maze measures were collected

monthly, from September through June, using different forms of the task. Data were collected using the discourse system, which is a computer-based classroom communication system where students' own minicomputers are linked to a teacher's computer. The maze passages in the present study were programmed into the discourse system. Segments of the passage appeared on the students' minicomputers, and students were given 3 minutes to read the maze passage and select answers. Students were asked to type in the first letter of their selected answer. At the end of 3 minutes, the discourse system recorded students' responses and scored the correct choices. Students had no difficulty using the discourse system because they had been using it daily throughout the school year during the ordinary classroom instruction. The outcome of their study indicated that Maze had alternate-form reliability with a mean coefficient of .81 between testing during a 1 to 3 month interval. Application procedures for the Maze assessment ask students to read silently from a passage presented. Embedded within this activity is a cloze task where every seventh word across the passage is replaced with three possible word choices; only one of the word choices makes sense given the story offered. Readers must circle the correct word. Three minutes are provided after which the number of correctly circled responses becomes the Maze score. Research conducted by Shin, Deno, and Espin (2000) and Martson and Deno (1981) provide documentation of the validity, reliability, and sensitivity of the Maze task for monitoring growth in reading comprehension. The Maze assessment also perceptively calculated improvement of student performance over a school year and discovered inter-individual differences in growth rates. Furthermore, growth rates estimated on repeated Maze scores were definitely associated with later reading performance on standardized reading test.

The Maze method of curriculum-based measurement depends on the selection of a grade-level passage of at least 250-words. The first and last sentences of the passage are not altered.

Then, a group of words is inserted for every fifth word. The student is asked to select the original word by circling it from among three to five distracters within a three to five minute time period. The complexity of maze will vary according to the difficulty of the passage and the difficulty of the distracters selected (Howell & Nolet, 2000

One additional study used two curriculum-based measurement procedures (ORF and Maze) to measure student progress in reading. Faykus, McCurdy, and Barry (1998) conducted an investigation that included six students (2 females, 4 males) from three self-contained special education classrooms at a special day school in suburban Philadelphia served as subjects for the study. Subjects were chosen based on the following criteria: (a) level of cognitive performance (b) reading comprehension level, (c) subjects must be placed in the integrated language reading curriculum which utilized a traditional basal reading series, and (d) motivation to participate in the study. Subjects ranged in age from 11-16 years (mean age= 14). In the classroom, students were placed at an instructional reading level ranging from two to eight years below their nominal grade level. The students were examined two times weekly for 12 weeks. The results indicated that oral reading rates might be a more proficient display of reading progress than Maze within the 12 weeks that data was recorded. It is obvious that oral reading rates resulted in fewer data points falling at or above the progress goal line than Maze with this particular group of students. However, it was mentioned that one reason for the higher results with oral reading fluency might have been accredited to the quantity of elements in the assessment.

Research on Curriculum-Based Measurement-Oral Reading Fluency

One investigation that studied the construct validity of Oral reading fluency by Hintze, J. M., & Silberglitt, B. (2005) provided research evidence that has strengthened the use of Oral reading fluency as a standard by which to assess reading performance. In their study, the participants

included 1,766 students from seven elementary schools that were part of a school district in the north central U.S. Oral reading fluency data were collected on five consecutive cohorts of students longitudinally over a 3-year period with the first cohort beginning in the 1996-97 school year and continuing through the 1998-99 school year. The participants were given the Oral reading fluency assessment eight times beginning in the winter of Grade 1 and continuing each Fall, Winter, and Spring until the Spring of Grade 3. R-CBM measures were administered by trained staff in accordance with standard R-CBM administration and scoring procedures. Students were administered the reading portion of the Minnesota Comprehensive Assessment (MCA) in the spring of third grade. Scores for each of the measures were obtained for all students. There were no missing data for R-CBM or MCA measures during the course of the 3-year assessment period. In addition, the R-CBM measures were strongly related to each other, with those measures collected within a particular grade level more highly correlated than measures across grade levels. Results of this analysis suggest that R-CBM has strong validity in predicting MCA performance and demonstrates itself as a strong construct of reading.

The curriculum-based measurement of oral reading fluency is a short fluency-based measure of oral reading ability. It is measured on a one-minute timed sample of reading behavior. The student is asked to read out loud and the examiner scores the number of errors that are made (Martson, 1989). Using standardized procedures, students typically read orally from a passage that corresponds to their reading level in a series for a set of repeated, one-minute sessions. This measure is quantitative due to the act of counting the number of words read correctly per minute. This indicator score has been used in identification and eligibility decisions, write individualized education plans objectives and oversee the effectiveness of reading instructional intervention (Shinn & Good, 1992). A major study using curriculum-based

measurement oral reading fluency and writing for the screening and placement of 465 middle and high school students was conducted by Fewster and Macmillan (2002). For this study, the CBM data collection, approximately 20% of the systems students from Grade 2 to Grade 7 were chosen through stratified random procedures, with proportional representation from each elementary school. This process generated about 300 students per grade level. The CBM norms could then be used for the purpose of identifying performance discrepancies for students in regular education programs as one criterion in determining student eligibility for the special support services. During each of the fall, winter, and spring assessment periods in the 1995-1996 school year, norms were established by students completing a reading fluency probe and a written expression probe. In April, 639 students were tested in Grades 6 and 7. At the end of the 1998-1999 school year, records for 465 of these students were located.

General education and other program placements were indicated within each student's record. This information was used to categorize students into four groups according to secondary school placements as follows: Group 1, special education class; Group 2, remedial support class; Group 3, general education class; and Group 4, English or social studies honors classes in any secondary school year. Students in grades 6 and 10 were compared with their year-end English and social studies grades received in each subject area. The students' grades from their permanent records were compared with the curriculum-based measurement measures. Discriminate analysis procedures demonstrated the ability of CBM to differentiate between student groups of various proficiency levels. In general, their findings supported the belief that oral reading fluency is an effective measure of performance and can effective be used to make curriculum placement decisions.

In a study by Hintze (1997) investigated the effects of the curriculum on the procedural features of curriculum-based measurement in reading. In this study, a total of 57 students enrolled in nine second, third, and fourth grades from one elementary school located in a suburban regional school district in the Northeast served as participants in the study. The school district consisted of five elementary, two middle, and one high school servicing approximately 3,500 students. A power analysis was conducted indicating that a sample size of 17 students per grade would provide adequate power (.80) for main effects assuming a medium effect size (.25) and an alpha level of .05. e study compared the relationship or criterion-related validity of survey-level curriculum-based measurement using literature-based basal reading material and authentic trade books Eighty-six percent of the students received their reading instruction within the regular classroom, while 12% were served by either remedial or special support services. Most of the students were principally instructed in the traditional literature-based series with trade books used as supplementary material. The assessment was based on three passages of at least 200 words were used for every grade level using curriculum-based measurement oral reading fluency. The outcome indicated that the concurrent validity of curriculum-based measurement oral reading measures were strong with a .67 for the authentic trade book materials and a .66 for the traditional literature-based program. The assessment was similar regardless of what reading passage that was used. Curriculum-based measurement assessments were developed according to procedures outlined by Tilly and Carlson (1992) for words read correctly and words spelled correctly. All of the results indicated a significant correlation between the results on the curriculum-based measurement measures and the grade level performance for the students. Words read correctly showed a significantly higher correlation with students' grades than words spelled correctly in the written expression.

Oral reading fluency uses fewer components than the Maze assessment in evaluating student progress in reading. The extent to which students read fluently can predict later reading achievement (National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). Oral Reading Fluency (ORF) is a test that monitors oral reading fluency. During ORF, a student is asked to read aloud from a150-400 (grade or instructional level appropriate) word passage. As the student reads for one minute, an examiner marks any words read incorrectly. The total number of words read correctly per minute serves as the ORF score.

In a study by Benjamin S., & Burn M.K. &, Madyun N.H. &, Lail K.E. (2006) examined the relationship between curriculum-based measurement for reading (R-CBM) and state accountability test scores, potential grade differences in relationship size, and differences in relationship size among R-CBM and Maze as they compare to state test scores. Result from data for 5,472 students in Grades 3, 5, 7, and 8 were correlated and resulted in corrected coefficients that ranged from .51 (eighth graders) to .71 (third graders) for R-CBM and .49 (eighth graders) to .54 (seventh graders) for Maze. The coefficients between R-CBM and state test scores were significantly larger for third and fifth graders than those for eighth graders. No significant differences in magnitude were found between the correlation coefficients for state test scores to R-CBM and to Maze among seventh or eighth graders. Potential implications and suggestions for future research are included.

In a significant study done on oral reading fluency, student performance effectively predicted student performance on third grade state required reading tests in Florida with a correlation of .74 documented (Buck &Torgesen, 2003). Similar findings were documented in Colorado (Shaw & Shaw, 2003) and Ohio (Vander Meer, Lentz, & Stollar, 2005). Test-retest reliabilities (ranging from .92 to .97) also can be reviewed in Tindal, Martson, and Deno's

(1983) work. In a study by Good and Jefferson (1998) provided validity coefficients in the ranged of .52 to .91.The possession of skills that enable students to derive meaning from written text reflects the ultimate objective for reading instruction (Adams, 1998; National Reading Panel, 2000; Snow, Burns, &Griffin, 1998). Research studies examining the validity of curriculum-based measurement oral reading fluency have been well documented. The findings have provided convincing support for oral reading fluency as a valid measure of student's general reading skills (Deno, Mirkin, & Chiang, 1982; Fuchs, Fuchs, & Maxwell, 1988; Martson & Deno, 1882). Several studies have examined curriculum-based measurement's relations with published norm-referenced reading achievement tests such as the Stanford Achievement Test, the Stanford Diagnostic Reading Tests, and the Woodcock Reading Mastery Tests. There is strong evidence of criterion-related validity including relations between reading fluency and criterion-referenced basal reading mastery tests (Fuchs & Deno, 1981; Tilly, 1989).

Using Curriculum Based Measurement Data as Response Source Data

Although curriculum-based measurement is used for screening and identification in many school districts (Shinn, 1989), it is primarily used to measure the performance and make modifications to instruction. Fuchs, Fuchs, and Stecker (1989) discovered that teacher usage of curriculum-based measurement was related to the use of more objective data sources for determining the adequacy of student progress and more frequent decisions to modify the instruction for the students.

Fuchs and Stecker (2000) examined the importance of designing student programs based on individual progress-monitoring data. The study consisted of 22 special education teachers monitoring the math progress of 42 students in grades 2 through 8 with mild to moderate learning disability and emotional/behavior disability using curriculum-based measurement. The

teachers made instructional adjustments for the 42 students based on curriculum-based measurement data along with instructional adjustments for a matched group of students. The results indicated that students for whom teacher's modified instructional adjustments based on those students' own CBM data performed significantly better on overall achievement test as compared to the students whose instructional adjustments were not based on their own data.

Researchers Shinn, Gleason, and Tindal (1989) examined the effects of passage difficulty level on the performance of students receiving special education or remedial reading instruction. The progress of 30 students in grades 3 through 8 was monitored in one of two different measurement conditions. The first condition was one level of the curriculum below and one level above instructional placement. The second condition was two and four curriculum levels above instructional placement. The curriculum-based measurement reading data were collected four days per week for 4 weeks. The results suggested no significant differences in the slope of improvement within condition as a function of difficulty level or from those sections in the curriculum from which progress-monitoring reading probes were selected. This study recommended that materials should be drawn from curricular levels at which students should be expected to be placed in approximately one year.

When used to track student progress, curriculum-based assessment has been shown to be responsive to student change over time (Fuchs, 1986, 1993; Fuchs & Fuchs, 1986). Additionally, in being responsive to the effects of instruction, curriculum-based measurement has shown to be influenced by variables other than instruction. For example, the basic curriculum-based measurement can be affected by variables such as who administers the reading passages and where the reading passages are administered (Derr & Shapiro, 1989; Derr-Minneci & Shapiro, 1992) and the instructional level of the instruments (Dunn & Eckert, 2002; Hintze,

Daly, & Shapiro, 1998). When used in a time-series manner, influential decision making and evaluation may be affected by how many data points are available for inspection or the context in which students are being evaluated (e.g., is growth being assessed within individual or a group standard; Shinn, Powell-Smith, & Good, 1996). Also, decision-making and evaluation may be affected by the nature of the curriculum used for assessment (Hintze, Shapiro, & Lutz, 1994), or by the number of data points used for determining the growth rate (Shinn, Good, & Stein, 1989).

Another important consideration when using curriculum-based measurement for progress monitoring is the manner in which the actual assessments are developed (Hintze & Christ, 2004). For example, Hintze, Shapiro, and Lutz (1994) found that the type of curriculum used in the sampling process could significantly change the type of growth that might be observed over time for a student. Reading curricula that were characterized by uncontrolled readability and vocabulary proved too difficult for students and insensitive to growth over time. In another study, Hintze and Shapiro (1997) found that by selecting text and controlling for readability and vocabulary content from otherwise uncontrolled material, sensitive progress monitoring growth information could be obtained that indicative of the type of growth that would be seen in controlled text. The results from this study suggested that when selecting reading material for use in curriculum-based measurement progress monitoring, that teachers closely monitor the difficulty of the chosen text making sure that the readability and vocabulary were appropriate for the given grade to help ensure that growth rate estimates are sensitive to instruction and growth over time.

Reading Intervention: Peer Assisted Learning Strategies (PALS)

The following reviews of research concentrated on Peer Assisted Learning Strategies (PALS) as a possible researched based reading intervention to be used within the RTI process.

Peer-Assisted Learning Strategies (PALS) is an instructional strategy that is a 30 to 45 minutes long. It is a reading activity implemented two to four times a week and is designed to supplement, not replace the existing reading curriculum. PALS combines peer tutoring with instructional principles and practices. Teachers classify and pair children who require help with specific skills with children who are the most appropriate to help other children learn those skills. The pairs of students are altered regularly, and over a period of time students work on a assortment of skills so that all students have the opportunity to be "coaches" and "players". Approximately 13 to 15 pairs of students are created in the classroom, and each of these pairs is appropriately matched to each individual student's needs. The PALS peer-tutoring strategy enables teachers to circulate around the classroom and observe students, providing feedback and remedial lessons where necessary.

Mathes and Fuchs (1993) evaluated a version of a ten-week long PALS program in a sample of fourth- to sixth-grade learning-disabled students from a large school district in the Southeast. Each of 12 teachers was asked to select six students from her reading class to be included in the study, and of these 72 students a total of 67 completed the posttest. The 12 teachers were first randomly assigned to either an experimental group or a control group (the latter received reading instruction in the traditional basal approach, i.e., a pre-set reading instruction program). The experimental teachers were then randomly assigned to one of two treatment groups: (1) peer-mediated instruction with repeated reading (the "player" student [tutee] read orally for nine minutes while the peer "coach" [tutor] monitored word-recognition errors) or (2) peer-mediated instruction with sustained reading (the player student read three different passages three times each, for one minute at a time; after each one-minute segment, the coaching student corrected the errors). In addition to the three groups, students were randomly

assigned to either instructional or independent texts. At pre-test, no considerable differences were found among the groups on students' demographics or students' intelligence, but analysis indicated that students in the sustained-reading group had been in special education classes for fewer years than students in the repeated-reading group or the control group. The outcome measure used to assess program effects was the Comprehensive Reading Assessment Battery (CRAB), including subtests for the average number of words correctly read orally in three minutes, the average number of correct responses to ten comprehension questions, and the number of items replaced correctly in a two-minute maze activity.

In a similar study, Simmons et al. (l994) studied another early version of a 14-week PALS program in a sample of 31 teachers from five elementary schools in the Southeast. Participating students were in grades two through five, and included 58 learning-disabled students, 27 low-performing students, and 33 average-achieving students. Teachers selected one low-performing student per class who was defined as a student who was not qualified to receive special education services and who scored under the 25th percentile on a standardized reading measure and was identified to be one of the lowest-functioning readers in class. Teachers also randomly selected one average-achieving student per class, characterized as a student who had not repeated a grade, was not enrolled in special education, and had average test scores. While eight teachers volunteered to serve as controls, 23 teachers were randomly assigned to one of four class wide peer tutoring (CWPT) programs: (1) CWPT with role reciprocity (i.e., tutors and tutees switching roles; six teachers and 26 students); (2) CWPT without role reciprocity (i.e., tutors and tutees do not switch roles; six teachers and 22 students); (3) modified CWPT with role reciprocity (five teachers and 23 students); or (4) modified CWPT without role reciprocity (six teachers and 21 students). There were no significant descriptive variable differences among

teachers or students in the four groups, e.g., teacher's experience, number of students in the reading class, students' estimated reading level, and other such variables. There were significant differences between the treatment and control groups. The treatment groups showed greater gains in reading achievement than the control groups.

Another early variation of PALS was investigated by Simmons et al. (l995) which the sample consisted of 24 teachers and 68 students in grades two through five, including 44 learning-disabled students and 24 low-performing students. The study was conducted over 16 weeks in five schools in a suburban area in the Southeast representing low- to upper-middle-class socioeconomic levels. Sixteen teachers were randomly assigned to experimental groups, and eight teachers served as controls. The 16 experimental group teachers were in turn randomly assigned to Explicit Teaching (involving teacher presentation, guided practice, and independent practice phases) or Explicit Teaching plus Peer Tutoring (peer tutoring by teacher-nominated classroom peers beginning after the eighth week of implementation and continuing for the final eight weeks). There were no significant demographic variable differences among teachers in the three groups, but pre-tests indicated that students in the control group had significantly higher aptitude than students in the Explicit Teaching groups. All qualified learning-disabled students who received reading instruction in regular classrooms participated in the study; additionally, teachers identified one low-achieving student per class to participate. Analysis indicated that no significant demographic or academic differences were found between the learning-disabled and low-performing students; therefore, data were consolidated for the outcomes analysis. Student outcomes were assessed using the Stanford Achievement Test comprehension subtest, as well as five additional subtests. The results did show that the Explicit Teaching groups with the PALS

intervention performed better on post-test than the group that did not participate in the PALS intervention.

Fuchs et al. (1995) studied a 25-week PALS program that included students in grades two through four in nine schools in an urban school district in the Southeast. The schools represented diverse populations of students, i.e., the percentages of African-American students at each of these schools ranged from 21 percent to 49 percent, and the percentages of students qualifying for free and reduced lunch ranged from 23 percent to 96 percent. While stratifying by grade level, 40 math teachers were randomly assigned to one of two groups: teacher-mediated instruction with PALS (20 teachers) or a control group (teacher-mediated instruction without PALS; 20 teachers). No significant differences were found between the two groups on teacher demographic characteristics. Each teacher identified the following three students in his or her class: (1) one student who was chronically low achieving and classified as learning disabled, (2) one student who was chronically low achieving but never referred for special education (low-performing student), and (3) one student whose math performance was near the middle of the class (an average-achieving student). Outcomes were assessed using the Math Operations Test-Revised and the Mathematics Concepts and Applications Test.

An additional study Fuchs et al (1997) reported results of a 15-week PALS program were assessed in a sample of 120 students from 40 classrooms in grades two through six in 12 schools in a southern state a). Twenty-two elementary and middle schools were first leveled into three groups (high, middle, and low) based on student achievement and family income (with a "high" level signifying populations with relatively high average reading scores and a comparatively low proportion of students qualifying for free or reduced lunch). Schools were then randomly assigned to PALS (20 classrooms) or No-PALS (20 classrooms) groups. The 12

schools were equally divided between PALS and No-PALS assignments and were equally divided across high-, mid-, and low-level socioeconomic designations. To determine the sample of students, each of the 40 participating teachers identified the following three students in his or her reading class: (1) a learning-disabled student, (2) a non-learning-disabled but low-performing student (in the lowest quartile in reading in the class), and (3) a student estimated to be an average-achieving reader. Pre-test analyses revealed no significant demographic differences among the groups, no significant differences in CRAB scores among the groups, and no significant interaction effects between treatment group and student type.

Although this study by Fuchs et al. (l997) did not focus on reading, important technical information regarding the research design was revealed. In their 18-week study of PALS that included 120 students from 40 classrooms in the second, third, and fourth grades. Teachers were randomly assigned to one of three groups: (1) Peer-Mediated Instruction (PMI) with training in how to offer and receive elaborated help (helpful, conceptual explanations; ten classrooms), (2) PMI with training in both elaborated help and methods for providing conceptual mathematical explanations (ten classrooms), or (3) a control group (ten classrooms). Each teacher identified the following four students: (1) a student who was chronically low achieving and had been classified as learning disabled, (2) a student who was chronically low performing but had never been identified as disabled, (3) a student with average math performance, and (4) a student whose math performance was near the top of the class. Analysis of groups found no significant differences among the three groups and no significant interactions between treatment and type of student. Student outcomes were assessed on the Operations and Concepts/Applications subscales of the Comprehensive Math Test.

One study targeted the elementary school level. Mathes et al. (1998) studied PALS in 20 first grade class rooms from six schools in an urban school district in the Southeast. Ten classes were assigned to PALS and ten to the control group. Before recruiting teachers, all schools in the district were identified by demographic variables (school size, percentage of students receiving free or reduced-price lunch, and mean reading scores for first graders on the previous year's statewide achievement tests) and were classified as high-, middle-, or low-level based on socio-demographic and achievement data. In each of the 20 classrooms, teachers identified five students based on reading test performance: the three lowest-achieving students, one average-achieving student, and one high-achieving student. In forming a baseline, a statistically significant difference was found between the control and treatment groups for low-achieving students on average words read per minute and on words on the CRAB read correctly in three minutes, with the control group having better scores than the PALS group. Student outcomes were assessed on the following tests: (1) Woodcock Reading Mastery Tests: Word Identification, Word Attack, and Passage Comprehension subtests; (2) Test of Early Reading Ability (TERA): Concepts of Print; (3) CRAB: Oral Reading Fluency and Comprehension of Story Content; and (4) Curriculum-Based Measurement Probes over Time: Oral Reading Rates and Phonological Awareness.

In another investigation, the effects of PALS were assessed by Fuchs et al. (1999) in a trial of 72 students from 24 classrooms in grades two through four. While grouping by grade level, classrooms were randomly assigned to PALS (16 teachers) or a control group (eight teachers). Half of the PALS teachers were then randomly assigned to one of two treatment groups: PALS plus collaborative reading activities or PALS only. No significant differences were found among the control and two treatment groups on demographic variables or on the pre-

test for the Stanford Diagnostic Reading Test (SDRT). After conclusion of the 21-week program, student outcomes were assessed with the Comprehension subtest of the SDRT and indicated that the PALS plus collaborative reading activities were the most effective group.

Additionally, Fuchs et al. (1999) studied PALS among secondary-level students in corrective and special education classes. In their study, they selected 18 special education and corrective high school reading teachers in 10 high schools within one metropolitan southeastern school system. To be eligible to participate, teachers had to include students with disabilities who experienced persistent reading difficulties. They assigned teachers to two treatment groups: PALS (nine teachers who implemented the PALS intervention) group and control group no peer-assisted reading activities. Inferential statistics indicated no interaction between treatment and class size for both groups. The classroom teachers implemented their individual treatments with all students in their reading classes. Each teacher identified the group of students who were at risk. They limited their research participants to students reading at grade levels 2 through 6. Inferential statistics indicated no relation between treatment and students' grade, age, number of absences during the study, reading level, gender, free/reduced lunch status, race, type of reading class and disability. The sample group contained nine PALS class rooms and nine control class rooms from ten high schools in a urban school district in the. Performance assessments were conducted for participants in grades two through six reading instructional levels. Teachers implemented the PALS program for 16 weeks within their lessons five times biweekly. Groups were comparable on pre-test measures. Results of this study suggest that the use of PALS as an instructional intervention is promising for at risk students. Findings indicate that among high school students reading at grade levels 2 through 6, the PALS program did improve the reading comprehension growth more than traditional instruction.

Fuchs et al. (2001) conducted a study of 168 kindergarten students in five schools in an urban public school district in the Southeast. Twenty classrooms inside the schools were randomly assigned to PALS (84 students) or control (84 students) groups. Treatment effects were predicted by using a subset of students, who were identified by scores on a pretest of mathematics achievement, and outcomes were examined separately for special education students and all other students in the study. No statistically significant differences among the groups were found for any demographic variables. Student performance was assessed using the mathematics portion of the Stanford Early School Achievement Test and the math portion of the Primary I level of the Stanford Achievement Test.

One study by Mathes and Babyak (2001) investigated First-Grade PALS in a medium-sized school district in the Southeast. Thirty first-grade teachers from five schools were randomly assigned to treatment or control groups, including ten teachers to a PALS group, ten teachers to PALS plus mini-lessons (which mirrored the content of PALS using teacher coaches) group, and ten teachers to a control group. Over the course of the study, two First-Grade PALS plus mini-lessons teachers withdrew from the study, leaving a total of 28 teacher participants. Schools were categorized for demographic comparison and classified as high-, middle-, or low-socioeconomic status before selecting the teachers. No considerable differences were found among teachers in each group for demographic and teaching experience variables. From within each participating classroom, teachers selected three students, who were considered low, average, and high performing, for outcomes assessment. To make sure that teacher student selections were accurate, a one-minute oral reading assessment was also administered. Sixty-one students from the PALS group, 20 students from the PALS plus mini-lessons group, and 49 students from the control group were assessed. Student outcomes were assessed with the

following tests: (1) Woodcock Word Identification, Word Attack, and Passage Comprehension and (2) Continuous Progress Monitoring of Reading Growth: Oral Reading Fluency of Connected Text, and Phonological Awareness Segmentation Skill.

A study by Mathes et al. (2001) assessed a 16-week PALS program that included 36 teachers and 183 first-graders from eight schools in a medium-sized school district in the Southeast. A one-minute oral reading test was administered to determine which students to include in the sample, and children's scores were rank-ordered to designate a high-achieving student, an average-achieving student, and the four lowest-achieving students. The 183 students consisted of 118 low- achieving, 33 average- achieving, and 32 high-achieving students. Teachers were randomly assigned to participate in PALS (12 teachers), PALS plus computer-assisted instruction (12 teachers; eight to ten hours of phonological awareness instruction via computer were added; implemented for only low-achieving students), or a control group (12 teachers). Prior to recruiting schools, all schools in the district were categorized according to socioeconomic variables as a high-, middle-, or low-level school. Initial comparisons indicated no significant differences between treatment and control groups on demographic variables. When assessing the impact of an intervention such as PALS, the focus can be directed at the effectiveness of the intervention across individuals or small groups of students. The following research studies, using CBM paired with PALS, or with a similar intervention gives evidence that progress monitoring and a research based intervention is productive.

For instance, Palincsar and Brown (1984) developed Reciprocal Teaching which is similar Peer Assisted Learning Strategies (PALS) which involves students' use of specific comprehension strategies in a peer-mediated instructional format (Stecker, Fuchs, & Fuchs, 2005). Initially, in Reciprocal Teaching, teachers and not peers model summarizing, predicting,

questioning, and clarifying strategies with small groups of students to promote the use of meta-cognitive conversations during reading. Students steadily assume the role of teacher, using the discussion to direct their peers in learning the strategies as they read. As students progress in the system, they acquire the leading role of coach to students who are at more risk of failure in reading. The player and coach concept is a positive model in a middle school setting. Researchers have investigated interventions which merge specialized instructional systems with instructional content designed to improve the comprehension skills of at risk readers(Rapp, Broek, McMaster, Kendeou, & Espin, 2007).

Different programs have included peer-mediated instruction with supplementary strategy coaching. One program studied by Englert & Mariage (1991) combines a Reciprocal Teaching format with activities that assist students to predict, organize, search, review, and evaluate what they are reading. This program called "POSSE" did help students to who were at risk of reading failure (including those with mild learning disabilities) recall details and thoughts from expository passages. Peer-assisted Learning Strategies (PALS) (Fuchs, Fuchs, Mathes, & Simmons, 1997) is an additional peer-mediated approach to building comprehension skills. PALS involve pairing higher performing readers with lower performing readers to complete structured reading activities. Students read and retell what they have read, summarize paragraphs using questioning strategies similar to those developed by Jenkins et al. (1987), and make predictions about what will happen next in texts. The PALS strategy has been demonstrated to improve reading fluency and comprehension for average-and low-performing readers, as well as for some students with disabilities (Fuchs et al., 1997).

Response to Intervention: Background and Methodology

In efforts to define more precisely what Response to Intervention is, The National Joint Committee on Learning Disabilities (NJCLD, 2005) defined it as a problem-solving approach that translates into a procedure of corrective interventions that can support the production of data to guide instruction and classify students who may require remedial instruction or special education services. Research in RTI on the middle school level is limited. It seems that most research in RTI has been conducted at the elementary school level. Therefore, information regarding the application of RTI for this study in a middle school setting will have to be generalized from methods and procedures designed for elementary school student.

In one empirical study, (Case, Speece, & Molloy, 2003) used a mixed-methodology, longitudinal design, individual differences and background factors related to differential response to general education instruction were investigated. They tested a response-to-intervention model relating to the first three phases of a model suggested by Fuchs and Fuchs (1998). Two groups of first- and second-grade children were selected based on the results of assessing all students on curriculum-based reading measures (CBM). First grade children (N = 124) received two Letter Sounds Fluency probes and second-grade children (N = 127) received two Oral Reading Fluency probes. Students were deemed at-risk for reading failure if mean performance on their CBM probes placed them in the lowest 25% of their classroom. These first- and second-grade students who were at-risk for reading problems were divided into one of three responsiveness groups and compared groups on reading, phonological processing, behavioral, and instructional context measures. They examined qualitatively the relations of individual differences and instructional readiness. The majority of the nonresponsive group scored noticeably lower on all individual difference measures, but did not experience an inferior

instructional environment. Additionally, this group demonstrated greater learning difficulties in the general education setting. This response-to-intervention model confirmed the construct and social validity that indicate that CBM reading measures are valid in the RTI process.

Velluntino et al. (2006) conducted an extensive study with students at risk for early reading difficulties that were identified at the beginning of kindergarten, and half of the children received small-group intervention two to three times a week as the experimental group during their kindergarten year, while the control group of the other half received traditional remedial instruction as given by their home schools. These children were assessed again at the beginning of first grade, and those who continued to have difficulties in reading received either intensive remediation via tutoring by project teachers for the entire first grade year. The experimental groups were systematically assessed through the end of their third grade year. Results from the their study expanded results from the first-grade intervention study they conducted by and provides additional support for their argument that early and long-term reading difficulties in most children are caused primarily by experiential and instructional deficits rather than organically based cognitive deficits. They found that students at risk for early reading difficulties were identified at the beginning of kindergarten and received either kindergarten (small-group) intervention alone or both kindergarten and first-grade intervention for most of each school year. Since the majority of children who received some form of kindergarten intervention generally performed better than children who did not receive any kindergarten intervention on measures of developing literacy skills and because most of these children were found to be no longer at risk in first grade and beyond. (Vellutino, Scanlon, Small, & Fanuele, 2006).

In a study by Silberglitt & Hintze (2007) with a population of 7,544 students from five rural or suburban districts in Minnesota. Students participating in the study were approximately

equal in representation of females (48.2%) and males (51.8%). Of this population, 12.8% of students received special education services under an individualized education program (IEP). Additionally, 40.3% of students qualified for free or reduced-price lunch during the study.

Each participant completed the fall, winter, and spring R-CBM during one or more years in Grades 2 to 6. They compiled data for each grade level over the school years from 1996 to 1997 to 2003 to 2004. Thus, many students participated in the study at multiple grade levels. They did not incorporate 47 students in the study who were retained for a grade. In addition, differences in district assessment plans led to lower numbers of students participating in Grade 6 (one district did not administer R-CBM in Grade 6, and another began administering in Grade 6 during the 2002-2003 school year). They collected R-CBM data for Grades 2 to 6 using standardized procedures (Shinn, 1989). All R--CBM assessments used in this study were part of the systematic benchmark reading assessments collected three times per year in each of the districts. All R-CBM data for a given point of reference were collected within a four weeks. The goal of Level 1 analysis was basically to generate individual slope and intercept estimates for each participant. Level 2 analyses then attempted to establish whether group membership provided any information that could predict differences in these individual slopes and intercepts. In the case of this study, students were placed into groups based on their initial level of performance, so differences in intercept were expected, and were not included in the Level 2 analyses. Thus, the Level 2 analysis at each grade level consisted of examining the beta values in equation (3), and testing whether they were significantly different from 0. A statistically significant result in this case would mean that the associated percentile groups slope differed significantly from the slope of the reference group, which in this case was the group consisting of the 50th to 59th percentile. This study investigated the differences in observed growth rates of

students on R--CBM assessments, conditioned on initial level of performance, and found differences in growth rates across dissimilar levels of performance that were significant from both a statistical and practical perspective.

Conclusions

This review of literature summarized in general the basic designs, approaches and what might be expected in terms of learning outcomes, assessment instruments and potential participants. Student performance and learning requires that we have a comprehensive and accurate assessment methodology. The review of research results presented provided both evidence and motivation to use curriculum-based measurements as a process element within the RTI process to modify instruction and increase student achievement. There is limited research on the use of CBM as a component of RTI process for middle grade students who are at risk of academic failure in reading. Curriculum-based measurements provide a validated set of procedures that allow classroom teachers flexibility in measuring a student's performance and to make valid decisions regarding the type and intensity of instructional interventions. In addition, curriculum-based measurement provides immediate and accurate feedback on achievement and performance to teachers, students, and parents. Also, any negative performance trends are immediately identified to allow educators necessary time to make quick changes to a student's instructional program. Additionally, the flexibility of curriculum-based measurements enables educators to align the assessment with the current curriculum and allows for a range of response options. Curriculum-based measurements allow educators to set standards for both general and special education students using curriculum-based measurements as the repetitive measure of students' performance. The studies presented in this literature review demonstrates that curriculum-based measurements are responsive enough to be used in comparison with standardized and state

assessments in assessing a student's reading ability. Teachers must see curriculum-based measurement as an early warning indicator and interpret its results in combination with a variety of other types of assessments and data (Fewster & McMillan, 2002). Curriculum-based measurement results can be helpful in identifying problems that deserve future investigations for the students in the classroom. The information from curriculum-based measurement measures can be extended into the development of appropriate intervention plans directly related to a student's current curriculum and learning needs.

It is not difficult to understand why additional research needs to be conducted. With the increased accountability imposed by federal and state laws such as The No Child Left Behind Act (2002) which mandates the use of research based assessments as well as research based instructional practices. There is a limited amount of research that focuses on RTI and CBM for students who are at risk of academic failure in reading at the middle school level. This limitation did not deter the researcher from conducting this study with the resources and information available. The use of CBM as a method of monitoring student progress over time and guiding instructional interventions that increase student achievement has been well documented (Stecker, P. M., Fuchs, L. S., & Fuchs, D., 2005). Most of the research has focused on the elementary grades. Few research articles exists that target the use of CBM as the primary response data component of RTI process for middle grade students who are at risk of academic failure in reading.

The No Child Left Behind Act (NCLB, 2002) mandates evidence-based instructional methods to be in place as well as efficient and valid assessment procedures for accountability purposes as well as similar requirements by The Individuals with Disabilities Education Improvement Act (IDEIA, 2004). The United States Department of Education's National Center

for Special Education Research is actively engaged in promoting RTI research in all academic areas and advocates the use of curriculum based measurement as a vital component to the RTI process (McLane, 2007).

Given the increased accountability standards that mandate research based assessments as well as research based instructional practices (NCLB, 2002) and given the limited amount of research of RTI and CBM for students who are at risk of academic failure in the middle grades, an investigation in the effectiveness of CBM as a component of RTI to gather response data and subsequently modifying instructional interventions is a logical progression. Additional research is needed and is supported by the United States Department of Education's National Center for Special Education Research call for additional research in the area of RTI methodology (Samuels, 2006).

Table 1.

S*ummary of Reading Research and Curriculum Based Measurements*

Citation	Participants	Assessments	Results
Espin, Scierka, Skare, & Halverson (1999)	N=147	CBM-written expression California Achievement Test	The results indicated that sentences and characters per word were the most strongly and consistently correlated with the writing performance measures. Also, a reliable model of relations was also found for correct word sequences and mean length of the correct word sequences. With the exception of the sentences and correct word sequences, all measures had a consistent and reliable pattern of relations with the other measures of writing proficiency.
Fuchs, & Fuchs (1991)	N=59	CBM-spelling S-MAIRS (Spelling-Modified Accuracy of Implementation Rating Scale-Revised)	The results indicated that the achievement of the curriculum-based assessment groups were comparable, but greater than that of the control group.

Citation	Participants	Assessments	Results
Shinn, Gleason, & Tindal (1989)	N=30	CBM-oral reading fluency	The findings suggested no significant differences in the growth rates of improvement within condition as a function of difficulty level or from those sections in the curriculum from which progress-monitoring reading probes were selected.
Fewster, & Macmillan (2002)	N=465	CBM-oral reading fluency CBM-writing	Research findings indicated words read correctly showed a significantly higher correlation with students' grades than words spelled correctly in the written expression. There were higher correlations with words read correctly and English than with the social studies scores. Also, the correlations were the highest for the students in the eight grade as compared with the other grade levels in middle and high school.

Citation	Participants	Assessments	Results
Madelaine, & Wheldall (1998)	N=50	CBM-WARP (Wheldall Assessment of Reading Passages) NAR-R (Neal Analysis of Reading-Revised)	The results showed criterion validity with reading accuracy of .83 to .87 when comparing phonic word attack skills test, .67 to .72 on reading comprehension, and .75 to .78 word attack skills. Inter-correlations between the five passages were shown
Shin, Deno, & Espin (2000)	N=43	CBM-MAZE	Results indicated that the MAZE task had an alternate-form reliability of .81. The MAZE task also perceptively reflected progress of student performance over a school year and revealed inter-individual differences in growth rates.
Faykus, McCurdy, and Barry (1998)	N=6	CBM-MAZE CBM-oral reading fluency	The results indicated that oral reading rates might be a more proficient indicator of reading progress than maze within the 12 weeks that data was recorded.

Citation	Participants	Assessments	Results
Gansle, Noell, VanDerHeyden, Naquin, & Slider (2002)	N=179	CBM-written expression ITBS (Iowa Test of Basic Skills)	The findings of this study found the comparison between the criterion measure (ITBS) and the CBM measures, the highest correlation with a reliability of .59 occurred with the language usage/expression and total writing subscale score. Words in correct sequence had a correlation of .46 with the ITBS, while total words written appeared not to be useful for predicting skill in written language as measured by criterion measures for third and fourth graders.
Naquin, & Slider (2002)	N=57	CBM-writing Louisiana Educational Assessment ITBS (Iowa Test of Basic Skills)	The results indicated that total words written were not perceived to be meaningful or instructionally useful indicators for students at the elementary level.

Citation	Participants	Assessments	Results
Allinder et. al. (2001)	N=50	CBM-oral reading fluency CBM-MAZE Woodcock Reading Mastery-Revised Clinical Evaluation of Language Fundamentals-Third Ed.	Results indicated that all students improved on a standardized norm-referenced reading measure, but students who used a specific oral reading strategy made significantly greater progress in reading, as measured by curriculum-based measurement maze procedure.
Hintze, & Conte (1997)	N=57	CBM-oral reading fluency Degrees of Reading Power Test	Results indicated that the correlation between survey-level CBM and reading comprehension was similar regardless of the material used for assessment.
Hintze, Daly III, & Shapiro (1998)	N=80	CBM-oral reading fluency	Results indicated that the amount of progress observed (i.e., slope of improvement) varied as a function of grade and whether student progress was monitored in grade or goal level material.

Citation	Participants	Assessments	Results
Tindal, & Parker - 2001	N=172	CBM-written expression California Achievement Test	The results suggested that regression of ratings on objective scores produced moderately strong results for two production independent indices (percentage of words correctly spelled and percentage of words correctly sequenced.
McGlinchey, & Hixson (2004)	N=1362	CBM-oral reading fluency Michigan Educational Assessment Program	The results indicated a positive correlation between the two measures. The positive and negative predictive power of the reading sample was higher than the lower rate of failing and passing the MEAP.
Stage, & Jacobson (2001)	N=172	CBM-oral reading fluency Washington Assessment of Student Learning	The results indicated that slope in oral reading fluency across the school year and the oral reading fluency probes administered reliably predicted WASL reading performance.

Citation	Participants	Assessments	Results
Mathes and Fuchs (1993)	N=67	Comprehensive Reading Assessment Battery (CRAB)	The outcome measure used to assess program effects was the Comprehensive Reading Assessment Battery (CRAB), including subtests for the average number of words correctly read orally in three minutes, the average number of correct responses to ten comprehension questions, and the number of items replaced correctly in a two-minute maze activity.
Fuchs et al. (2001)	N=168	Stanford Early School Achievement Test (SESAT) and the math portion of the Primary I level of the Stanford Achievement Test.	Treatment effects were predicted by using a subset of students, who were identified by scores on a pretest of mathematics achievement, and outcomes were examined separately for special education students and all other students in the study. No statistically significant differences among the groups were found for any demographic variables.

Calhoun and Fuchs (2003)	N=92	The Tennessee Comprehensive Achievement Test Math Sub-Test and Math Operations Test—Revised, the Math Concepts and Applications Test	Student outcomes were assessed on the Math Operations Test—Revised, the Math Concepts and Applications Test, and the mathematics portion of the Tennessee Comprehensive Achievement Test. Results were mixed, but over-all, there was a significant improvement of skills for the treatment group.

Citation	Participants	Assessments	Results
Velluntino et al. (2006)	N=1373	Word Identification and Word Attack subtests of the Woodcock Reading Mastery Test–Revised (WRMT–R)	Experiment groups where pulled three times a week and engaged in early literacy intervention. Compared to the control group, the treatment group made significant gains in reading ability.
(Burns et al., 2005)	Meta- analysis of 4 major studies on RTI	Statistical Analysis of effect size	Twenty-four effect sizes and unbiased estimates of effect (UEE) were computed. The results found a superior UEE for studies of existing RTI models than those conducted by college faculty for research, but both were significant
(Case et al., 2003)	N=670	WJ-R Basic Reading Skills Cluster standard score	The study assessed the validity of CBM and ability testing as a means of grouping students that have difficulty in the educational setting by means of responsiveness to interventions. The study confirmed the validity of the RTI process to identify students in need of instructional modifications.
Silberglitt & Hintze (2007)	N=6,642	R-CBM	Growth rates across different levels of performance that were significant from both a statistical and practical standpoint

CHAPTER 3

METHODS

The purpose of this study is to investigate the validity and effectiveness of curriculum-based measurements as a means to collect response data for use in the response to intervention process when associated with a researched based instructional strategy. The goal of RTI is to assist in making appropriate instructional modification decisions based upon assessment data that are researched based. This investigation studied middle grade students with and without disabilities who are at risk of academic failure due to skill deficits in reading. This investigation will hopefully provide meaningful information regarding the use of CBM and RTI strategies at the middle grade level for students who have significant deficits in reading comprehension and fluency.

Participants

The participants consisted of male and female students from a rural middle school setting in northeast Georgia. There were originally 60 eighth grade students participating in this study. During the nine week investigation, 10 students were lost due to schedule changes or withdrawing from the school. The total population of the middle school is approximately 425 students. The middle school has approximately twenty general education teachers and five special education teachers. The middle school has no self-contained special education teacher and one resource special education teacher. In Table 2, the ethnic composition of the school is represented as approximately 92% Caucasian, 8% African American, and 10% Hispanic and 2% Asian. The poverty rate for the school is about 55%.The students that are participating in this

study were administered two different types of assessments (Maze comprehension test and oral reading fluency). The Maze comprehension test relates to the accuracy and speed at which a student selects a word from a multiple-word group to properly complete sentences within a passage. The Oral Reading Fluency relates to the speed and accuracy with which a student read words. The Oral Reading Fluency will be administered to each student individually during a one-minute time period across three different reading passages.

Table 2.
Race and N and Percent

Race	N	Percent
White American	46	92
African American	1	2
Hispanic American	3	6

Setting

This study took place in a rural middle school setting in northeast Georgia. The study was conducted in two eight grade collaborative classrooms. Parent permission and student assent forms (see Appendix F and G) were distributed to all participants. Each class room is taught by a general education teacher and a learning specialist serving students with disabilities. Maze word comprehension assessment was given to two groups, whereas the oral reading fluency was conducted individually with all students in the two groups. Students who were not participating in the individual assessments were engaged in their regularly scheduled classroom activities.

Instruments and Materials

All of the students in the experimental group were administered curriculum-based measures (Maze word comprehension and oral reading fluency) approximately once a week for nine weeks. The Maze assessments were given to each group during a time period of three minutes per group. The oral reading fluency assessments were administered to each student individually during a one-minute time period. The following sections describe the reliability and validity of the instruments used in this study. These results were located collected by the review of research literature.

Oral Reading Fluency

Oral reading fluency (Shinn, 1998) relates to the speed and accuracy with which a student read words. The students are given a one-minute passage to read through a 350 word reading passage correctly pronouncing words in each sentence (see Appendix B). This process is repeated for three different reading passages. The students' performance is assessed by words read correctly minus the number of errors. An error is considered as any mispronunciation of the word or substitutions, omissions, or three-second pauses. If a passage is too difficult and the student reads less than ten words correctly in one minute, then the assessment is halted and words from any passages from that grade level is used as the words read correctly score.

Studies examining the validity of curriculum-based measurement Oral Reading Fluency have been well researched. The findings have provided strong support for Oral Reading Fluency as a valid measure of students' general reading skills (Deno, Mirkin, & Chiang, 1982; Fuchs, Fuchs, & Maxwell, 1988; Martson & Deno, 1882). Numerous studies have examined CBM's validity with published norm-referenced reading achievement tests such as the Stanford Achievement Test, The Stanford Diagnostic Reading Tests, and the Woodcock Reading Mastery

Tests. Also, there is evidence of criterion-related validity between reading fluency and criterion-referenced basal reading mastery tests (Fuchs & Deno, 1981; Tilly, 1989). Typical correlation coefficients in these studies have ranged from .60 to .90 with most correlations around .80 (Shinn & Good, 1992).

One such research study conducted by Hintze (1997) evaluated the effects of the curriculum on the technical features of curriculum-based measurement in reading. The study compared the association or criterion-related validity of survey-level curriculum-based measurement using literature-based basal reading material and authentic trade books. A total of 57 students enrolled in second, third, and fourth grades from one elementary school located in a suburban school district in the Northeast participated in the study. All of the students were primarily instructed in the literature-based basal series with authentic trade books used as supplementary material. Three passages of at least 200 words were used for every grade level using CBM oral reading fluency. The results indicated that the concurrent validity of curriculum-based measure Oral Reading Fluency was strong with a .665 for the authentic trade book series and a .655 for the literature-based basal series. The measure was similar regardless of the reading material that was used. In addition, developmental fluency rates were also similar across the two curricula. The significance of these finding will support the research design of this study.

Additional research in the utility of CBM assessments were done by Madelaine and Wheldall (1998) using a curriculum-based passage reading test for monitoring the performance of low readers. This study examined the criterion validity of the curriculum-based measure WARP (Wheldall Assessment of Reading Passages, Wheldall, 1996) against other established standardized reading tests (Neal Analysis of Reading-Revised, Neale, 1988; Multi Word Attack

Skills Placement Test, Macquarie University Special Education Center, 1996). This study included 50 students from a Sydney independent school with 25 males and 25 females. The students were given five passages from the WARP, and their scores were compared with two other standardized reading measures. The results indicated criterion validity with reading accuracy of .83 to .87 when compared to phonic word attack skills test, .67 to .72 on reading comprehension, and .75 to .78 on word attack skills. Inter-correlations between the five passages were shown to be very high at .94 to .96, demonstrating high alternate-forms reliability.

Maze Comprehension

The accuracy and speed at which a student selects a word from a multiple-word group to properly complete sentences within a passage is referred to as a Maze assessment probe (Shinn, 1998) relates to (see Appendix A). The students are given a three-minute time limit for this assessment. The first sentence of a passage remains intact; however, every 5^{th} to 7^{th} word is deleted, and replaced with three word choices. Under the time limit, the student selects a word that meaningfully replaces the blank. A three-item multiple-choice format with 50 word sets is employed with only one choice representing a semantically meaningful replacement. The students' performance is assessed by subtracting the number of incorrect answers from the total number of items attempted. If a student completes the passage ahead of time, the student's packet is collected, the time is noted on the paper, and the student's score is prorated. Prorating involves converting the student's time to seconds, dividing by the number correct, and dividing that number into 180 (representing 180 seconds= 3 minutes) to receive the student's score.

Using the Maze as a measurement has significant usefulness (Shinn, 1989) in that data can be compared to local norms, and assessment can be conducted repeatedly to evaluate intervention effects and curriculum modifications. Studies in curriculum-based measurement

maze reading have been shown to be a reliable, valid, and unbiased measure for screening, monitoring performance, and instructional decision-making with criterion-related validity coefficients ranging from .73 to .81 (Ardoin et al., 2004; Shin, Deno, Espin, 2000).

There were significant correlations in a study conducted by (Ardoin et.al, 2004) between CBM-Maze and the Woodcock-Johnson III, and ITBS subtest in conducting a broad screening in reading. The results of their study recommended that a single CBM-Maze probe is sufficient for purposes of screening when being compared to norm-referenced assessments. The use of curriculum-based measurements by schools was considered to be a quick, and cost-efficient screening device for immediate use by schools for identifying early intervention for students with reading difficulties. Furthermore, the study stated how most group-administered norm-referenced tests are costly and require substantial time to administer. In addition, it is often several months before schools are provided with the results. For example, students that were administered the ITBS in this study had to wait a number of months before the results were received. School system school psychologists often reported that decisions were usually made without the norm-referenced data because the performance results arrived so late in the school year. These facts encourage the use of CBM as a standard method for decision making that need timely and valid results.

Shin, Deno, and Espin (2000) conducted a study to observe the procedural capability of curriculum-based measurement for assessing students' growth over time on CBM-Maze tasks. Forty-three second graders from a Midwestern city were used in this study. Pearson product-moment correlations and hierarchical linear regression models were used to test for the validity and reliability of the curriculum-based measures with the California Achievement Test. Their findings Maze had alternate-form reliability with a mean coefficient of .81 between testing

during a one to three month interval. Alternate-form dependability estimates in this study are comparable with those in early research on alternate-form reliability (Bradley, Ackerson, & Ames, 1978; Marston, 1989; Parker, Tindal, & Hasbrouck, 1989). Knowing that CBM assessments are able to consistently and accurately measure performance growth is a significant factor when establishing response to intervention norms and procedures.

Georgia Criterion Reference Competency Test

The CRCT test was implemented in Georgia in 2000 in grades 4, 6, and 8. Grades 1, 2, 3, 5, and 7 were added in 2002. The test was designed to assess how well students acquire the skills and knowledge as established in the Georgia standards, the Quality Core Curriculum. The math test consists of 60 items in seven sub-parts-- Number Sense and Numeration, Geometry and Measurement, Patterns and Relationships/Algebra, Statistics and Probability, Computation and Estimation, and Problem Solving.

The Georgia Department of Education does not provide evidence of the validity and reliability and does not offer specific technical information. Scale scores for the math and reading test range from 750 to 900. Scores that are at or above 850 indicate a level of performance that exceeds the standard for the state test; scores from 800 to 849 indicate a level of performance that meets the standard; and scores below 800 indicate a level of performance that does not meet the standard. The results from the 2006-2007 CRCT year were used in this study. This study will use only the reading scores from the CRCT.

Procedures

Initially, this study included sixty participants. Ten students were lost due to schedule changes or withdrew from school. Of the sixty that started, only fifty (N=50) were selected at the beginning

of the semester and divided into two equivalent groups of N=30. All students in the 8th grade were heterogeneously grouped to avoid ability grouping. The students in group A (treatment) engaged in CBM progress monitoring assessments and PALS intervention three days a week. Each session was approximately thirty minutes in duration. This treatment group still received their traditional reading instruction in addition to the PALS intervention. Group B (control) only received traditional reading instruction. Both groups were given pre-test and post-test using the Maze and Oral Reading Fluency assessments.

The Maze comprehension assessment and the Oral Reading Fluency assessment were administered to both groups. Results of these assessments were used to select students and to pair them with the most appropriate peer (Mastropieri et al., 2001). This procedure is consistent with a study by Donovan & Cross (2002) using curriculum-based measurements to collect response data as a means to detect problems early and to begin intervention for students who are at-risk for academic failure

Results from the curriculum based measures were used to assign students to appropriate intervention levels in the treatment group. Students were also identified in the control group. Level one consisted of students who scored between one standard deviation below and above the mean score on the pre-test of oral reading fluency. Level two was defined by students who scored one standard deviation below the mean score on the pre-test of oral reading fluency. Students were paired by assigning level one with level two students. These levels correspond to tier levels. Response to intervention (RTI) procedures uses the term “tier” to identify an instruction modification or alternate strategy for which the student is thought to be better able to increase performance. The strongest reader of the pair was referred to as the “coach” and the weaker reader of the pair was referred to as the “player”. The level one ranked students on oral

reading fluency were paired with the level two ranked students by using an alternating pattern that matched the highest ranked level one student with the highest ranked level two student until all students were paired. There were pairings of equally match students due to a greater number of level one students than level two students. This study did not examine movement of students between levels. If a student was identified as a level 2 reader, that student stayed in the same level for the duration of the study. The researcher did not have the organizational flexibility to incorporate that dimension into the study. It is acknowledged by the researchers that level movement transitions are a critical aspect of response to intervention model.

The PALS intervention used an activity agenda sheet that outlined the activities as the students worked in their teams during instruction. The researcher trained the coaches and players in a two day training session during class. Each pair was referred to as a "team". On Tuesdays, Wednesday and Thursdays, for approximately nine weeks, the teams would meet for approximately 20 to 30 minutes of the class period and do their PALS session. Both class room teachers would monitor the room to take notes and assist if coaches needed help with any reading passages. The reading passages use for the PALS sessions were from the eight grade literature text book. Coaches would prepare the agenda sheet and then read for ten minutes to model reading for the player. Then, the coach would listen to the player read and would take notes and assist the player when needed. After each member of the team completed their reading passages, the coach would ask the player to summarize the reading passage in ten or fewer words. The player would be assessed on accuracy of summary. After this was completed, the coach would ask questions about the passage or what would happen next in the story or passage. The player had to answer the questions or speculate or predict what might happen next. This discussion would last about five minutes. There were a few changes made in the pairings in the first few

days when personality issues conflicted with the activity. Overall, the students were highly engaged with the activity. Both teachers would take turns monitoring the students during the activities. Each team was assessed by both the oral reading fluency test and the Maze test each week. The teams would discuss progress and issues related to the PALS intervention.

The Maze assessment was given to the students in their corresponding groups during a time period of three minutes per group. The Oral Reading Fluency was administered to each student individually. The Oral Reading Fluency assessment took about 3 minutes total per student per administration. The students were asked to begin reading and were timed for one minute while reading aloud through a passage. The students were given one minute to read the 350 word reading passage. The number of correctly pronounced words minus the errors was calculated and a composite score of words per minute was recorded. The students' performance is assessed by words read correctly minus the number of errors. An error is considered any mispronunciation of the word, substitutions, omissions, or three-second pauses. Coach administered assessments of oral reading fluency were compared to teacher administered assessments and were found to as valid.

Reliability

The researcher was trained in procedures for conducting the curriculum-based measure assessments as outlined in research on the curriculum-based measurement process (Fuchs & Fuchs, 1997; Shinn, 1998) by faculty members from University of Georgia. The general education teacher was trained by the researcher to monitor procedural integrity. Inter-rater reliability was evaluated and was determined to be acceptable. Both scorers collected data on the student responses. In order to ensure uniformity, the scorers practiced scoring students chosen randomly from the population of students that participated. This data was compared using a

comparison in which agreements by both the raters were divided by agreements plus disagreements and multiplied by 100 to compute a percentage. The same formula was used to calculate agreements during the entire curriculum based assessments. Data collected during the procedural checklist (see Appendix C and D) and scoring of the assessment measures were constantly monitored due to the sensitivity and danger of unreliable scores. The researcher would re-test and/or rescored any measure that seemed to be discrepant until a 95% agreement was reached.

Research Design

One-Way analyses of covariance (ANCOVA) were used to evaluate if the population means on the dependent variable (Post-test group mean scores) are the same across levels. Group A (treatment) and group B (control) of factor (PALS intervention & CBM), adjusting for differences on the covariate (Pre-test group means scores). Descriptive statistics were calculated using the group mean scores from the pre-test and post-test on oral reading fluency assessments as well as pre-test and post test group mean scores on the Maze. The pre-test results on the oral reading fluency and the Maze assessments served as the covariate. The independent variables were the factor of treatment across two levels which were defined by group A (treatment) engaging in traditional instruction with the addition of Peer Assisted Learning Strategies (PALS) as the treatment for nine weeks and group B (control) receiving traditional instruction without treatment intervention. The dependent variables were the post-test group means scores on both the oral reading fluency and Maze assessments. Pearson product moment correlations were derived to determine if there were any significant correlations between CBM pre-tests and post-tests and the reading portion of the Georgia Criterion Reference Competency Test (CRCT). A significant relationship between these assessments may generate an index measure that could

identify students more efficiently for an appropriate level of intervention or tier earlier in the school year.

Research Questions

Research Question 1: Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?

A one-way analysis of covariance (ANCOVA) was conducted. The independent variable, Oral reading fluency CBM coupled with PALS intervention included two levels. These consisted of group A (treatment) and group B (control). Pre-test group means were used as the covariant. The dependent variable, Oral reading fluency CBM post-test group means was analyzed to evaluate the effect size of the treatment.

Research Question 2: Are there any significant differences between group mean scores in reading comprehension as measured by Maze CBM when coupled with the PALS intervention?

A one-way analysis of covariance (ANCOVA) was also conducted to test this question. The independent variable, Maze coupled with PALS intervention included two levels: group A (treatment) and group B (control). Pre-test group means were used as the covariant. The dependent variable, Maze CBM post-test group means was analyzed to evaluate the effect size of the treatment.

Research Question 3: Are there any significant correlations between CBM and CRCT tests that could identify an appropriate intervention level for students that are at risk?

The Pearson Product-Moment Correlation Coefficient statistical method was used to assess to what degree quantitative variables are linearly associated in a sample. In this study, it would be very helpful to determine if there is a relationship between oral reading fluency and word comprehension CBM assessment scores and the CRCT reading test. A Pearson product-

moment matrix was constructed to examine all possible correlations between pre-test, post-test and CRCT reading sub test scores. Having a significant relationship between these assessments may help place students more efficiently in the appropriate level of intervention or tier earlier in the school year.

Chapter 4

RESULTS

This chapter details the findings of this investigation. The purpose of this study is to investigate the validity and efficacy of curriculum-based measurements as an instrument to collect response data for use in the response to intervention process when coupled with a researched based instructional strategy. The goal of RTI is to assist in making appropriate instructional modification decisions based upon assessment data that are researched based. This investigation focused on middle grade students who are at risk of academic failure due to skill deficits in reading. This investigation will hopefully provided meaningful results regarding the use of CBM and RTI strategies at the middle school level for students who have significant deficits in reading comprehension and fluency.

Research Questions

Research Question 1: Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?

Research Question 2: Are there any significant differences between group mean scores in reading comprehension as measured by Maze CBM when coupled with the PALS intervention?

Research Question 3: Are there any significant correlations between CBM and CRCT tests that could identify an appropriate intervention level for students that are at risk?

Analysis of Research Questions

Research Question 1

Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?

Table 3 shows the results of the pre-test and post-test group means scores of group A (treatment) and group B (control). The results show an increase in oral reading fluency words per minute (WPM). Pre-test results on oral reading fluency (ORFPRE) were slightly higher for group A (M= 140.12, SD= 25.58) and group B (M=135.92, SD=23.58) with the difference between the group mean scores being only about 4 words per minute. The post-test on oral reading fluency (ORFPOST) results for Group A (M = 160.16, SD = 28.63) were much higher than group B (M=148.12, SD= 23.93) with a difference in group mean scores being about 12 words per minute. Both groups did improve their overall WPM scores when pre-test and post-test results are compared.

Table 3. *Means of ORF for group A and B pre-test and post-test*

Measure	Group	N	M	SD
ORFPRE	A	25	140.12	25.58
ORFPRE	B	25	135.92	23.58
ORFPOST	A	25	160.16	28.63
ORFPOST	B	25	148.12	23.93

Presented in Figures 1 and 2 are histograms of pre-test and post-test measures on the Oral reading fluency test for both groups A (treatment) and B (control). These two histograms show positive performance growth rates for both treatment and control groups as indicated by

movement of the means. The distribution of the scores is similar with some exceptions to a normal distribution. Students who scored less than one standard deviation below the mean on the pre-test were identified as level two students. Students scoring between one standard deviation (SD= 24) below and above the mean (M= 140) were identified students at level one. This procedure identified 14 level two students and 36 level one students. Of the 36 students in level one, only 9 were one standard deviation above the mean. The remaining 27 students were within one standard deviation above or below the mean. Post-test results show the difference in the number of level one and level two students. This study did not investigate level transitions of students. This was primarily due to the short duration of the study. If the study had continued for another nine weeks, the students would have been reassigned to an appropriate intervention level.

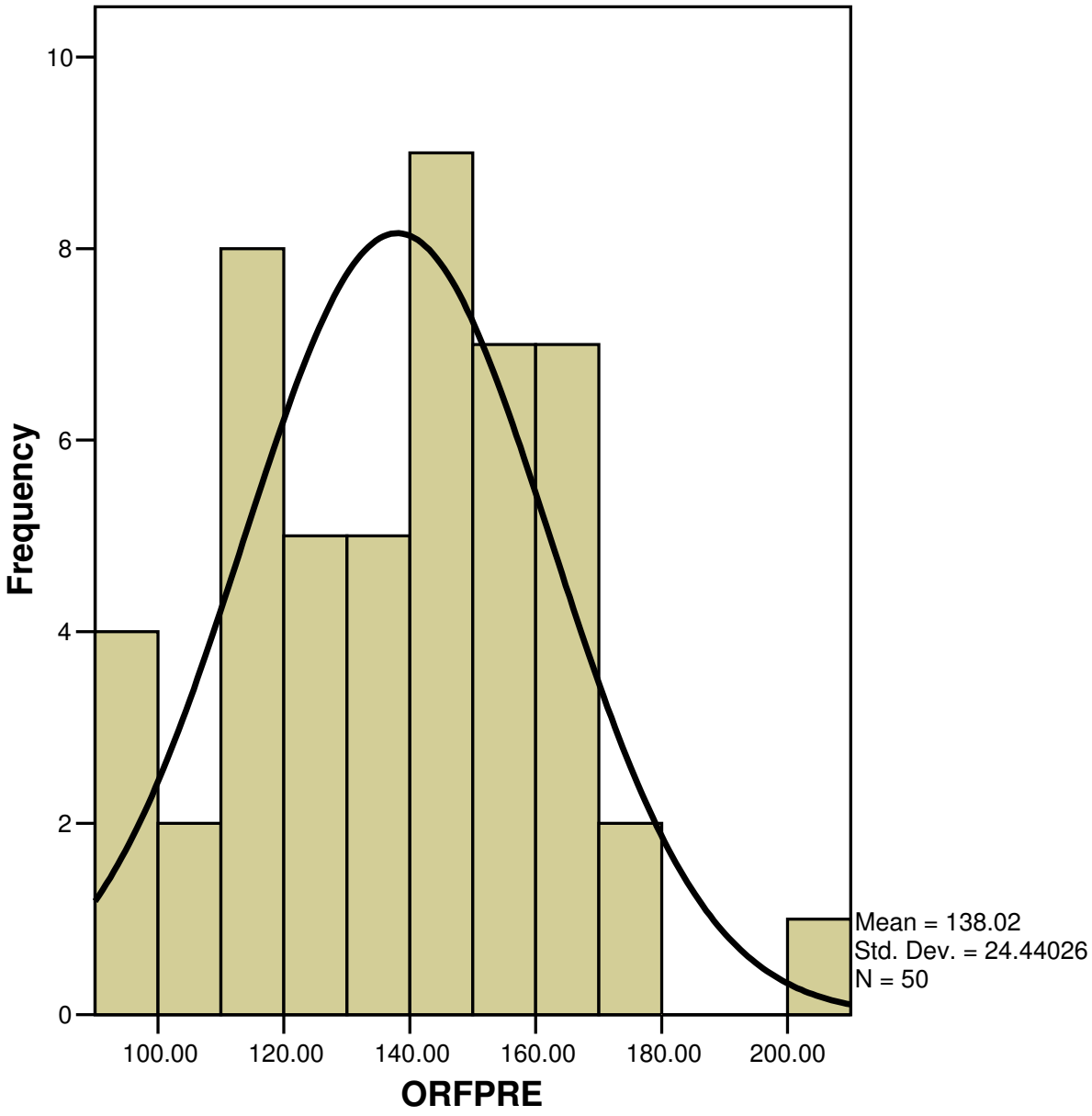

Figure1. Group A (treatment) and B (control) Pre-Test Oral Reading Fluency (ORFPRE)) Histogram

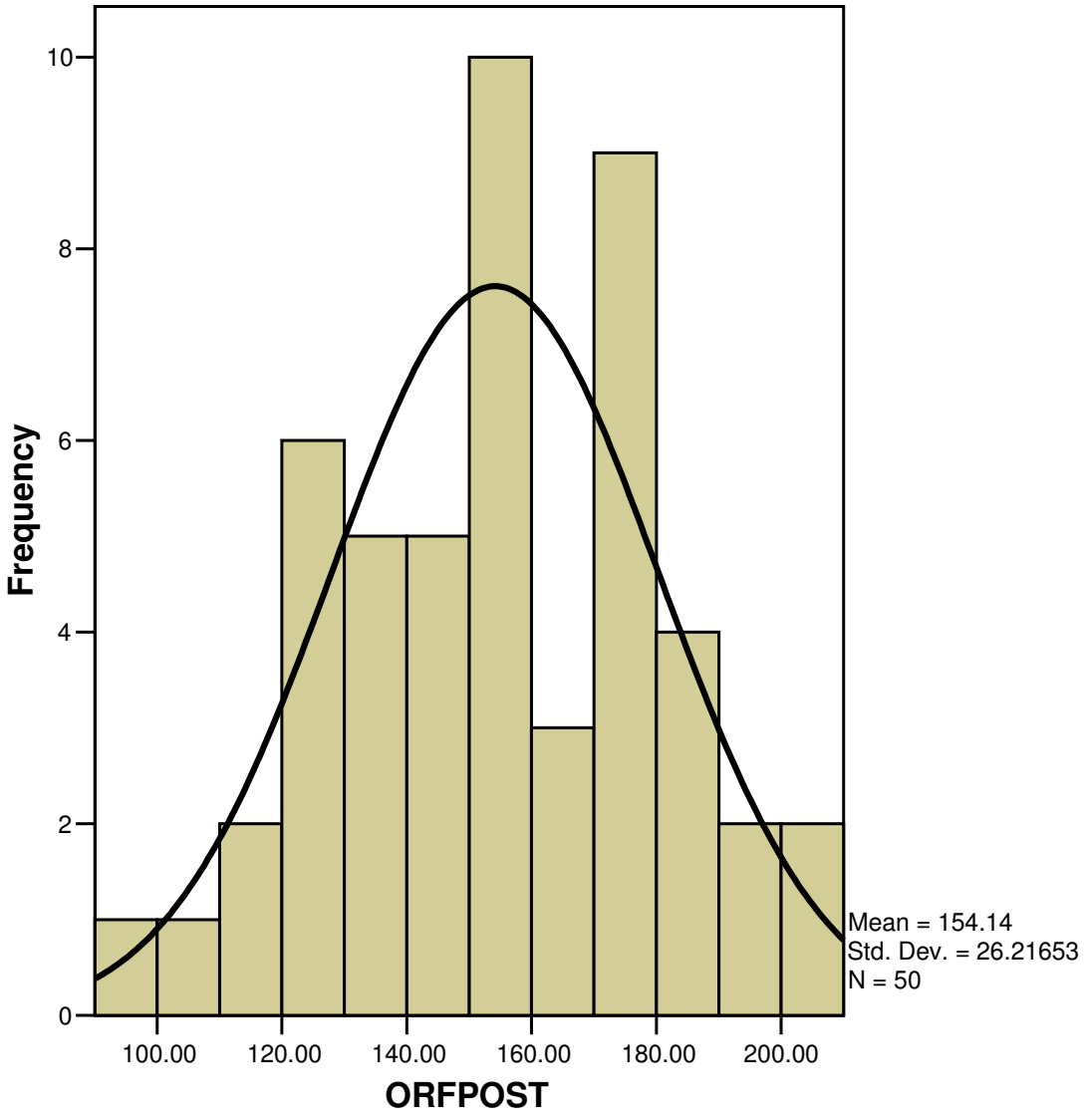

Figure 2. Group A and B Post-Test Oral Reading Fluency (ORFPOST) Histogram.

To illustrate growth by factor for treatment and control groups, Figures 2. 1 to 2.4 shows the group A (treatment) and group B (control) pre-test and post-test results on oral reading fluency.

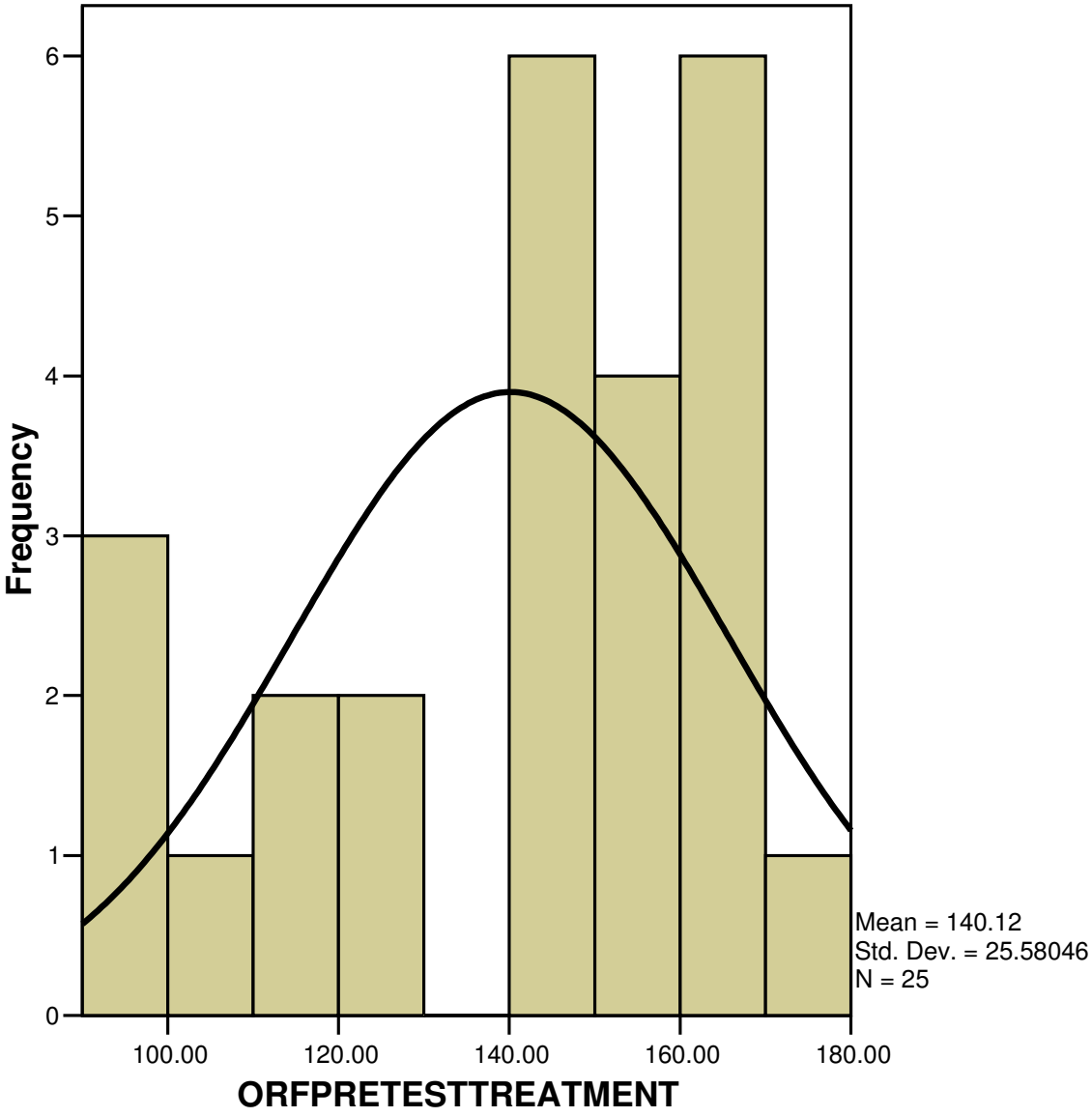

Figure 2. 1. Pre-Test Group A (treatment) Results on Oral Reading Fluency

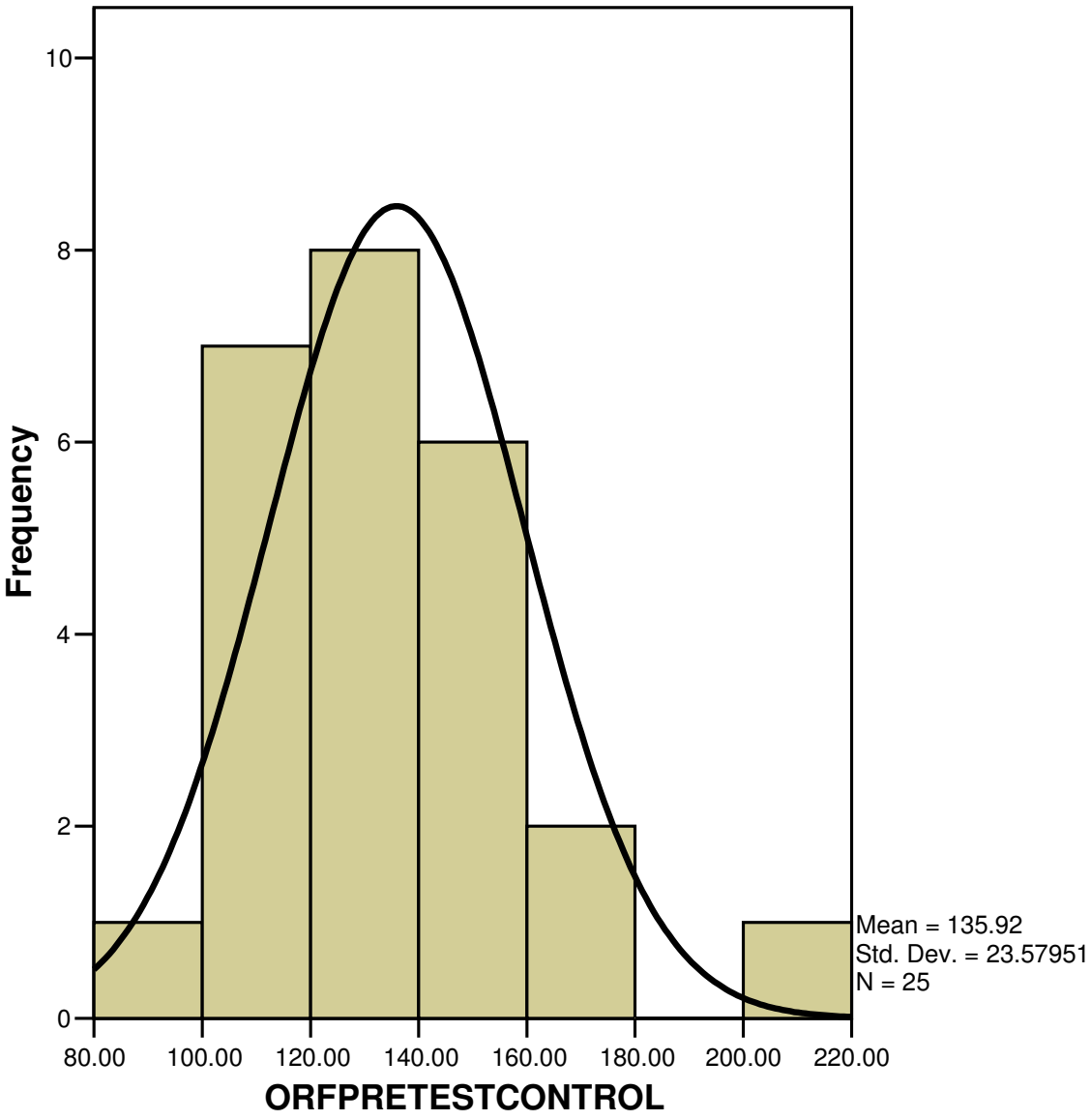

Figure 2. 2. Pre-Test Group B (control) Results on Oral Reading Fluency

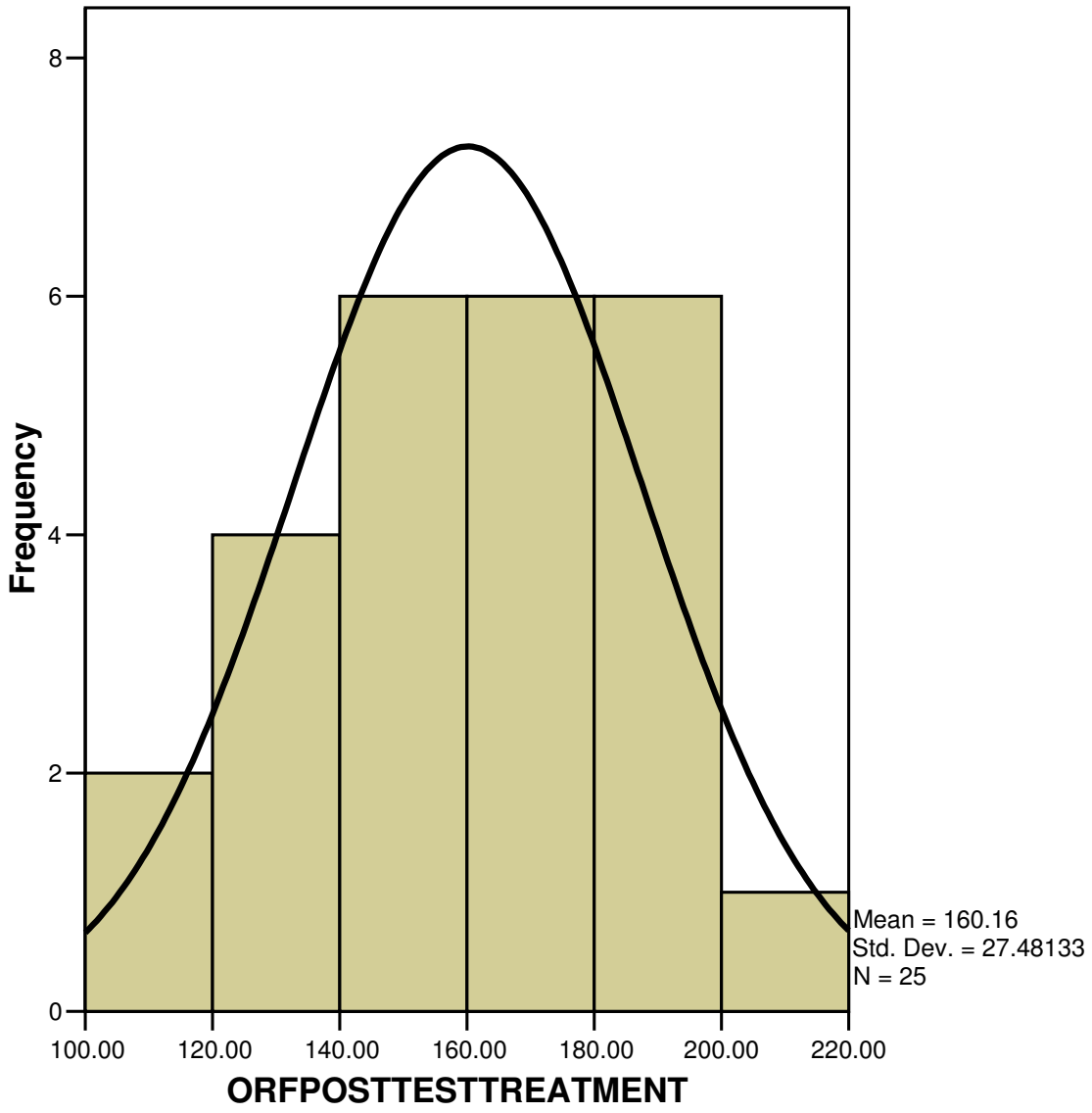

Figure 2. 3. Post-Test Group A (treatment) Results on Oral Reading Fluency.

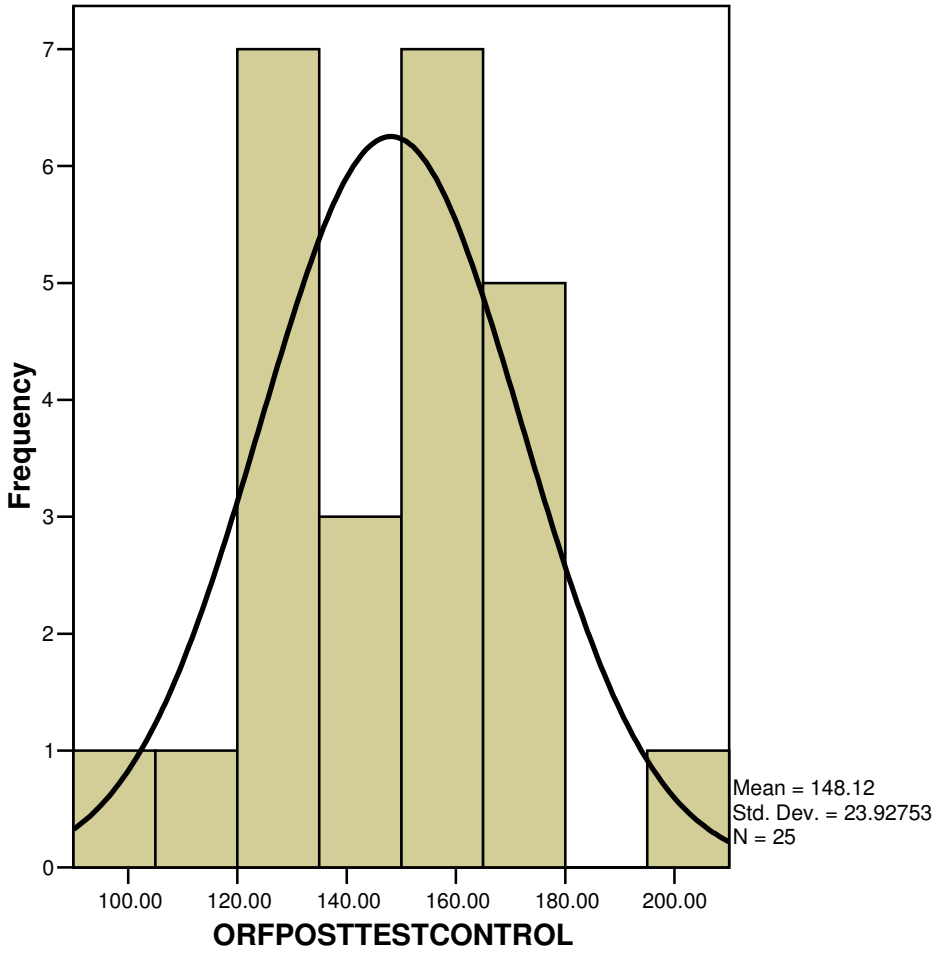

Figure 2. 4. Post-Test Group B (control) Results on Oral Reading Fluency.

To determine if the improvement in group A's results were significantly different from group B's results and associated with the PALS intervention and CBM assessments, a more precise statistical analysis was needed. To meet this requirement, a one-way analysis of covariance (ANCOVA) was conducted to test the effects of the treatment. The independent variable, CBM progress monitoring coupled with PALS intervention include two levels that consisted of treatment group A and the control group B. The dependent variable was the post-test group means scores on the Oral reading fluency test and the Maze word comprehension test. The

covariate was defined as the pre-test on both the Oral reading fluency and the Maze word comprehension test. Table 4 shows a preliminary analysis

evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable. The analysis yielded an F (1, 46) = .176, MSE= 129.87, p=.68, partial η^2=.004.

Table 4
Univariate Analysis Test of Between-Subjects Effects

Source	SS	df	MS	F	p	η^2
ORFPRE	25869.15	1	25573.82	196.92	.000	.811
ORFPRE*treatment	22.88	1	22.87	.176	.677	.004
Error	5973.98	46				

Note. P>.05 for ORFPRE*treatment

The analysis proceeded to the ANCOVA analysis because there was no a significant interaction between the source labeled ORFPRE*treatment. The results in Table 5 clearly show the main effects of the treatment source and a significance level of P<.05. The null hypothesis tested stated that the population means are equal for both the experimental group A and control group B. The results of the analysis indicate that this hypotheses should be rejected, F (1, 47) = 6.34, MSE= 127.60, p<.05. The strength of the relationship between the treatment factor and the dependent variables was strong, as assessed by a partial η^2=.12, with the treatment factor accounting for 12% of the variance of the dependent variable, holding constant for the pre-test achievement results. The results do show that there was a real positive effect on the learning outcomes for the students in group A.

Table 5

ANCOVA for PALS and Oral Reading Fluency

Source	SS	df	MS	F	p	η^2
ORFPRE	25869.15	1	25869.15	202.75	.000	.812
Treatment	809.23	1	809.23	6.35	.015	.119
Error	5996.85	47				

Note. p<.05

Research Question 2

Are there any significant differences between group mean scores in reading comprehension as measured by Maze CBM when coupled with the PALS intervention?

Table 6 shows the results of the Maze word comprehension pre-test and post-test group means scores of group A and group B. The results show an increase in word comprehension scores. Pre-test results on the Maze word comprehension results pre-test (MAZEPRE) were higher for group A (M=21.40, SD=6.30) and group B (M=17.80, SD=4.51) with the difference between the group mean scores being approximately 3.6 correct word responses more. The post-test group mean scores on Maze word comprehension results for Group A (M = 29.36, SD = 6.77) were higher than group B (M=26.60, SD= 6.44) with a difference in group mean scores being about 3 correct word responses more. Both groups did improve their overall word comprehension scores when pre-test and post-test results are compared.

Table 6

Means of Maze Scores for Group A and B Pre-test and Post-test

Measure	Group	N	M	SD
MAZEPRE	A	25	21.40	6.30
MAZEPRE	B	25	17.80	4.51
MAZEPOST	A	25	29.36	6.77
MAZEPOST	B	25	26.60	6.44

A one-way analysis of covariance (ANCOVA) was used to analyze the treatment effects and interactions of the variables. The independent variable, Maze word comprehension CBM coupled with PALS intervention included two levels that consisted of treatment group A and the control group B. The dependent variable for this question was the post-test group means scores on the Maze word comprehension test. The covariate was the pre-test scores on the Maze word comprehension test. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable. Table 7 represents the evaluation of the homogeneity-of-slopes between the covariant and the dependent variable test of between-subjects effects. The analysis yielded an $F(1, 46) = .057$, $MSE = 10.40$, $p = .812$, partial $\eta^2 = .001$.

Table 7

Univariate Analysis test of between-subjects effects

Source	SS	df	MS	F	p	η^2
MAZEPRE	1037.28	1	1037.28	99.82	.000	.685
MAZEPRE*treatment	.60	1	.60	.057	.812	.001
Error	478.00	46				

Note. P>.05 for MAZEPRE*treatment

Due to no significant interaction between the MAZEPRE*treatment, the analysis progressed to the ANCOVA testing of the hypothesis. The results in table 6 indicated that the ANCOVA analysis was significant, F (1, 47) = 5.66, MSE= 57.71, p<.05. The strength of the relationship between the treatment factor and the dependent variables was strong, as assessed by a partial η^2, with the treatment factor accounting for 10% of the variance of the dependent variable, holding constant for the pre-test achievement results.

Table 8
ANCOVA for PALS and Maze Comprehension Assessment

Source	SS	df	MS	F	p	η^2
MAZEPER	1174.52	1	1174.52	115.34	.000	.710
Treatment	57.71	1	57.710	5.66	.021	.108
Error	478.600	47				

Note. P<.05 for Treatment

Research Question 3

Are there any significant correlations between CBM and CRCT tests that could identify an appropriate intervention level for students that are at risk?

Correlation coefficients were computed among the pre-test and post-test on both the Maze and the Oral reading fluency assessments and with the reading sub test scores from the 2006-2007Georgia CRCT. Using the Bonferroni approach to control for Type I error across the 5 correlations, a P<0.01 value or less was required for significance. The results of the correlation analyses presented in Table 9 show that there are significant relationships between the pre-test and post-test with the CRCT.

The correlations coefficients between Oral reading fluency post-test and CRCT scores were calculated. This was a total comparison using an aggregated total of all 50 post-test and 50 CRCT scores from both the treatment and control groups. With a significant correlation coefficient, $r(48) = .68$, $p < .000$, (see Table 9) there may some utility in using the post-test scores to predict in general CRCT performance. Pre-test correlation coefficients based on an aggregated total of both groups yielded $r(48) = .57$, $p < .000$.

When disaggregated correlation coefficients were computed, this study was limited by having N=25 in both the treatment and control groups. When the treatment group's post-test scores alone are correlated with CRCT scores, the results are still significant, $r(24) = .76$, $p < .000$. Continuing with the disaggregation, the control groups pre-test with CRCT was not as significant, $r(24) = .48$, $p < .014$. The control groups post-test and CRCT correlation was slightly higher with a correlation coefficient of $r(24) = .56$, $p < .003$. The most significant correlation was between the treatment group's post-test scores and CRCT scores. Due to the limited number of cases (N=25), these correlations may not represent accurate associations. For this question 3, the correlations between post-test and CRCT provides significant data on identifying associations between performance on the oral reading fluency test and the Maze word comprehension test and performance on the CRCT.

Table 9.

Correlation Matrix

	1	*2*	*3*	*4*	*5*
1. ORF PRETEST	1	.893	.714	.599	.564
P	.	.000	.000	.000	.000
N	50	50	50	50	50
2. ORF POSTTEST	.893	1	.766	.628	.676
P	.000	.	.000	.000	.000
N	50	50	50	50	50
3. MAZE PRETEST	.714	.766	1	.858	.565
P	.000	.000	.	.000	.000
N	50	50	50	50	50
4. MAZE POSTTEST	.599	.628	.858	1	.461
P	.000	.000	.000	.	.001
N	50	50	50	50	50
5. CRCT	.564	.676	.565	.461	1
P	.000	.000	.000	.001	.
N	50	50	50	50	50

Figure 3 shows the trend pattern when previous CRCT scores are plotted with post-test oral reading fluency scores. This pattern suggests a positive trend of linearity. Figure 3 shows a scatter plot of post-test and pre-test scores on Oral reading fluency and CRCT scores. The scatter plot corresponds with oral reading fluency post-test and CRCT scores. The blue data points represent the treatment group and the green data points represent the control group. This was a total comparison using an aggregated total of all scores from both the treatment and control groups.

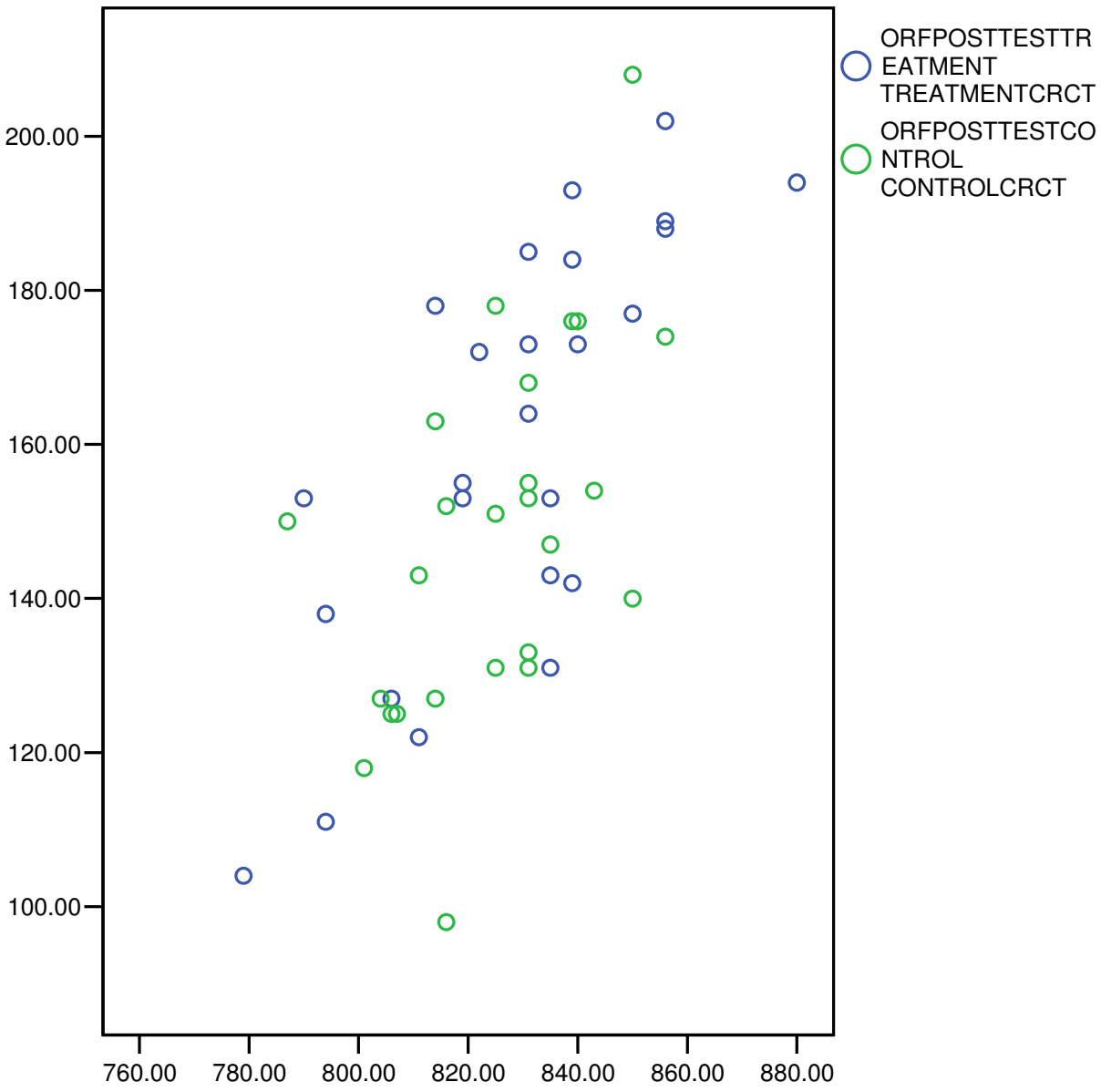

Figure 3. Scatter Plot of CRCT Scores and Post-Test ORF Scores for Group A and B.

Figure 3.1 shows a consolidated matrix of scatter plots that illustrate patterns of linearity between the post-test scores on the Oral reading fluency, Maze word comprehension and the CRCT. The strongest associations can be seen in Oral reading fluency and CRCT scores. The Maze word comprehension scores and the CRCT show a less defined linear pattern.

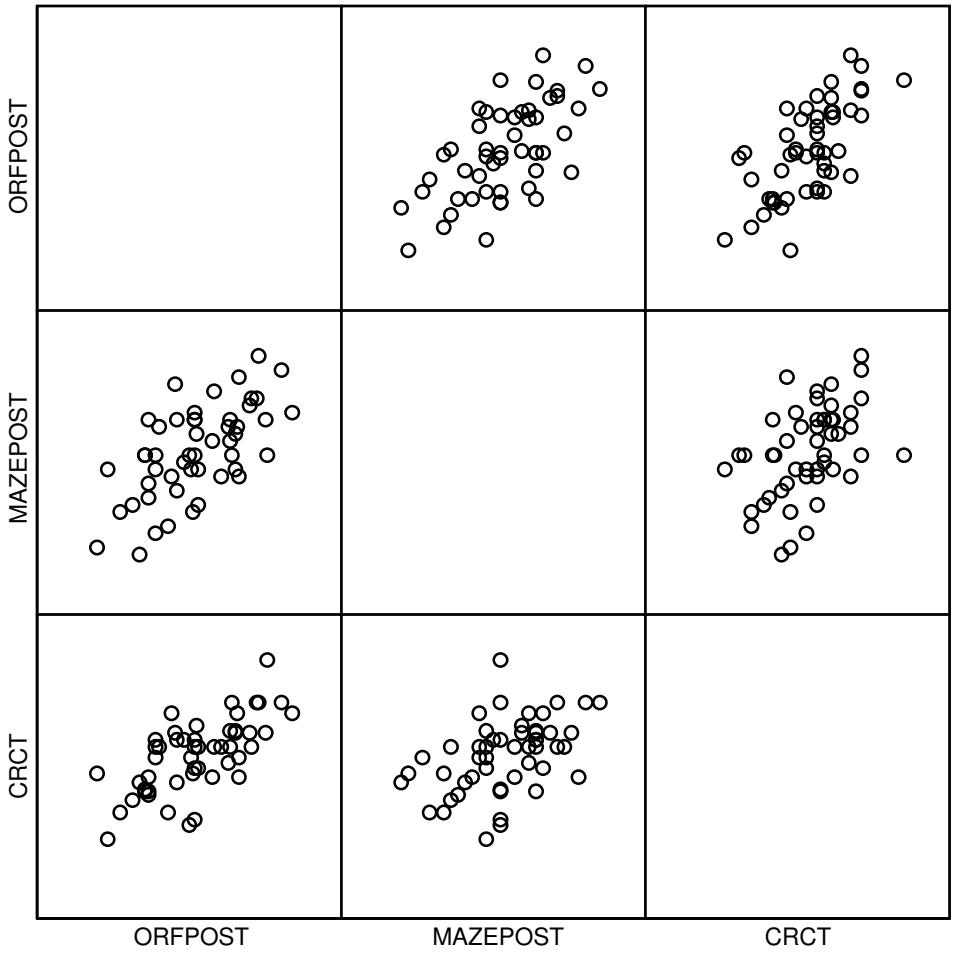

Figure. 3.1. Scatter plot of CRCT, ORFPOST and MAZEPOST

Chapter 5

DISCUSSION

The following chapter details an analysis of the investigation along with cumulative and summative details of the research findings along with comparisons with previous research findings. Limitations of this investigation are also discussed as well as suggestions for future research.

The purpose of this study was to investigate the validity and effectiveness of curriculum-based measurements as an instrument to collect response data for use in the response to intervention process with a researched based instructional strategy. This investigation focused on middle grade students with and without disabilities who are at risk of academic failure due to skill deficits in reading. The findings of this study supported that the use of CBM assessment were sensitive to performance grow rates and had a high level of construct validity (Hintze & Silberglitt, 2005).

One significant finding of this study was consistent with a study by Fuchs & Fuchs (1997) on the utility of curriculum based measurement as a means to identify instructional level. Findings obtained from this study have been established as research based for data-based decision making within the response to intervention process. The findings of the study also support early research findings regarding the use of curriculum-based measures as a valid response data source for response to intervention decisions (NASDSE, CASE, 2006).

Decisions regarding what intervention level students should be assigned to after CBM measurement data demonstrated a variation of the response to intervention (RTI) process. This

investigation did provide meaningful information regarding the use of CBM and RTI strategies at the middle grade level for students who have significant deficits in reading comprehension and fluency. The results of the study did show significant correlations between the CRCT scores and CBM assessments. Initial findings indicate that the use of reading fluency measures can efficiently screen for students that may have difficulty with criterion reference tests like the CRCT in the area of reading comprehension. There were significant improvements in performance for the experimental group receiving the PALS intervention with CBM assessments when compared with the control group.

Researching the effectiveness and validity of using curriculum-based measurements as a component of RTI requires careful examination of the research. A review of literature provided a foundation for an examination of curriculum-based measurements as a response data source and subsequently modifying instructional interventions methods and their use with students in a middle school setting. These answers will all prompt additional investigations to improve the RTI process for use with students at the middle grades level to provide the most effective instruction possible.

The following research questions will be evaluated to determine if any cumulative statement can be made after data evaluation.

The questions that were addressed by this study include:

1. Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?
2. Are there any significant differences between group mean scores in reading comprehension as measured by Maze CBM when coupled with the PALS intervention?

3. Are there any significant correlations between CBM and CRCT test that could identify an appropriate intervention level for students that are at risk?

Summary of the Results

Research Question One

Does oral reading fluency assessment when coupled with the PALS intervention affect reading fluency?

Findings from this research were generally consistent with an investigation that studied the construct validity of Oral reading fluency. In a study by Hintze, J. M., & Silberglitt, B. (2005) provided research evidence that has strengthened the use of Oral reading fluency as a standard by which to assess reading performance. In their study, the participants included 1,766 students from seven elementary schools that were part of a school district in the north central region of the United States Oral reading fluency data were collected on five consecutive groups of students longitudinally over a 3-year period with the first group beginning in the 1996-97 school year and continuing through the 1998-99 school year. The participants were given the Oral reading fluency assessment eight times beginning in the winter of Grade 1 and continuing each Fall, Winter, and Spring until the Spring of Grade 3. R-CBM measures were administered by trained staff in accordance with standard R-CBM administration and scoring procedures. Students were administered the reading portion of the Minnesota Comprehensive Assessment (MCA) in the spring of third grade. Scores for each of the measures were obtained for all students. There were no missing data for R-CBM or MCA measures during the course of the 3-year assessment period. In addition, the R-CBM measures were strongly related to each other, with those measures collected within a particular grade level more highly correlated than

measures across grade levels. Results of this analysis suggest that R-CBM has strong validity in predicting MCA performance and demonstrates itself as a strong construct of reading.

The findings of this research showed post-test on oral reading fluency (ORFPOST) results for Group A (M = 160.16, SD = 28.63) were much higher than group B (M=148.12, SD= 23.93) with a difference in group mean scores being about 12 words per minute (see Figure 5). Both groups did improve their overall WPM scores when pre-test and post-test results are compared (see Figure 4 and 5). Group A is represented by treatment group 2.00 in Figure 4 and Group B is represented by treatment group 1.00 in Figure 4. These finding do suggest that the treatment group did respond to the PALS program more significantly than the control group.

Findings from this research indicated that there were significant statistical differences between the post-tests of the treatment and control groups. The null hypotheses was rejected, $F(1, 47) = 6.34$, MSE= 127.60, $p<.05$. The strength of the relationship between the treatment factor and the dependent variables was strong, as assessed by a partial $\eta^2=.12$, with the treatment factor accounting for 12% of the variance of the dependent variable, holding constant for the pre-test achievement results. The results do show that there was a real positive effect on the learning outcomes for the students in group A.

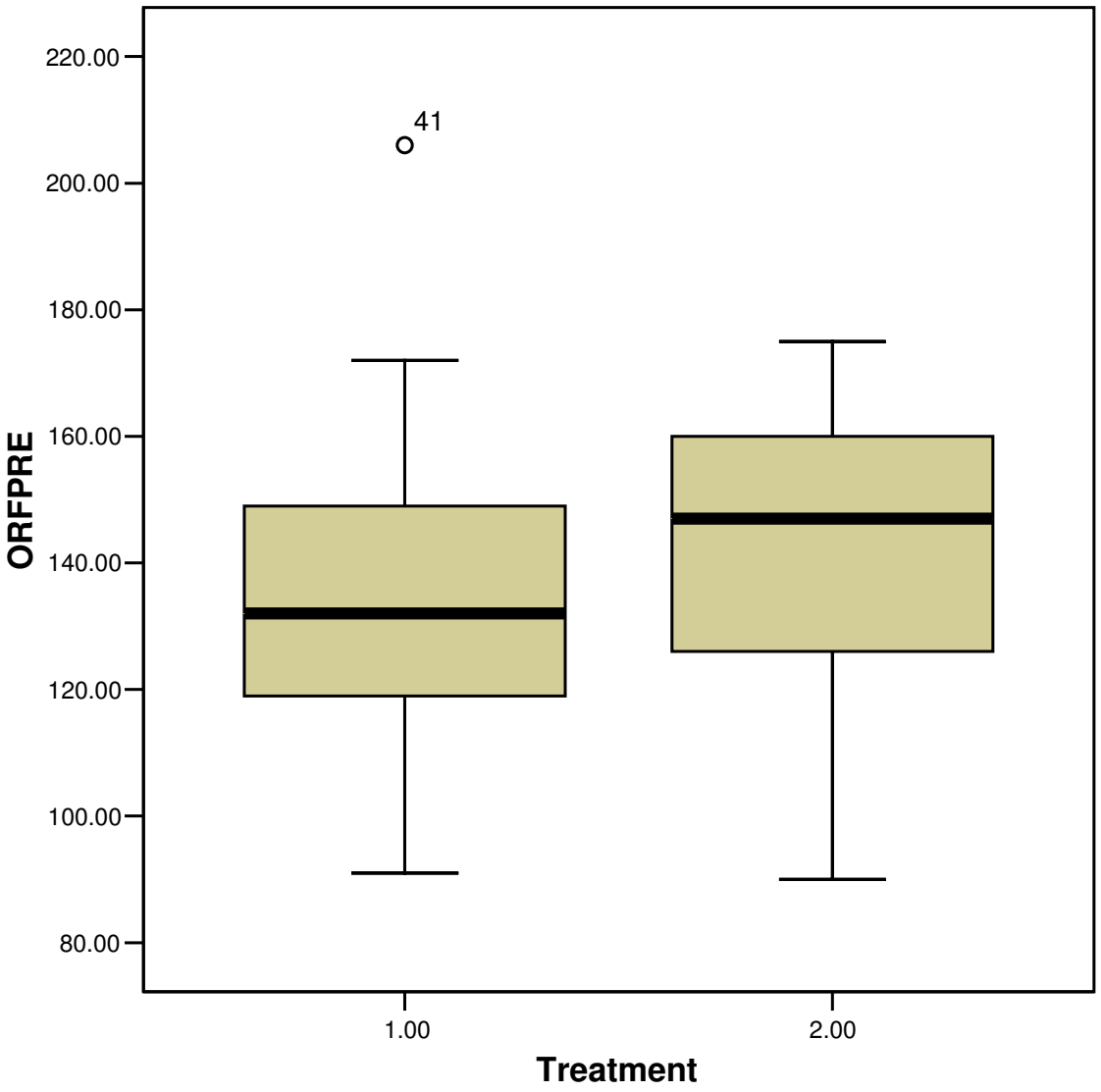

Figure 4. Pre-Test Results on Oral Reading Fluency by Group A and B.
Note. Group A (treatment) is represented by treatment factor 2.00 and Group B (control) is represented by treatment factor1.00

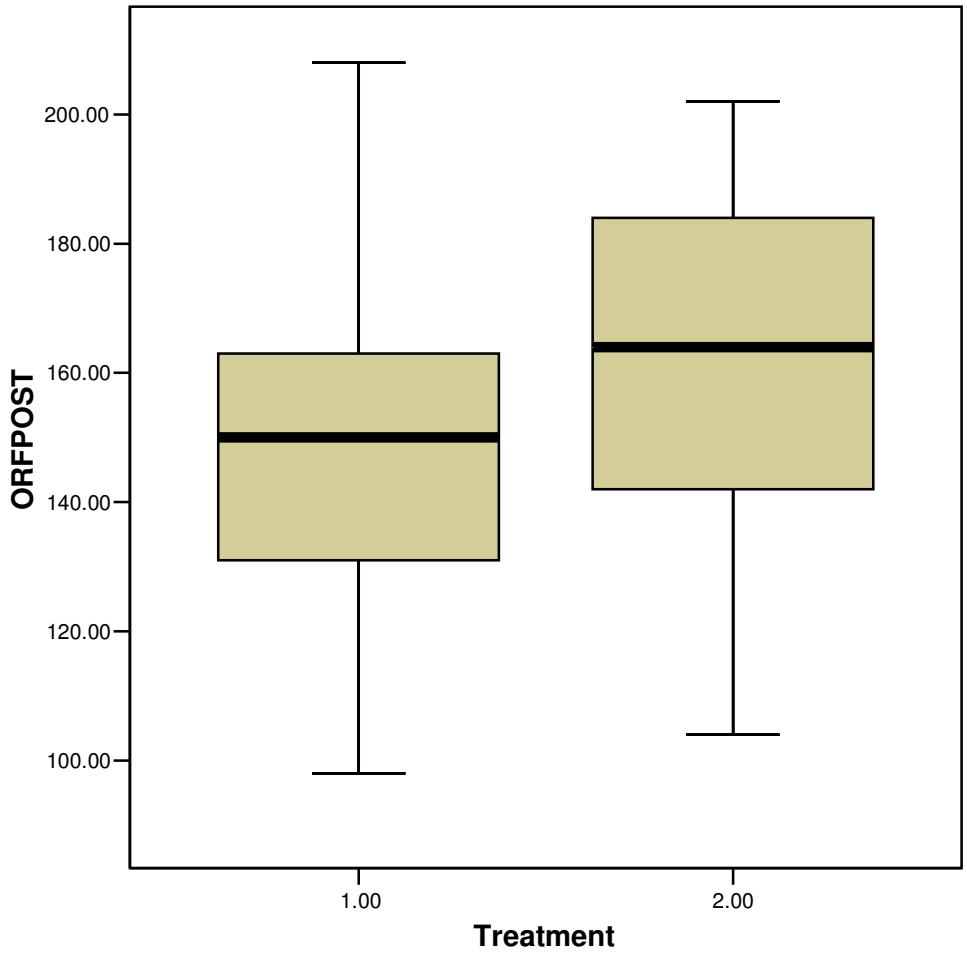

Figure 5. Post-Test Results on Oral Reading Fluency by Groups A and B.
Note. Group A (treatment) is represented by treatment factor 2.00 and Group B (control) is represented by treatment factor1.00

Research Question 2

Knowing if there are any significant differences between group means scores in reading comprehension as measured by the Maze word comprehension assessment after implementing the PALS intervention would indicate that the treatment was effective and that the curriculum based measurement was a valid measure of reading word comprehension. The findings in this study were similar to Shin, Deno, and Espin (2000) who investigated performance of students with disabilities in general classroom settings. Forty-three second graders (25 male and 18 female students) from three classes in a large city school in the Midwest participated. All

participants took the California Achievement Test (CAT; CTB/McGraw-Hill, 1985) toward the end of second grade, in April 1996. Mean scaled scores on the reading and mathematics subtests for participants receiving remedial educational services were 652 and 648, corresponding to the 47th and 46th percentiles on the national norms, correspondingly. The mean scaled scores for students in general education were 704 and 703 on the reading and mathematics subtests, corresponding to the 71st and 79th percentiles. The procedures included administering ten different maze passages to assess students' reading performance over a school year. Passages were arbitrarily selected from traditional grade-level reading materials. To construct maze reading tests, every seventh word was deleted after the first sentence, and three alternatives words were provided. One of the alternatives was a correct choice and the other two were distracters. The number of correct choices in the maze task was scored and used for the data analysis in the study. Results showed correlations between monthly maze scores with 1- to 9-month intervals ranged from .69 to .91, with a mean of .81. The correlation between maze scores with 1-month intervals between testing ranged from .75 to .90, with a mean of .83. The correlation for 2-month intervals ranged from .75 to .87, with a mean of .80, and the correlation for 3-month intervals ranged from .69 to .91, with a mean of .80.

The findings in this research found very similar results. The correlation coefficient between pre-test Maze and post-test Maze was $r(48) = 0.86$, $P<.000$ after a nine week interval. The correlation coefficient computed for Maze and the CRCT was significant at $r(48) = 0.46$, $P < .000$.

The independent variable, Maze word comprehension assessment coupled with PALS intervention included two levels that consisted of a treatment group and a control group. The dependent variable for this question was the post-test group means scores on the Maze word

comprehension test. shows the results of the Maze word comprehension pre-test and post-test group means scores of group A and group B. The results show an increase in word comprehension scores. Pre-test results on the Maze word comprehension results pre-test (MAZEPRE) were higher for group A (M=21.40, SD=6.30) and group B (M=17.80, SD=4.51) with the difference between the group mean scores being approximately 3.6 correct word responses more. The post-test group mean scores on Maze word comprehension results for Group A (M = 29.36, SD = 6.77) were higher than group B (M=26.60, SD= 6.44) with a difference in group mean scores being about 3 correct word responses more. Both groups did improve their Maze word comprehension scores when pre-test and post-test results are compared.

There were similarities of this study to an earlier variation of PALS investigated by Simmons et al. (l995). Their research dealt with a sample consisting of 24 teachers and 68 students in grades two through five, including 44 learning-disabled students and 24 low-performing students. The study was conducted over 16 weeks, where as this study only lasted 9 weeks. Their setting included five schools in a suburban area in the Southeast representing low- to upper-middle-class socioeconomic levels. Sixteen teachers were randomly assigned to experimental groups, and eight teachers served as controls. The 16 experimental group teachers were randomly assigned to Explicit Teaching (control group) or Explicit Teaching plus Peer Tutoring (treatment group). There were no significant demographic variable differences among teachers in the three groups, but pre-tests indicated that students in the control group had significantly higher aptitude than students in the Explicit Teaching with PALS groups. All qualified learning-disabled students who received reading instruction in regular classrooms participated in the study. All teachers identified one low-achieving student per class to

participate. Analysis indicated that no significant demographic or academic differences were found between the learning-disabled and low-performing students; therefore, data were consolidated for the outcomes analysis. Student outcomes were assessed using the Stanford Achievement Test comprehension subtest, as well as five additional subtests. The results show that the Explicit Teaching groups with the PALS intervention performed better on post-test than the group that did not participate in the PALS intervention.

The research findings in this study are presented in Figure 6 which shows the differences in pre-test results between groups A and B and in Figure 7 the post-test results are shown for groups A and B. The treatment factors were defined as groups receiving the PALS intervention with traditional instruction (group A) and the control only receiving reading traditional instruction (group B) using the 8th grade-reading curriculum. The box plots do show graphically the results of the post-test scores from the Maze word comprehension assessments.

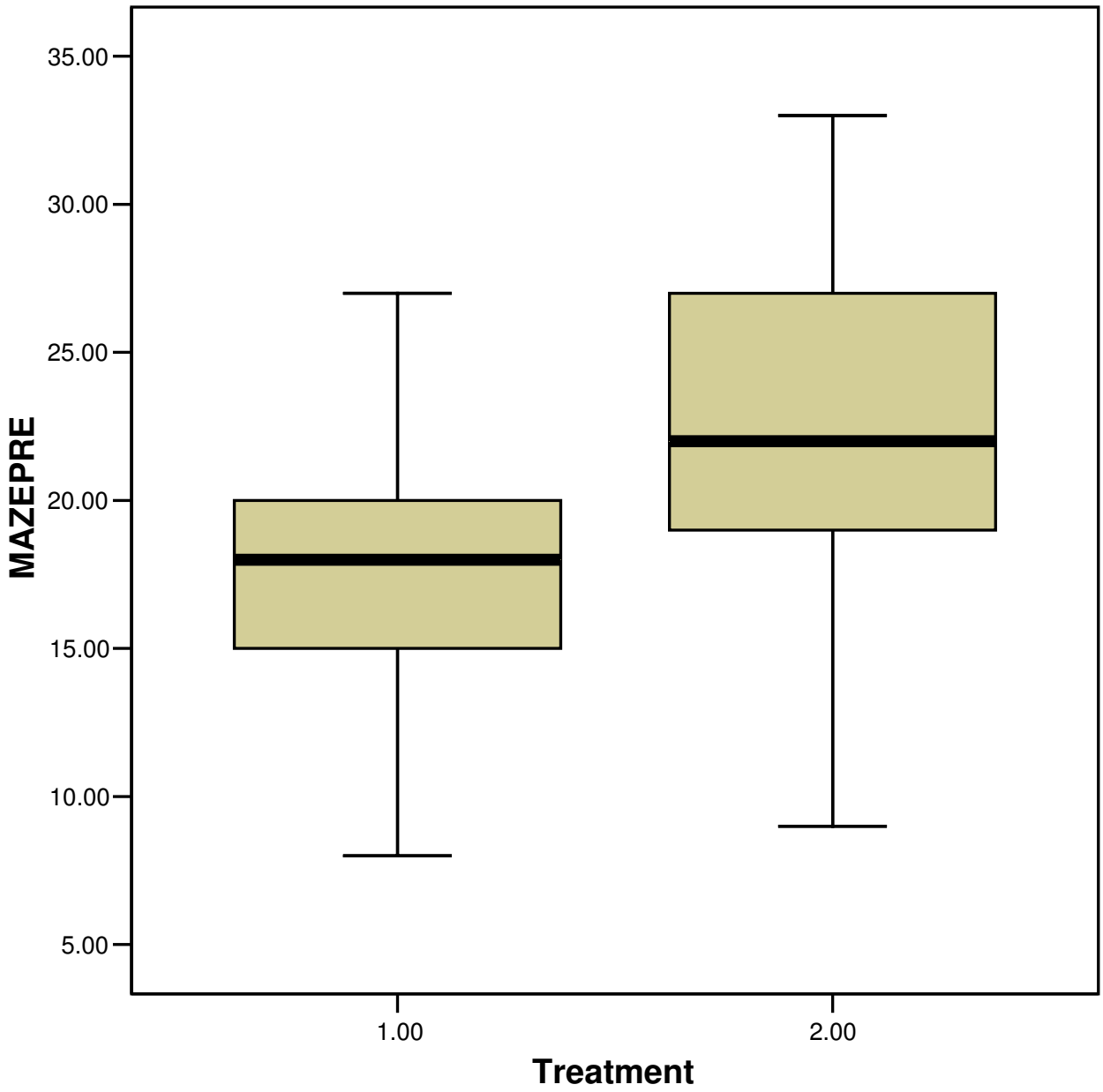

Figure 6. Pre-Test Maze Word Comprehension Results by Groups.

Note. Group A (treatment) is represented by treatment factor 2.00 and Group B (control) is represented by treatment factor1.00

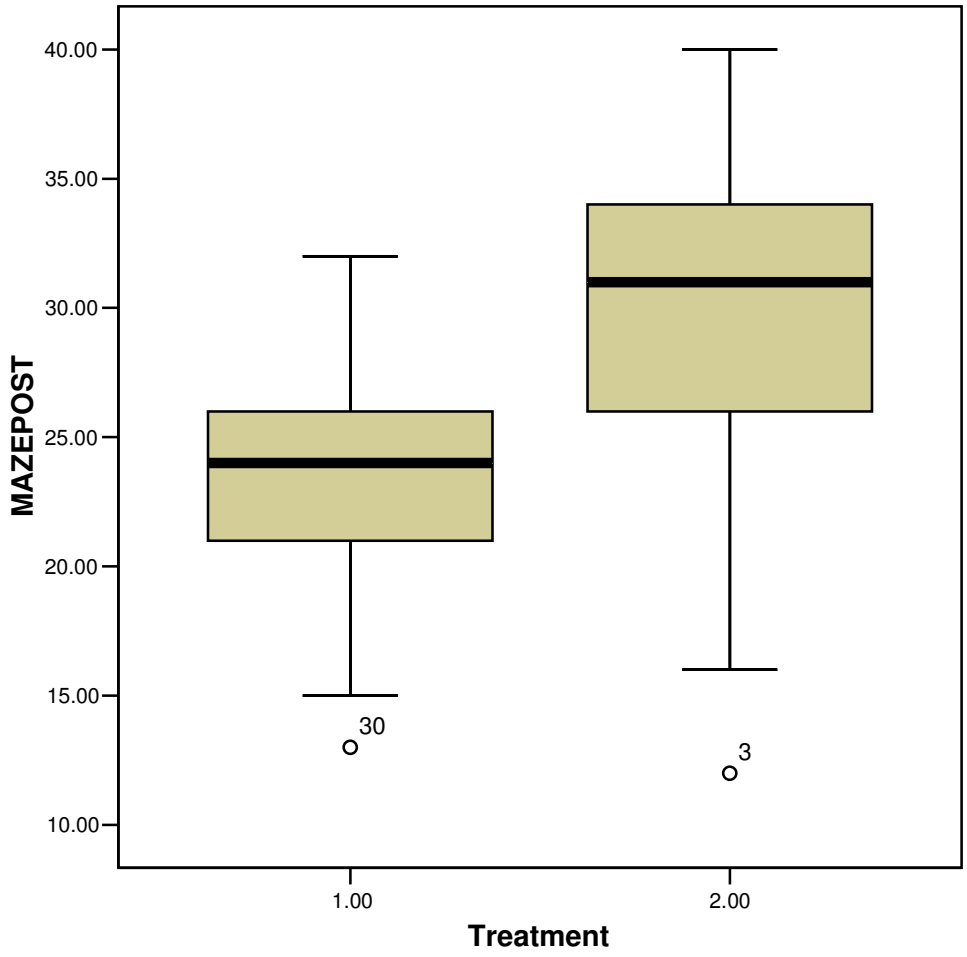

Figure 7. Post-Test Maze Word Comprehension Results by Groups.

Note. Group A (treatment) is represented by treatment factor 2.00 and Group B (control) is represented by treatment factor1.00

Research Question 3

Findings from this research are consistent with previous research studies. For example, studies by Benjamin, Burn, Madyun &, Lail (2006) and Hintze, & Silberglitt (2005) found significant associations between CBM assessments and mandatory state assessments. Correlation coefficients were computed using the pre-test and post-test on both the Maze and the Oral reading fluency assessments and with the reading scores from the 2006-2007 CRCT. Using the Bonferroni approach to control for Type I error across the 5 correlations, a $P<0.01$ value or less

was required for significance. The correlations coefficients between Oral reading fluency post-test and CRCT scores were calculated. This was a total comparison using an aggregated total of all 50 post-test and 50 CRCT scores from both the treatment and control groups. With a significant correlation coefficient, $r(48) = .68$, $p < .000$, (see Table 10) there may some utility in using the post-test scores to predict in general CRCT performance. Pre-test correlation coefficients based on an aggregated total of both groups yielded $r(48) = .57$, $p < .000$. Pre-test correlation coefficients were only slightly higher.

When disaggregated correlation coefficients were computed, this study was limited by having N=25 in both the treatment and control groups. When the treatment group's post-test scores alone are correlated with CRCT scores, the results are still significant, $r(24) = .76$, $p < .000$. Continuing with the disaggregation, the control groups pre-test with CRCT was not as significant, $r(24) = .48$, $p < .014$. The control groups post-test and CRCT correlation was slightly higher with a correlation coefficient of $r(24) = .56$, $p < .003$. The most significant correlation was between the treatment group's post-test scores and CRCT scores. Due to the limited number of cases (N=25), these correlations may not represent accurate associations.

For question 3, the correlations between post-test and CRCT provides significant data on identifying associations between performance on the oral reading fluency test and the Maze word comprehension test and performance on the CRCT. Figure 3 shows the trend pattern when previous CRCT scores are plotted with post-test oral reading fluency scores. The results of the correlation analyses presented in Figure Table 10 and Figure 8 shows that there are significant relationships between the pre-test and post-test with the CRCT.

Table 10

Correlation Matrix

	1	*2*	*3*	*4*	*5*
1. ORF PRETEST	1	.893	.714	.599	.564
P	.	.000	.000	.000	.000
N	50	50	50	50	50
2. ORF POSTTEST	.893	1	.766	.628	.676
P	.000	.	.000	.000	.000
N	50	50	50	50	50
3. MAZE PRETEST	.714	.766	1	.858	.565
P	.000	.000	.	.000	.000
N	50	50	50	50	50
4. MAZE POSTTEST	.599	.628	.858	1	.461
P	.000	.000	.000	.	.001
N	50	50	50	50	50
5. CRCT	.564	.676	.565	.461	1
P	.000	.000	.000	.001	.
N	50	50	50	50	50

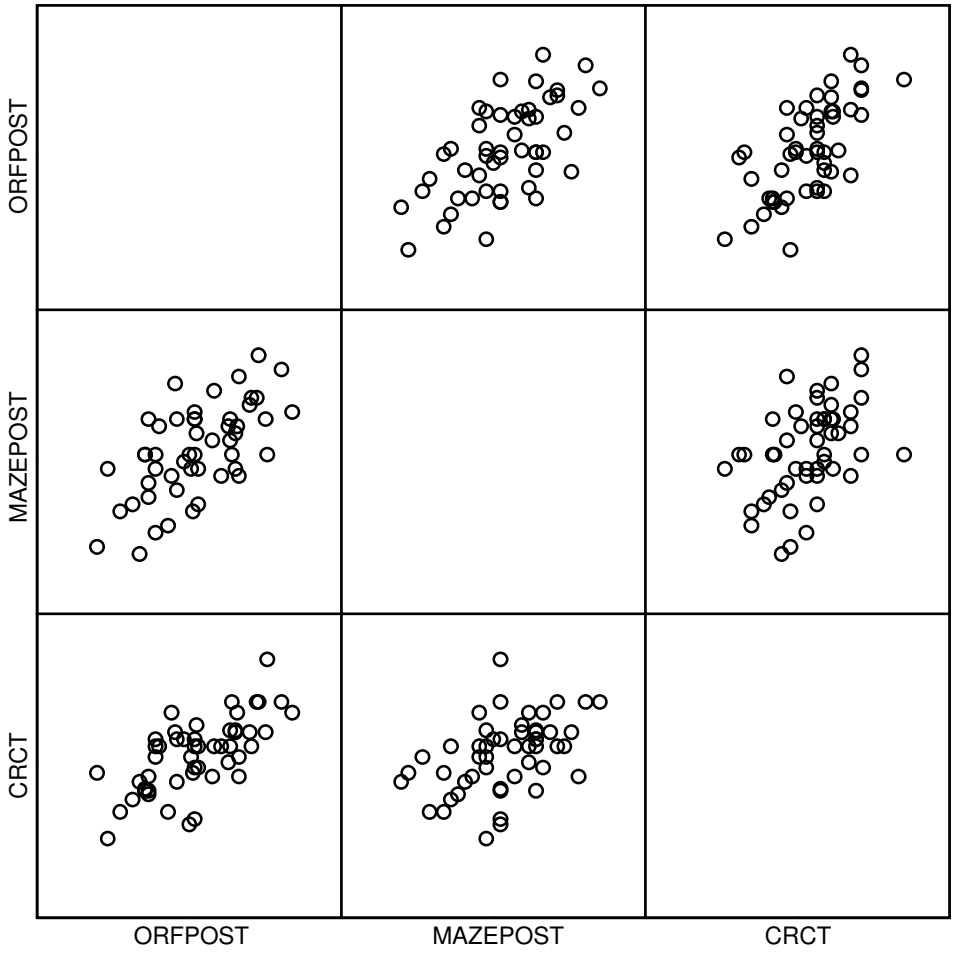

Figure 8. Post-Test Correlations Matrix Scatter Plots for CRCT, Oral Reading Fluency and Maze Word Comprehension.

This research study showed consistent findings with a similar investigation by Benjamin, Burn, Madyun & Lail (2006) in the relationship between curriculum-based measurements of reading (R-CBM) and state accountability test scores similar to the CRCT. They computed correlation coefficients using R-CBM (oral reading fluency) and Maze word comprehension with state test scores. Result from data for 5,472 students in Grades 3, 5, 7, and 8 were correlated and resulted in corrected coefficients that ranged from .51 (eighth graders) to .71 (third graders) for R-CBM and .49 (eighth graders) to .54 (seventh graders) for Maze. The coefficients between R-

CBM and state test scores were significantly larger for third and fifth graders than those for eighth graders. No significant differences in size were found between the correlation coefficients for state test scores to R-CBM and to Maze among seventh or eighth graders.

Additionally, the findings in this research study were consistent with a study that investigated the construct validity of Oral reading fluency by Hintze & Silberglitt (2005). Their research findings provided research evidence that has strengthened the use of Oral reading fluency as a standard by which to assess reading performance. In their study, the participants included 1,766 students from seven elementary schools that were part of a school district in the north central U.S. Oral reading fluency data were collected on five consecutive cohorts of students longitudinally over a 3-year period with the first cohort beginning in the 1996-97 school year and continuing through the 1998-99 school year. The participants were given the Oral reading fluency assessment eight times beginning in the winter of Grade 1 and continuing each Fall, Winter, and Spring until the Spring of Grade 3. R-CBM measures were administered by trained staff in accordance with standard R-CBM administration and scoring procedures. Students were administered the reading portion of the Minnesota Comprehensive Assessment (MCA) in the spring of third grade. Scores for each of the measures were obtained for all students. There were no missing data for R-CBM or MCA measures during the course of the 3-year assessment period. In addition, the R-CBM measures were strongly related to each other, with those measures collected within a particular grade level more highly correlated than measures across grade levels. Results of this analysis suggest that R-CBM has strong validity in predicting MCA performance and demonstrates itself as a strong construct of reading.

The results from this study showed significant correlation coefficients computed among the pre-test and post-test on both the Maze and the Oral reading fluency assessments and with the

reading sub test scores from the CRCT. When the treatment group's post-test scores alone are correlated with CRCT scores, the results are still significant, $r(24) = .76$, $p < .000$.

The results from this study indicated that the post-test scores on both the Oral reading fluency assessment and to a lesser sense the Maze word comprehension assessment scores could be used to plot a pattern of linearity between individual student scores and performance levels on the CRCT. These findings are consistent with the study by Ardoin et.al (2004) where they recommended using CBM-Maze probes for purposes for identifying early intervention for students with reading difficulties. This is similar to using the curriculum based measurements during the fall to assess the appropriate intervention level for students within the response to intervention (RTI) process. Results from initial curriculum based measurements like the Maze or Oral reading fluency assessments could be use to identify and place students in differentiated learning groups or tier levels which correspond to their instructional needs.

Limitations of the Study

The findings of this study were consistent with most research and did support the validity and effectiveness of curriculum-based measurements as a means of collecting response data for use in the response to intervention process when coupled with a researched based instructional strategy. This investigation focused on middle grade students with and without disabilities who are at risk of academic failure due to skill deficits in reading. This investigation did provide meaningful information regarding the use of CBM and RTI strategies at the middle grade level for students who have significant deficits in reading comprehension and fluency. The results of the study did show significant correlations between the CRCT scores and CBM assessments. The study also validated the use of CBM as a response data source for the RTI process. The correlations did indicate that the use of CBM assessment is sensitive to performance change over

a relative short duration. However, there were some limitations to the study and concern should be used when making comparisons and generalizations regarding the findings to other settings and populations. The most obvious limitations are detail in the following paragraphs.

First, the sample of this study was comparatively small. There were only 50 students included in this study. The sample size may not be large enough to make generalizations to a larger population.

Second, this investigation was limited by a minimum sample size for an experimental study. It is recommend that the sample size be thirty if possible and not less than fifteen. This study had a sample size of two groups with twenty-five participants in each group. Having thirty or more in each sample when comparing the treatment factors and student performance on the two different types of assessments (Maze word comprehension and oral reading fluency) would have increased generalizations of the study to more settings.

Third, the present study did not have a sufficient number of student scores to calculate correlation coefficients as suggested by research standards. The study began with 60 students and lost 10 over the course of the investigation. Given the strength of the results of the treatment effect sizes, the researcher is confident that the reported correlations are acceptable for similar population and sample sizes if all similar variables are controlled for.

Fourth, the fidelity of the instructional procedures and student compliance were difficult to control at times. Consistency within a middle school setting is difficult to manage without rigid control of the educational setting. Interruptions in the schedule, student and teacher illnesses and other miscellaneous factors have to be taken into consideration.

Finally, the factor of frequency of curriculum based measurements was not evaluated because no control group receiving traditional reading instruction with weekly assessments

without the PALS intervention could be included. This was due to a limited population size and logistics. There was no inquiry about level transitions within the study due to the relative short duration of the study. This study concentrated on one researched based teaching strategy. The Peer Assisted Learning Strategy was a novel approach to these students. The activity was student centered and teachers input were at a minimum. The two teachers in this study monitor and felicitated the teams.

Implications for Future Research

The findings of this study were consistent with other research that measured the efficiency of curriculum based measurement as a progress monitoring component. It was shown in this study that the use of CBM assessments was sensitive to performance grow rate and that differentiated levels of instructions could be recommended. For example, decisions concerning who would be the "coach" (level 1) and who would be the "player" (level 2) demonstrated a simplified version of the RTI process. Students were assigned to different instructional levels based on CBM assessment data. The use of CBM within the response to intervention process for making appropriate instructional decisions for at risk middle grade students in the area of reading fluency and comprehension is not common. This investigation will hopefully increase the validity of the RTI process and support the central concepts defined by The National Joint Committee on Learning Disabilities (2005).

The research objective of this study was similar to that of Fuchs and Stecker (2000) who examined student instructional interventions based on individual progress-monitoring data. The study consisted of 22 special education teachers monitoring the math progress of 42 students in grades 2 through 8 with mild to moderate learning disability and emotional/behavior disability using curriculum-based measurement. The teachers made instructional adjustments for the 42

students based on curriculum-based measurement data along with instructional adjustments for a matched group of students. The results indicated that students for whom teacher's modified instructional adjustments based on those students' own CBM data performed significantly better on overall achievement test as compared to the students whose instructional adjustments were not based on their own data. However, there is an immediate need for additional research regarding different instructional practices and strategies across all content areas. This is especially true for reading interventions at the middle school level.

The National Joint Committee on Learning Disabilities (NJCLD, 2005) defined response to intervention (RTI) as a problem-solving approach process of corrective interventions that can support the production of data that will guide instruction and categorize students who may require remedial instruction or special education services. The NJCLD identified important concepts that need additional research within the process are (1) application of scientific, research-based interventions in general education; (2) measurement of student responses to the interventions; and (3) use of the response data to change the intensity or type of successive intervention (NJCLD, 2005).

Conclusions

In general, the findings of this research were similar to previous research studies and contributed to the research base by providing additional data on the use of CBM and researched based instructional strategies at the middle school level. This study was designed to investigate the validity and effectiveness of curriculum-based measurements as a means to gather response data for use in the response to intervention process when paired with a researched based instructional strategy. This investigation focused on middle grade students with and without disabilities who are at risk of academic failure due to skill deficits in reading. This investigation did provide

meaningful information regarding the use of CBM and RTI strategies at the middle grade level for students who have significant deficits in reading comprehension and fluency. The findings of the study did derive significant correlations between the CRCT scores and CBM assessments. The study also showed that CBM measurements were a reliable response data source for the RTI process. There were significant improvements in performance for the treatment group receiving the PALS intervention with CBM assessments when compared with the control group. However, the study was not without limitations and these should be addressed in further research studies. There is a need for additional research regarding different instructional practices and strategies across all content areas. This is especially true for research focusing on Curriculum Based Measurements (CBM) as an instrument to facilitate the response to intervention (RTI) process for students who are at the middle school.

REFERENCES

Allinder, R. M. (2001). Improving fluency in at-risk readers and students with learning disabilities. *Remedial & Special Education*, 22(1), 48-55.

Allinder, R., Bolling, R., Oats, R., & Gagnon, W. (2000). Effects of teacher self-monitoring on implementation of curriculum-based measurement and mathematics computation achievement of students with disabilities. *Remedial & Special Education*, 21(2), 219-226.

Begeny, J. C., & Martens, B. K. (2006). Assisting Low-Performing Readers with a Group-Based Reading Fluency Intervention. *School Psychology Review, 35*(1), 91-97.

Benjamin S., & Burn M.K. &, Madyun N.H. &, Lail K.E. (2006). Relationship of reading fluency assessment data with state accountability test scores: A longitudinal comparison of grade levels. *Psychology in the Schools, 43*(5), 527-535.

Burns, M. K., Appleton, J. J., & Stehouwer, J. D. (2005). Meta-analytic review of responsiveness-to-intervention research: examining field-based and research-implemented models. *Journal of Psychoeducational Assessment, 23*(4), 381.

Case, L. P., Speece, D. L., & Molloy, D. E. (2003). The Validity of a Response-to-Instruction Paradigm to Identify Reading Disabilities: A Longitudinal Analysis of Individual Differences and Contextual Factors. *School Psychology Review, 32*(4), 557-583.

Calhoon, M. B., & Fuchs, L. S. (2003). The effects of peer-assisted learning strategies and curriculum-based measurement on the mathematics performance of secondary students with disabilities. *Remedial and Special Education, 24*(4), 235-246.

Clarke, B., & Shinn, M. R. (2004). A preliminary investigation into the identification and development of early mathematics curriculum-based measurement. *School Psychology Review*, 33, 234-248.

Deno, S. L. (1985). Curriculum-based measurement: The emerging alternative. *Exceptional Children*, 52, 219–232.

Deno, S. L., & Fuchs, L. S. (1987). Developing curriculum-based measurement systems for data-based special education problem solving. *Focus on Exceptional Children*, 19(8), 1–16.

Deno, S. L., Fuchs, L. S., Marston, D. & Shin, J. (2001). Using curriculum-based measurements to establish growth standards for students with learning disabilities. *School Psychology Review*, 30(4), 507-525.

Deno, S., Mirkin, P., & Chiang, B. (1982). Identifying valid measures of reading. *Exceptional Children*, 49, 36-45.

Deno, S., Mirkin, P. & Wesson, C. (1984). How to write effective data-based IEPs. *Teaching Exceptional Children*, 12, 99-104.

Elliott, S. N. & Fuchs, L. S. (1997). The utility of curriculum-based measurement and performance assessment as alternatives to traditional intelligence and achievement tests. *School Psychology Review*, 26, 224-236.

Englert, C. S., & Thomas, C. C. (1987). Sensitivity to Text Structure in Reading and Writing: A Comparison between Learning Disabled and Non-Learning Disabled Students. *Learning Disability Quarterly, 10*(2), 93-105.

Espin, C., Scierka, B., Skare, S., & Halverson, N. (1999). Criterion-related validity of curriculum-based measures in writing for secondary school students. *Reading & Writing Quarterly*, 15(1), 5-28.

Espin, C. A., & Tindal, G. (1998). Curriculum-based measurement for secondary students. In M. R. Shinn (Ed.), Advanced applications of curriculum based measurement (pp. 214-253). New York: Guilford Press.

Faykus, S., & McCurdy, B. (1998). Evaluating the sensitivity of the maze as an index of reading proficiency for students who are severely deficient in reading. *Education & Treatment of Children*. 21(1), 1-21.

Fewster, S. & Macmillan, P. (2002). School-based evidence for the validity of curriculum-based measurement of reading and writing. *Remedial & Special Education*, 23(3), 149-158.

Forness, S., Kavale, K., Blum, I., & Lloyd, J. (1997). What works in special education and related services: Using meta-analysis to guide practice. *Teaching Exceptional Children*, 29(6), 4-9.

Fuchs, D., & Fuchs, L. S. (2006). Introduction to response to intervention: What, why, and how valid Is It? *Reading Research Quarterly, 41*(1), 93-99.

Fuchs, D., & Deshler, D. D. (2007).What we need to know about responsiveness to intervention (and shouldn't be afraid to ask). *Learning Disabilities Research & Practice, 22*(2), 129-136.

Fuchs, L. S., Fuchs, D., & Hollenbeck, K. N. (2007). Extending responsiveness to intervention to mathematics at first and third Grades. *Learning Disabilities Research & Practice, 2*(1), 13-24.

Fuchs, L. S., Fuchs, D., & Kazdan, S. (1999). Effects of peer-assisted learning strategies on high school students with serious reading problems. *Remedial and Special Education, 20*(5), 309-318.

Fuchs, L. (2004). The past, present, and future of curriculum-based measurement research. *School Psychology Review*, 33(2), 188-192.

Fuchs, L. S., Fuchs, D., & Karns, K. (2001). Enhancing kindergartners' mathematical development: effects of peer-assisted learning strategies. *The Elementary School Journal, 101*(5), 495-510.

Fuchs, L. S., & Deno, S. L. (1991). Paradigmatic distinctions between instructionally relevant measurement models. *Exceptional Children*, 58, 232-243.

Fuchs, L., & Fuchs, D. (1990). The role of skills analysis in CBM in math. *School Psychology Review*, 19(1), 6-23.

Fuchs, L., Fuchs, D. (1991). Effects of expert system advice within curriculum-based measurement on teacher planning and student achievement in spelling. *School Psychology Review*, 20(1), 49-60.

Fuchs, L. S., Fuchs, D., Kazdan, S., & Allen, S. (1999). Effects of peer-assisted learning strategies in reading with and without training in elaborated help giving. *The Elementary School Journal, 99*(3), 201-219.

Fuchs, L., Deno, S., & Mirkin, P. (1984). Effects of frequent curriculum-based measurement and evaluation on pedagogy, student achievement, and student awareness of learning. *American Educational Research Journal*, 21, 449-460.

Fuchs, L. & Fuchs, D. (1984). Criterion-referenced assessment without measurement: How accurate for special education. *Remedial and Special Education*, 5, 29-32.

Fuchs, L. & Fuchs, D. (1986). Effects of systematic formative evaluation: A meta-analysis. *Exceptional Children*, 53, 199-208.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Thompson, A., Roberts, H., Kubec, P., & Stecker, P. (1994). Technical features of a mathematics concepts and applications curriculum-based measurement *s*ystem. *Diagnostique*, 19(4), 23-49.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Phillips, N. B., & Bentz, J. (1994). Class wide curriculum-based measurement: Helping general educators meet the challenge of student diversity. *Exceptional Children*, 60, 518-537.

Fuchs, L. S., Fuchs, D., Phillips, N. B., Hamlett, C. L., & Karns, K. (1995). Acquisition and transfer effects of class wide peer-assisted learning strategies in mathematics for students with varying learning histories. *School Psychology Review, 24*(4), 604-620.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Phillips, N. B., Karns, K., & Dutka, S. (1997). Enhancing students' helping behavior during peer-mediated instruction with conceptual mathematical explanations. *The Elementary School Journal, 97*(3), 223-249.

Fuchs, L. S., & Fuchs, D. (1992). Identifying a measure for monitoring student reading progress. *School Psychology Review*, 21 (1), 45-58.

Fuchs, D., Roberts, P. H., Fuchs, L. S., & Bowers, J. (1996). Reintegrating students with learning disabilities into the mainstream: A two-year study. *Learning Disabilities Research & Practice*, 11, 214-229.

Fuchs, D., Fuchs, L. S., Mathes, P. G., & Simmons, D. C. (1997). Peer-assisted learning strategies: making classrooms more responsive to diversity. *American Educational Research Journal, 34*(1), 174-206.

Fuchs, L.S., & Fuchs, D. (1997). Use of curriculum-based measurement in the identification of students with disabilities. *Focus on Exceptional Children*, 30(3), 1-16.

Fuchs, L. S., & Fuchs, D. (1999). Monitoring student progress toward the development of reading competence: A review of three forms of classroom-based assessment. *School Psychology Review*, 28, 659–671.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Stecker, P. M. (1991). Effects of curriculum-based measurement and consultation on teacher planning and student achievement in mathematics operations. *American Educational Research Journal*, 28, 617-641.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Stecker, P. (1990). The role of skills analysis in curriculum-based measurement in math. *School Psychology Review*, 19, 6-22.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Walz, L., & Germann, G. (1993). Formative evaluation of academic progress: How much growth can we expect? *School Psychology Review*, 22 (1), 27-48.

Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading*, 5, 239–256.

Fuchs, D. & Fuchs, L. S. (1997). Use of curriculum-based measurement in identifying students with disabilities. *Focus on Exceptional Children*, 30, 1-16.

Germann, G., & Tindal, G. (1985). Applications of direct and repeated measurement using curriculum based assessment. *Exceptional Children*, 51 (2), 110-121.

Good, R. H. III &Jefferson, G. (1998). Contemporary perspectives on Curriculum-Based Measurement Validity. In M. R. Shinn (Ed.), Advanced applications of curriculum-based measurement (pp. 61–88). New York: Guilford.

Good, R. H., Simmons, D. C., & Kame'enui, E. J. (2001). The importance and decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third grade high-stakes outcomes. *Scientific Studies of Reading*, 5(3), 257-288.

Good, R. H., Simmons, D. C.,& Smith, S. (1998). Effective academic interventions in the United States: Evaluating and enhancing the acquisition of early reading skills. School *Psychology Review*, 27, 45–56.

Gresham, F. M., MacMillan, D. L., & Bocian, K. M. (1996). Learning disabilities, low achievement, and mild mental retardation: More alike than different? *Journal of Learning Disabilities*, 29 (6), 570-581.

Grimes, J. & Tilly, W.D., (1996). Policy and process: Means to lasting educational change. *School Psychology Review*, 25, 465-476.

Hargrove, L., Church, K., Yssel, N., & Koch, K. (2002). Curriculum-based: Reading and state academic standards. *Preventing School Failure*, 46(4), 148-152.

Hintze, J. M., & Silberglitt, B. (2005). A Longitudinal Examination of the Diagnostic Accuracy and Predictive Validity of R-CBM and High-Stakes Testing. *School Psychology Review, 34*(3), 372-386.

Hintze, J. M., Callahan, J. E., III, Matthews, W. J., Williams, S. A., & Tobin, K. G. (2002). Oral reading fluency and prediction of reading comprehension in African American and Caucasian elementary school children. *School Psychology Review*, 31, 540-553.

Hintze, J. M, Owen, S. V., Shapiro, E. S., & Daly, E. J., III. (2000). Generalizability of oral reading fluency measures: Application of g theory to curriculum- based measurement. *School Psychology Quarterly, 15,* 52-68.

Hintze, J. M., & Shapiro, E. S. (1997). Curriculum-based measurement and literature-based reading: Is curriculum-based measurement meeting the needs of changing reading curricula? *Journal of School Psychology, 35*, 351-375.

Hintze, J., Shapiro, E., & Lutz, J. (1994). The effects of curriculum on the sensitivity of curriculum-based measurement in reading. *The Journal of Special Education,* 28, 188-202.

Howell, K. W. & Nolet, V. (2000). Curriculum-*based evaluation: Teaching and decision making (Third Edition).* Belmont, CA: Wadsworth Publishing Company.

Helwig, R., Anderson, L., & Tindal, G. (2002). Using a concept-grounded, curriculum-based measure in mathematics to predict statewide test scores for middle school students with LD. *The Journal of Special Education*, 36(2), 102-112.

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

Kaminski, R. A., & Good, R. H., III. (1996). Toward a technology for assessing basic early literacy skills. *School Psychology Review*, 25, 215–227.

Marston, D. B. (1989). *A curriculum-based measurement approach to assessing academic performance: What it is and why do it.* In Mark R. Shinn Curriculum-Based Measurement: Assessing Special Children. New York: The Guilford Press.

Marston, D., & Magnusson, D. (1985). Implementing curriculum-based measurement in special and regular education settings. *Exceptional Children*, 52 , 266-276.

Marston, D. B., Mirkin, P.K., & Deno, S. L. (1984). Curriculum-based measurement: An alternative to traditional screening, referral, and identification. *The Journal of Special Education*, 18, 109-117.

Martson, D., Muyskens, P., Lau, M., Canter, A. (2003). Problem-solving model for decision making with high-incidence disabilities: The minneapolis experience. *Learning Disabilities Research & Practice*, 18, 197-200.

Madeline, A., & Wheldall, K. (1998). Towards a curriculum-based passage reading test for monitoring the performance of low-progress readers using standardized passages: A Validity study. *Educational Psychology*, 18(4), 471-479.

Mastropieri, M. A., Scruggs, T., Mohler, L., Beranek, M., Spencer, V., Boon, R. T., et al. (2001). Can Middle School Students with Serious Reading Difficulties Help Each Other and Learn Anything? *Learning Disabilities Research and Practice, 16*(1), 18-27.

Mathes, P., Howard, J., Allen, S., & Fuchs, D. (1998). Peer-assisted learning strategies for first-grade readers: responding to the needs of diverse learners. *Reading Research Quarterly, 33*(1), 62-94.

Mathes, P. G., & Babyak, A. E. (2001). The effects of peer-assisted literacy strategies for first-grade readers with and without additional mini-skills lessons. *Learning Disabilities Research and Practice, 16*(1), 28-44.

Mathes, P. G., & Fuchs, L. S. (1993). Peer-mediated reading instruction in special education resource rooms. *Learning Disabilities Research and Practice, 8*(4), 233–243.

Mathes, P. G., Torgesen, J. K., & Allor, J. H. (2001). The effects of peer-assisted literacy strategies for first-grade readers with and without additional computer-assisted instruction in phonological awareness. *American Educational Research Journal, 38*(2), 371.

Naquin, G., & Slider, N. (2002). Moving beyond total words written: The reliability, criterion validity, and time cost of alternate measures for curriculum-based measurement in writing. *School Psychology Review*, 31(4), 477-497.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal Teaching of Comprehension-Fostering and Comprehension-Monitoring Activities. *Cognition and Instruction, 1*(2), 117-175.

Rapp, D. N., Broek, P. v. d., McMaster, K. L., Kendeou, P., & Espin, C. A. (2007). Higher-Order Comprehension Processes in Struggling Readers: A Perspective for Research and Intervention. *Scientific Studies of Reading, 11*(4), 289 - 312.

Samuels, C. (2006, November 8). Ed. Dept. backs research plans for RTI method. *Education Week*, *26*(11), 20-22.

Scott, V., & Weishaar, M. (2003). Curriculum-based measurement for reading progress. *Intervention In School and Clinic*, 38(3), 153-159.

Shinn, M. R. (1989*). Curriculum-based measurement: Assessing special children.* New York, NY: the Guilford Press.

Shinn, M.R. (1998). *Advanced applications of curriculum-based measurement*. New York, NY: the Guilford Press.

Shin, J., Deno, S., & Espin, C. (2000). Technical adequacy of the maze task for curriculum-based measurement of reading growth. *Journal of Special Education*, 34(3), 164-173.

Shinn, M. R., & Good, R. H. (1992). Curriculum-based measurement of oral reading fluency: A confirmatory analysis of its relation to reading. *School Psychology Review,* 21(3), 459-480.

Shinn, M., Good, R., & Parker, C. (1999). *Non-categorical special education services with students with severe achievement deficits.* In D. J. Reschly, W.D. Tilly, & J. P. Grimes (Eds.), *Special Education in Transition* (pp. 81-105). Longmont, CO: Sopris West.

Shinn, M., Good, R., Knutson, N., Tilly, W., & Collins, V. (1992). Curriculum-based measurement or oral reading fluency: A confirmatory analysis of its relation to reading. *School Psychology Review*, 21, 459-479.

Shinn, M., Good, R., & Stein, S. (1989). Summarizing trend in student achievement: A comparison of models. *School Psychology Review*, 18, 356- 370.

Shinn, M. & Hubbard, D. (1992). Curriculum- based measurement and problem solving assessment: Basic procedures and outcomes. *Focus on exceptional children*, 24(5), 1-20.

Simmons, D. C. (1995). Importance of instructional complexity and role reciprocity to class wide peer tutoring. *Learning Disabilities Research and Practice, 9*(5), 387-408.

Simmons, D. C., Fuchs, L. S., Fuchs, D., Mathes, P., & Hodge, J. P. (1995). Effects of explicit teaching and peer tutoring on the reading achievement of learning-disabled and low-performing students in regular classrooms. *The Elementary School Journal, 95*(5), 387-408.

Tilly, W., & Carlson, S. (1992). Creating measurement materials. In M. R. Shinn, N. Knuston , & W.D. Tilly (Eds.), Curriculum-based measurement training modules. Eugene: University of Oregon.

Tindal, G. A., & Marston, D. B. (1990). *Classroom-based Assessment: Evaluating Instruction Outcomes.* Columbus, OH: Merrill Publishing Company.

Tindal, G., McDonald, M., Tedesco, M., Glasgow, A., Almond, P., Crawford, L., & Hollenbeck, K. (2003). Alternate assessments in reading and math: Development and validation for students with significant disabilities. *Exceptional Children*, *69*(4), 481-494.

U.S. Department of Education. (2001). 22nd Annual Report to Congress on the Implementation of IDEA. Washington, D.C.

U.S. Department of Education. (2002). No Child Left Behind Education Act. Washington, D.C.

Vellutino, F. R., Scanlon, D. M., Small, S., & Fanuele, D. P. (2006). Response to intervention as a vehicle for distinguishing between children with and without reading disabilities: evidence for the role of kindergarten and first-grade interventions. *Journal of Learning Disabilities, 39*(2), 157-169.

Appendix A

Sample of Maze reading passage

Books were everywhere, and Mrs. Tuttle, the person responsible for the books, was getting frantic. Her predicament started in October when (odd, hair, **she**) found the book supply running low.(Her, That, **Mrs.**) Tuttle was a very organized person. (**She**, Even, Only) ordered more
books immediately, requesting that (**they**, more, all) be delivered by air. Air mail (cup, **was**, just) always the speediest way to receive (mail, **books**, cloud). By November, it was obvious that (morning, uniform, **someone**) messed up somewhere. She was sure (age, get, **she**) had not ordered this many books!

(**As**, By, He) usual, flocks of birds delivered the (show, **books**, lemon). Mrs. Tuttle would find the birds (disregard, waiting, **gathered**) on the steps of her library (her, **in**, the) the morning. Each bird would flap (one, saw, **its**) wings and remove the leather bound (**books**, around, caught) tied to its legs by straps (was, to, **of**) ribbon. They would wait for her (it, **to**, or) unlock the doors with her skeleton (dew, less, **key**). Some days they were not patient, (low, **and**, had) they would peck holes in her (bead, gift, **socks**). She would end up shouting, "Stop! (do, **I**, as) am moving as quickly as I (way, **can**, but)!"
Mrs. Tuttle was usually cool and (necklace, abruptly, **composed**), but now she was beside herself (hues, **with**, way) worry. She did not have enough (black, once, **room**) in her library for this many (middle, **books**, path).

"That's it! I've had enough! Someone (**will**, deny, true) have to call off these birds," (box, **Mrs.**, all) Tuttle screamed one afternoon. A flock (had, so, **of**) flamingoes with packs of dictionaries had (back, **just**, held) stumbled through the doors. She marched (lost, best, **over**) to the telephone, dialed, and waited. (**She**, Page, Back) tapped her foot in annoyance. "Hello, (gift, black, **this**) is Mrs. Tuttle from the library. (Outside, **Someone**, Pasture) will have to call off this (attention, stockings, **multitude**) of birds. I have more than (someone, **enough**, already) books."

"You can never have enough (**books**, share, black)," said the person who answered the (cheerless, completely, **telephone**). The voice sounded different to Mrs. (woman, **Tuttle**, clouds), as if the speaker had a (**beak**, lost, sugar).

"I have stacks of books here (explain, **taller**, mundane) than I am," Mrs. Tuttle huffed. (White, **Just**, Soon) then a hummingbird fluttered by her (intricate, dreamed, **shoulder**) carrying a tiny book of poems. (Told, They, **Mrs.**) Tuttle gave the bird one of (that, **her**, saw) sternest looks, but instead of flying (where, many, **away**), the bird began to chirp and (**sing**, when, calm). Mrs. Tuttle sighed and slowly hung (bow, **up**, far) the receiver.
"My, you're pretty," she (ash, **told**, slice) the hummingbird. "Can you help me (fantasized, surrounds, **straighten**) out this mess?"

Appendix B

Samples of Oral Reading Fluency Test

After moving to a new town, nine-year-old Samantha and her twelve-year-old brother Robert had heard of an old toboggan slide from some of the other neighborhood children. They decided they needed to check it out. Supposedly, it was on the northern side of the peninsula in the middle of the lake behind their new home.

Paddling lazily, they headed across the lake in their canoe. Just as they had been told, there was the decrepit, wooden-framed toboggan slide. The slide itself was barely wide enough to fit a toboggan. It left only a couple of inches to spare on either side before adjoining a short, wooden sidewall about six inches in height that kept the toboggans from falling off. Hundreds of steep steps climbed the shoreline to the top of the slide. Looking down from the top, it was evident that the slide abruptly ended approximately six feet above the water.

Since they didn't have a toboggan, they improvised with a piece of cardboard. Robert went first and flew down the slide. He used his feet against the side rails to stop the contraption before catapulting himself into the muddy water below. Samantha went next but her momentum was too great and she shot off the edge into the water. Samantha's immediate thought after bobbing to the surface was "Blood-suckers!" Her second thought was, "This is all Robert's fault!" She frantically climbed out of the water and ripped off her socks and shoes to look for blood sucking worms. After finding none, but fearing they were still lurking in her shoes, she refused to put them back on.

"Put your shoes on," Robert insisted. "Put your shoes on or you'll never be able to walk back to the canoe." Samantha refused. Finally, either from a desire to be gallant or from fear of repercussions from their parents, Robert picked up Samantha. He carried her to the canoe and quickly paddled home. After a steamy bath and the reassurance that there weren't any blood-sucking worms hidden anywhere, Samantha told the story to their parents with a great deal of enthusiasm. She forgot entirely that she had originally blamed Robert for everything and made him the hero of her story.

Appendix C

Sample of Oral Reading Fluency Test

Jamie always hates having his picture taken because of his face full of freckles and wild red hair that can never be tamed. He thinks he looks funny in any photograph, but school pictures always seem to turn out to be the worst of all.

The photographer of last year's school pictures used a red backdrop and the only things that appeared on Jamie's pictures were his white teeth and bright green eyes.

Jamie already knows this year's school pictures aren't going to be any better than his pictures from last year. Apparently, the photographer brought an orange backdrop today and Jamie can already hear some kids snickering at him from the line of kids behind him.

Finally, it's finally Jamie's turn. He sits down on the stool and gives the photographer a tiny smile. The only thing he wants to do is get the picture taken and get back to class. However, that's not what happens as the photographer presses the button to take Jamie's picture. One moment Jamie is sitting on the stool, and the next he is being sucked into the camera's memory.

With a gasp, Jamie lands in the middle of a dusty savannah. The photographer must have been to Africa recently to take pictures of lions. As Jamie slowly rises to his feet, he finds he is amongst a pride of golden lions. The king of the lions roars in Jamie's face and bats at him with his gigantic paws.

"Yikes! Get me out of here," Jamie shouts nervously.

Suddenly, he is high in a tree in a rain forest. While reaching for a branch to steady him, Jamie loses his balance and nearly falls to the ground. Luckily enough, he manages to grab onto a hanging vine just in the nick of time.

"Take me back to the school cafeteria right now!" Jamie bellows, swinging through the air as he swoops past sleeping pythons and monkeys.

In a flash Jamie is back in school, lying on the ground with his teacher and classmates gathered around him. All he can see now are worried faces.

"What happened, Jamie? Are you okay?" his teacher asks.

"Nothing. I'm fine," Jamie says as he pulls himself to his wobbly feet. "I just decided I'm going to be a photographer when I grow up. The idea sort of knocked me off my seat."

Appendix D

Qualitative Features Checklist

Student Name:_____

Rater:_____

Date:_____

Testing Material:_____

After listening to the student read connected text, judge the degree to which you observe these important

features of successful reading. Note that some features may not be observed.

_____ Reads fluently or efficiently.

_____ Reads very accurately (> 95%).

_____ Has an effective strategy for unknown words.

_____ Reading errors preserve rather than distort meaning.

_____ Reads with expression (attention to prosodic features).

_____ Self-corrects errors (comprehension self-monitoring).

_____ Adjusts pace when complexity or “considerateness” of text changes.

Additional Comments:

_____

_____

Appendix E

Accuracy of Implementation Rating Scale (AIRS)

Examiner:_____

Observer:_____

X = completed accurately O = incorrect	Observations				
	1	**2**	**3**	**4**	**5**
Places student copy in front of reader.	___	___	___	___	___
Places examiner copy out of view of reader.	___	___	___	___	___
Seated appropriate distance from reader.	___	___	___	___	___
Says standardized directions.	___	___	___	___	___
Says “Begin”.	___	___	___	___	___
(after student says first word).					
Marks errors on examiner copy.	___	___	___	___	___
Times accurately for 1 minute.	___	___	___	___	___
Stays “Stop”.	___	___	___	___	___
Stops stopwatch.	___	___	___	___	___
Marks last word read with a bracket.	___	___	___	___	___
Turns off tape recorder (optional).	___	___	___	___	___
Records score as WRC/Errors.	___	___	___	___	___

Appendix F

The University of Georgia

College of Education
Department of Special Education
Parental Permission Form

I agree to allow my child, _____, to take part in a research study titled, "Using Curriculum based Measurements and Response to Intervention in Middle Grades with Students Who Are at Risk of Academic Failure in Reading." which is being conducted by Mr. Danny McFay from the Special Education Department at the University of Georgia (706-542-4571) under the direction of Dr. Cecil Fore III. I understand that participation in this study is voluntary. I do not have to allow my child to be in this study if I do not want to. My child may stop taking part at any time without giving any reason, and without penalty. I can ask to have the information related to my child returned to me, removed from the research records, or destroyed.

The following points have been explained to me:

- The reason for the study is to find out how well weekly reading fluency and comprehension assessments can identify problems in reading.

- Benefits: Children who take part may improve their reading skills. The researcher also hopes to learn something that may help other children improve their reading fluency and comprehension.

- If I allow my child to take part in the research, my child will be asked to participate in weekly reading fluency and reading comprehension assessment. The researcher will ask my child to do these activities each week for 10 minutes for six weeks. This activity will take place during the regular reading time and will not interfere with normal lessons. If I do not want my child to take part then she/he will be allowed to study as usual.

- The research is not expected to cause any harm or discomfort to participants. My child can quit at any time. My child's grade will not be affected if my child decides not to participate or to stop taking part.
- No individually-identifiable information will be collected about my child. My child's identity will be coded so that no one will be identified.
- The researcher will answer any questions about the research, now or during the course of the project, and can be reached by telephone at (706-208-3552). I may also contact the professor supervising the research, Dr. Cecil Fore III, Department of Communication Sciences and Special Education, at 542-4571.
- I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.
-

_____ _____ _____
Name of Parent or Guardian *Signature* *Date*

Please sign both copies, keep one and return one to the researcher.

Appendix G

The University of Georgia
College of Education
Department of Communication Sciences and Special Education

Minor Assent Form

11-17-07

Dear Student,

You are invited to participate in my research project titled, "Using Curriculum Based Measurements and Response to Intervention in Middle Grades with Students Who Are at Risk of Academic Failure in Reading." This project will help me learn how to better plan and assess your reading skills.

If you decide to be part of this, you will allow me to work with you on your reading skills. You will be given weekly reading fluency and comprehension assessments. These assessments will only last about 10 minutes each week. Your participation in this project will not affect your grades in school. I will not use your name on any papers that I will write about this project. Your participation in this project may improve your reading skills. I hope to learn something about reading fluency and comprehension that will help other children in reading in the future.

If you want to stop participating in this project, you are free to do so at any time. You can also choose not to answer questions that you don't want to answer.

If you have any questions or concerns, you can always ask me or call my advisor, Dr. Cecil Fore III at the following number: 706-542-4571

Sincerely,

Danny D. McFay
Department of Communication Sciences and Special Education

I understand the project described above. My questions have been answered and I agree to participate in this project. I have received a copy of this form.

_____
Signature of the Participant/Date

Please sign both copies, keep one and return one to the researcher.

Appendix H

PALS Activity Sheet

Coach_____ Player_____ Date_____

Reading Passage _____ pages_____

1. Coach and Player will read aloud 10 minutes each. The coach should listen for errors in reading and make notes of them. The coach will read first and then the player will read.

2. List words were not pronounced correctly or unknown. Please discuss what the words mean and how are they used in the passage.

3. The player will write in 10 or less words the main topic of the story.
_____
_____

4. The coach will ask the player to make a prediction about what may happen next in the story.

5. The coach will ask 3 comprehension questions regarding the reading passage.

Questions a_____

b_____

c_____

WPM Player_____ Coach _____
List words: _____

Appendix I
Vita

Danny Dale McFay
160 Vineyard Drive
Athens, Ga. 30607
(706) 613-8492
E-mail: danmcfay@gmail.com

Academic History

Due to receive Ph D. in Special Education from University of Georgia
May, 2008

Master of Science, Georgia Southwestern University
October, 1990

Bachelor of Arts Philosophy, Valdosta State University
July, 1984

Associates of Arts Philosophy, Darton College
June, 1982

Work Experience

Jackson County School System

Aug. 2007-Present
Special Education Collaborative Teacher
Leadership Team Member
Peer-Mediation Counselor
Cross-Country Coach for 2008-2009

Rutland Academy

Aug. 2005 to July 2007
Middle and High School Coordinator and Director of Children Services

University of Georgia Special Education Department

Teaching Assistant in the SetWeb and WebCT program.

Greene County Board of Education

Aug. 1993 to July 2005
Special Education Teacher in collaborative teaching model
High-School Volley Ball Coach 2000-2001

Oak Tree Children's Center Psychoeducational Program

Oct. 1987 to July 1993
Special Education Teacher

Chatham County Board of Education

January 1987- July 1987
8th grade Social Studies Teacher

Professional Presentations

Georgia Council for Exceptional Children Conference. *Differentiating Behavioral Characteristics of Students with SEBD and ODD Diagnosis.* Presented at State CEC Conference in Savannah, Ga., November, 2005.

Georgia's State Special Education Directors Conference. *Collaborative Teaching Model.* Presented at the Special Education Directors Conference in Macon, Ga. 2000.

U.S. Naval Academy's Conference on Foreign Affairs. *Protecting the United States of America's Right to Assess to Energy.* Paper presented at the U.S. Naval Academy, 1983.

Professional Memberships

Council for Exceptional Children- current member