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Identifying the Relationship Between the Map and WJ-III Reading Tests to Make Instructional Decisions Within a RTI Framework

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IDENTIFYING THE RELATIONSHIP BETWEEN THE MAP AND WJ-III READING TESTS TO MAKE INSTRUCTIONAL DECISIONS WITHIN A RTI FRAMEWORK

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IDENTIFYING THE RELATIONSHIP BETWEEN THE MAP AND WJ-III READING TESTS TO MAKE INSTRUCTIONAL DECISIONS WITHIN A RTI FRAMEWORK

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The current study explored the relationship between the reading tests of the Measures of Academic Progress (MAP), a screening test, and the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III), a diagnostic academic achievement test. By examining the relationship between these two tests, more reliable instructional decisions within a Response to Intervention (RTI) framework can potentially be established. Reading scores were collected for 234 students who completed the MAP three times per year both in first and second grades. One hundred of those students were randomly selected and administered the five reading subtests of the WJ-III in the spring of their second grade year. Results indicate that first and second grade MAP scores were significantly and positively correlated at a moderate to strong level with the Basic Reading, Reading Comprehension, and Reading Fluency scores of the WJ-III. The area from the WJ-III with the highest correlation with the MAP scores was Reading Comprehension. For the area of Reading Comprehension, cutoff scores at the 20th percentile and adjusted cutoff scores determined through regression analysis were evaluated using sensitivity, specificity, and positive and negative predictive values. Results indicate that adjustments increased specificity, but sensitivity values remained poor. Results of the study should be regarded with caution, as they could be potentially skewed due to the small sample size. It is recommended that this study be replicated using a larger sample size to verify the findings.

CHAPTER I: INTRODUCTION

Student reading progress is of great interest to local, state, and federal education agencies. An Internet search for reading statistics within the state of Kentucky and nationally revealed that state and federal organizations exert an abundant amount of time and effort into collecting data that allows reading progress to be tracked and compared longitudinally and nationally. Documents written by organizations such as the Kentucky Department of Education, the Kentucky Reading Association, and the National Center for Education Statistics (2009) publicize state and national reading data so that the general public is aware of how students are performing. While these documents keep the general public abreast of reading statistics, the data reveal alarming facts regarding the state of reading development both in Kentucky and nationwide.

Nationally, reading statistics published by the National Center for Education Statistics (NCES) in the National Assessment of Education Progress (NAEP) report indicate that only, "…one-third (33 percent) performed at or above *Proficient*" (NCES, 2009, p. 1). In Kentucky, 36% of students performed at or above the proficient level, 36% performed at the basic level, and 28% were below the basic level (NCES). The NAEP report specified, "Basic denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade. Proficient represents solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter. Advanced represents superior performance" (NCES, 2009, p. 5). Hence, nearly one-third of fourth graders do not read well enough to possess an adequate understanding of the material needed to competently complete grade-level tasks.

The amount of time, money, and energy that has been expended by multiple organizations both statewide and across the nation may entice some to ask the question: Why is there such an emphasis on learning to read? Reading is an integral part of literacy. As reported by Jennings and Whitler (1997), adults with higher literacy skills are more prone to gain employment and have an increased ability to support themselves and their families versus those with lower literacy skills. Lower levels of adult literacy translate into lower levels of literacy for their children as well. Jennings and Whitler stated the following, "…those with lower literacy levels are less likely to keep newspapers, magazines or books in the home. Thus, they run the risk of discouraging literacy development in their own children" (p. 4). Therefore, it may be assumed that a cycle of low literacy levels within families perpetuates itself without the intervention of an outside agency such as an educational organization.

Widespread concern regarding low literacy levels promoted national efforts to improve the situation. Specifically, the federal No Child Left Behind Act (NCLB, 2001); reports by the National Reading Panel (Armbruster, Lehr, & Osborn, 2001); and national college and career readiness goals and standards (National Center for Education Achievement, 2013) attempted to resolve the concerns related to academic competency. Each of these national efforts will be described in the following paragraphs.

The No Child Left Behind Act was signed into law in 2001. One purpose of NCLB is "…to ensure that every student can read at grade level or above not later than the end of grade 3" (Subpart 1 – Reading First; Sec. 1201). In order to ensure that every student is reading at or above grade level by the end of the third grade, school districts across the nation need to heavily emphasize reading skills the moment that students first

enroll in school. Schools were held accountable for student progress, and the use of scientifically based reading instruction programs was stressed.

Due to the emphasis on early instruction of reading skills, and early intervention efforts for children struggling with reading, research has been reviewed and summarized to guide educators on providing reading instruction to young children. The National Reading Panel provides publications that act as guides to educators on how to teach reading skills in such a way that a strong foundation is laid as a base for further reading instruction. "The Panel was charged with reviewing research in reading instruction (focusing on the critical years of kindergarten through third grade) and identifying methods that consistently relate to reading success" (Armbruster et al., 2001, p. i). Armbruster et al. (2001) identified five key elements as essential in teaching children to read, including: (1) phonemic awareness, (2) phonics, (3) fluency, (4) vocabulary, and (5) text comprehension. The researchers also provided examples for how educators can put the five key elements for the teaching of reading into practice.

Even with the passage of the No Child Left Behind Act in 2001 and the National Reading Panel's recommendations on teaching reading, all students across the United States continue to fall short of the goal of the national mandate to be reading at or above grade level by the end of the third grade (NCES, 2009). To renew the focus on academic competency, the National Center for Education Achievement (NCEA, 2013) was created to assist K-12 students attain College and Career Readiness (CCR). In 2010, the Kentucky Department of Education (KDE), in conjunction with the Kentucky Council on Postsecondary Education (CPE), prepared a document regarding College and Career Readiness in Kentucky. Within that document, Kentucky's definitions for college

readiness and career readiness were defined. College readiness was defined as "…the level of preparation a first-time student needs in order to succeed in a credit-bearing course at a postsecondary institution" (KDE & CPE, 2010, p. 7). Career readiness was defined as "…the level of preparation a high school graduate needs in order to proceed to the next step in a chosen career, whether that is postsecondary coursework, industry certification, or entry into the workforce" (KDE & CPE, 2010, p. 7). Based on the information on the NCEA (2013) website, the Kentucky definitions of college readiness and career readiness (KDE & CPE, 2010), and other articles related to college and career readiness (e.g., Dougherty, Mellor, & Smith, 2006), one can glean that a purpose of creating these readiness standards is to ensure that K-12 students receive the skills needed to successfully pursue their postsecondary goals and to navigate life after high school graduation.

In an NCEA brief regarding college readiness standards and the responsibility of K-12 school systems in educating students, Dougherty et al. (2006) stated that "…to have a chance at success, they must get students on track to reach those standards in elementary school, as getting academically behind students up to high academic standards later is difficult and costly" (p. 2). Based on this statement, it is evident that, in order for students to meet the CCR standards by the time they graduate from high school, they must first master the basic skills that are taught in elementary school. Thus, this initiative also highlights the importance of early interventions in reading.

The reading achievement level of students continues to be a concern, even though the federal government has charged state and local educational agencies with the goal of ensuring that all students read at or above grade level by the end of the third grade. It is

imperative that more is done to identify struggling readers at an early age. Academic interventions should be developed and implemented to meet the needs of struggling students so that they can read on grade level by the time they exit the third grade and can develop the skills that will one day allow them to meet the CCR standards. One possible solution for identifying struggling readers at an early age and intervening to remedy their reading skills may be the utilization of a Response to Intervention (RTI) model.

Individuals with Disabilities Education Improvement Act

The concept of Response to Intervention (RTI) was first referenced to in federal law within the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA, 2004). Section 300.307 of IDEA referred to the intervention process as "…response to scientific, research-based intervention..." Specifically, RTI was referenced within IDEA as a method for determining the existence of specific learning disabilities. Prior to RTI being identified by IDEA as one method for determining the existence of a specific learning disability, the discrepancy model was utilized. As is reported in IDEA, the discrepancy model required "…the use of a severe discrepancy between intellectual ability and achievement…" (§300.307).

Numerous concerns were voiced about the severe discrepancy model of identifying learning disabilities. Gresham, VanDerHeyden, and Witt (2005) stated the following, "The IQ-achievement discrepancy approach to determining which students have and do not have LD has numerous conceptual and measurement problems that seriously call into question its continued use in making eligibility determinations" (p. 7). In particular, concerns exist that the ability to measure hypothetical internal cognitive processing skills is inadequate and that there is too much focus on which specific children

with learning difficulties qualify, instead of focusing on intervention strategies for all struggling learners (Reschly, 2008).

The original 2001 white paper by Gresham et al. (2005) influenced the inclusion of RTI in IDEA (2004) as a method for identifying students with specific learning disabilities rather than continuing to rely on the use of the discrepancy model. Because IDEA allows for RTI to be used to determine specific learning disability eligibility, it is imperative that local educational agencies become adept at implementing RTI so that students will receive the full benefits available within this system.

While IDEA (2004) was the first federal law to refer to the use of a process that soon became termed as Response to Intervention, IDEA did not provide any guidance for how RTI should be implemented within schools. Educational publications, such as *Education Week*, began to print articles on RTI, and websites such as The National Center on Response to Intervention came into existence as a way to provide educational entities and other stakeholders with information on RTI. Technical assistance papers referencing the implementation of RTI were written. State educational agencies, such as the Kentucky Department of Education, launched websites to inform local educational agencies about the implementation of RTI. Even local educational agencies within Kentucky (and other states) began to build RTI pages on their websites in order to guide educators in their quest to implement RTI within schools and as a way to inform parents about this system of interventions. In the following section, a definition of RTI is provided, along with a brief explanation for what the process should entail when implemented in schools.

Response to Intervention

Many publications defined RTI using similar terminology. A technical assistance paper produced by the Bureau of Exceptional Education and Student Services (2006) stated that "RTI represents a systematic method for evaluating the needs of all students and for fostering positive student outcomes through carefully selected and implemented interventions" (p. 1). An article written by Stecker, Fuchs, and Fuchs (2008) stated that,

> Response to intervention (RTI) encompasses a process for evaluating whether students react to evidence-based instruction as expected. Typically considered a multitiered, prevention-intervention system, successive levels of instructional support are provided when a student's response to the academic program is sufficiently poor, particularly as compared to his or her peers' responses. (p. 10)

Finally, Ardoin, Witt, Connell, and Koenig (2005) noted, "In an RTI model, many students may be identified as at risk but only those who subsequently fail to respond adequately to empirically based interventions qualify for special education services" (p. 362).

While definitions of RTI were consistent, models and implementation practices varied across the country. To clarify key conceptual issues, Barnes and Harlacher (2008) distinguished between five key principles that are part of any RTI model and features that may vary between RTI models. The five principles of RTI are:

> (1) a proactive and preventative approach to education, (2) insuring an instructional match between student skills, curriculum, and instruction, (3) a problem-solving orientation and data-based decision making, (4) use of effective practices, and (5) a systems-level approach. (p. 419)

Barnes and Harlacher discussed four features of RTI: "(1) multiple tiers, (2) assessment system, (3) protocol, and (4) evidence-based instruction" (p. 420). Thus, the basic premise, or its foundation, remains constant across the nation. For example, RTI is implemented so that student progress can be monitored at regularly scheduled intervals, and instruction can be tailored to meet the specific needs of individual students. However, depending upon particular states, regions, and even districts, the specific features of RTI may vary. For instance, some districts emphasize the use of four tiers of RTI, while others may utilize a three-tiered approach. Some districts construct universal screening and progress monitoring probes to assess their students, while others use standardized tests produced by a testing company such as the Measures of Academic Progress, (MAP, NWEA, 2009).

Another feature of RTI that varies greatly is the method used by districts in deciding how to transition students between the tiers. Many districts emphasize that a team should meet at regular intervals to make decisions on individual student progress and interventions. However, no mandated time interval has been determined relative to when teams should meet. A plethora of names have emerged (e.g., student assistance teams, problem solving teams, child study teams) for teams that meet at regular intervals to discuss student progress. In sum, while most school personnel understand the basic principles underlying RTI, the features that make up RTI are vastly different between districts, and even within particular schools located in the same district. How schools choose to apply the features of RTI is what causes variances in implementation and, perhaps, in effectiveness.

RTI models typically consist of three tiers, as does the RTI model that has been implemented in the district where this dissertation research was conducted. The Bureau of Exceptional Education and Student Services (2006) stated that the core instructional program provided within a general education setting, labeled Tier I, should be a "…scientifically validated curriculum" (p. 4). Tier I also involves the assessment of all students' skills at least three times per year (e.g., fall, winter, spring) with a universal screening instrument to determine whether the child is performing at grade level. Students performing at or above grade level continue to receive instruction within Tier I of RTI.

Students who are not making progress, as determined by the universal screening instrument, may be moved to Tier II to receive supplementary interventions in conjunction with the instruction they are receiving through the core instructional program at Tier I. Tier II interventions are "…usually delivered in small groups…" and "…progress monitoring is conducted on a frequent and repeated basis (at least weekly)…" (Bureau of Exceptional Education and Student Services, 2006, p. 4) in order for informed instructional decisions to be made.

Tier II students who are not making progress, based on the weekly progress monitoring assessments, are moved to Tier III, which is for "Students who require intensive, small group, or individual interventions of longer duration to increase the rate of progress…" (Bureau of Exceptional Education and Student Services, 2006, p. 5). Students who do not make progress within Tier III may be referred for a special education evaluation.

The process for identifying students as eligible for special education services varies among states and even among school districts. Certain school districts use the RTI data to determine eligibility for a special education program, while others use RTI data to determine only which students should be referred for a more traditional special education evaluation. In the targeted school district that is the focus of this dissertation, RTI data are used to identify which students are in need of a referral for a special education evaluation. Students who are not making progress after Tier III interventions are likely to be referred for a special education evaluation, where a cognitive assessment (i.e., IQ test) and an academic achievement test are administered to determine whether a severe discrepancy exists between IQ and achievement. If a severe discrepancy is found, the special education decision-making team, the Admissions and Release Committee (ARC), is allowed to consider whether a student is eligible to receive special education services.

The Problem Statement

With the reauthorization of IDEA in 2004, RTI was listed as a method that could be utilized for determining the existence of specific learning disabilities; however, no mention was made on how to implement RTI within IDEA. Furthermore, the Kentucky Administrative Regulations (2008) do not provide guidance on how to implement RTI within Kentucky schools. This lack of information has led to an inconsistency across school districts on implementation of RTI, as well as confusion on the matter.

RTI programs can be used to regulate the provision of interventions and monitor interventions for students having both academic and behavioral concerns (Bureau of Exceptional Education and Student Services, 2006). In this study, however, RTI will refer only to academic interventions for students who are struggling in the area of

reading. Specifically, basic reading, reading fluency, and reading comprehension skills will be the academic skills that are the assessment focus within this research. These are the three areas of reading in which a student may qualify to have a specific learning disability in the state of Kentucky.

The purpose of this research is to evaluate a universal screener, Measures of Academic Progress (MAP, Northwest Evaluation Association, 2009), used by one Kentucky school district as the basis for identifying struggling readers within an RTI model. The district targeted in the current study utilizes a three-tiered RTI model similarly aligned to the model illustrated by the Bureau of Exceptional Education and Student Services (2006). Every student within the targeted district participates in RTI. Students performing on grade level, as determined by a universal screening measure (i.e., MAP) administered three times per year (i.e., fall, winter, spring) remain at Tier I and receive instruction only from the core reading program. The students scoring at or below the 20th percentile on the MAP assessment are considered at risk and are moved to Tier II of the RTI program to receive additional reading interventions in addition to the core reading program.

Generally, the progress of students at Tier II is monitored via oral reading fluency probes for a minimum of four weeks, while being administered one reading intervention at a time. If this reading intervention proves unsuccessful, then it is discontinued and another Tier II reading intervention is administered for a minimum of four weeks. The students in Tier II who fail to make progress after implementation of the second reading intervention are moved to Tier III to receive intensive reading interventions, in addition to instruction through the core reading program. Students placed in Tier III also have

their reading skills measured with oral reading fluency progress monitoring probes once per week to assess progress. These students also are administered one Tier III intervention for a minimum of four weeks. If this intervention proves unsuccessful, they are administered a second Tier III intervention for a minimum of four weeks. If a student progresses through Tier II and Tier III interventions with little or no improvement in reading ability, the next option would be to consider referral of the student for an evaluation for special education services.

According to IDEA (2004), a specific set of criteria must be followed in order to determine eligibility of a child for special education services for a specific learning disability. IDEA gives state educational agencies the flexibility to determine whether specific learning disability eligibility can be solely based on a student's response to intervention, or if the eligibility determination is based on the existence of a severe discrepancy between intellectual ability and achievement (i.e., discrepancy model). While students in the study must progress through the three tiers of RTI prior to referral for a special education evaluation, the determination of eligibility for a specific learning disability is made through the use of the discrepancy model. The student must exhibit a severe discrepancy between intellectual ability and achievement in order to qualify for special education services with a specific learning disability.

The targeted school district requires that an evaluation to assess for a specific learning disability in reading must include the administration of an individual academic achievement test. The most common achievement test utilized in this district to assess reading ability at the early primary grade levels is the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III, Woodcock, McGrew, & Mather, 2001). As the

MAP assessment is the universal screening instrument used to identify struggling students who may eventually be referred for special education services, it would be helpful to determine the relationship between MAP reading test scores and reading scores on the academic achievement test used to determine special education eligibility (i.e., WJ-III).

Purpose of the Study

A correlation of reading scores from the MAP test with the scores from the WJ-III tests will determine whether a relationship exists between the two instruments used by the district. If a significant and positive correlation is found, school districts may use the outcomes from this research study to become better equipped at selecting a more objective (i.e., data-based) cutoff score on the MAP assessment. The use of a more appropriate cutoff score will ensure that those students who may be transitioned to Tier III of RTI and referred for a special education evaluation are more likely to display reading skills low enough to qualify for special education services. Hence, more appropriate special education referrals may result from the RTI data collected by this district in the future. For example, school personnel will not refer students for an evaluation just to "check and see" whether a reading disability exists, but the school personnel referring students for an evaluation will have documented reading concerns based on the RTI data that was collected.

The participants of the current study are second grade students enrolled at four elementary schools within the targeted district. Hit rates for three of the four schools were calculated using special education referral data from the 2009-2010 academic year (data for one school was unable to be obtained). Hit rate, as defined by the author, is the

number of students referred for special education services who actually qualify for special education services pending the results of the evaluation. The hit rate for Tier III students who were referred for special education services for a suspected specific learning disability was only 33.33%, which represents a waste of district resources. Personnel are spending time on unnecessary evaluations, when their efforts and expertise could be directed toward interventions. One method for improving the hit rate may be to revisit the guidelines for the 20th percentile being used as the cutoff level to begin receiving supplemental reading interventions through RTI. No empirical reason is seen for using a cutoff score at the 20th percentile; this level appears to have been arbitrarily chosen. Through the use of correlational data from the WJ-III reading assessments and the MAP reading scores, a more objective comparison may be made to determine at risk.

Measures of Academic Progress (MAP) scores will be obtained from a sample of students currently enrolled in the second grade. Specifically, fall, winter, and spring MAP reading scores will be obtained from those students' first and second grade years. This study focuses on early primary students due to the globally accepted premise that early intervention is preferred for students performing below grade level in reading skills. The No Child Left Behind Act (2001) mandates that all students read at grade level by the end of their third grade year. In order to ensure that students meet this NCLB mandate, it is imperative that interventions be implemented as early as possible. The reading tests of the WJ-III will be administered to this sample of second grade students. The purpose of this study is to determine how test scores from the RTI universal screening instrument, MAP, compare with scores from the WJ-III, an individual academic achievement test used to identify learning disabilities in reading. If a

significant and positive relationship is found between these tests, scatterplots will be created to show the relationship between MAP and WJ-III scores. The scatterplots will be useful in ascertaining specific cutoff scores to identify at-risk students in the area of reading on the MAP assessments to allow for recommendations for early intervention.

The researcher hypothesized that the MAP reading test administered in first and second grades will have a significant and positive correlation with performance on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III administered in second grade. A second hypothesis is that the Primary Grades (MAP-PG) version of the MAP reading test administered in first grade will significantly correlate with performance on the MAP reading test administered in second grade.

Research Questions

1. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III administered in spring of second grade?
2. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the fall, winter, and spring MAP reading tests in the second grade?
3. Do spring scores on the MAP reading test for second grade students significantly correlate with the WJ-III tests administered in spring of second grade (i.e., Basic Reading, Reading Comprehension, and Reading Fluency)?
4. The area from the WJ-III (i.e., Basic Reading, Reading Comprehension, Reading Fluency) with the highest correlations from the MAP scores will be

further analyzed by conducting scatterplots and regression analyses. The scatterplots and regression analyses will be used to answer the question: What would be the best cutoff scores on the MAP-PG reading test administered in the fall, winter, and spring of first grade and on the MAP reading test administered in the fall, winter, and spring of the second grade that indicates a severe need for intervention services in reading, as indicated by second grade WJ-III scores less than the 16th percentile?

CHAPTER II: LITERATURE REVIEW

This study is focused on determining the relationship between the MAP and WJ-III reading tests to enable more accurate instructional decisions within the RTI framework used within a Kentucky school district. The emphasis on College and Career Readiness standards, along with directives included in acts such as No Child Left Behind (NCLB, 2001), have encouraged school districts across the nation to ensure that students meet mandated standards, as assessed by national reading achievement tests. As was mentioned in Chapter I, the results of the 2009 National Assessment of Education Progress report (NCES, 2009) indicate that approximately 33% of fourth grade students had insufficient reading skills to perform at benchmark levels. Statistics such as these increases the pressure for state educational agencies to ensure that local agencies are providing appropriate reading instruction to enable students to attain the necessary skills to successfully complete grade-level work. Response to Intervention (RTI) has been identified by IDEA (2004) as a means to methodically monitor student performance.

RTI is a relatively new initiative; thus, school districts across the nation are in need of guidance and innovative research to effectively implement RTI programs. Through the RTI process, early identification of an academic deficit is documented, which allows for intervention implementation and monitoring of progress. In this study, a particular part of RTI implementation is reviewed. Specifically, the intent of this study is to enhance the identification of students with the most severe reading skill deficits in order that early remediation can occur. The district in this study arbitrarily chose the 20th percentile as a specific cutoff score for identifying students in need of reading interventions. The determination of a data-based cutoff score through this research will

ensure that limited resources are expended on reading interventions with students who require the most intensive assistance, and that unnecessary, costly, and time-consuming special education evaluations are decreased.

Chapter II expands on the information introduced in Chapter I. Information is included relative to the importance of reading and its impact on the relationship to future learning and success after high school graduation. The researcher also will highlight the importance of early identification of struggling readers. The following section will focus on the identification of RTI as an effective method for monitoring and improving student achievement across a variety of environments and settings. This section also will showcase the broad and varied spectrum of research that has been conducted regarding RTI, and it will illustrate that questions continue to exist within the current body of research regarding the implementation of RTI features. The section includes a discussion of the advantages and disadvantages associated with the use of RTI. Finally, the chapter will conclude with previous research regarding factors that may weaken the effectiveness of RTI. The contents of Chapters I and II will serve as the foundation for the core of this paper, which is to answer four research questions associated with the relationship between the MAP and the WJ-III reading assessments within an RTI framework.

The Importance of Reading

For the purpose of this study, the most appropriate definition of "literacy" is that of Jennings and Whitler (1997). According to the authors, both the Kentucky Adult Literacy Survey and the National Adult Literacy Survey used the following definition to define literacy: "Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (p. 1). Taken at face value,

this definition suggests that, in order for citizens to actively and effectively function in society, they must be able to read and write. Aside from the fact that federal initiatives such as The No Child Left Behind Act (2001) and the College and Career Readiness Standards have mandated the reading level that students should have achieved by a certain point, Jennings and Whitler illustrated the necessity of literacy skills from a practical standpoint.

Although literacy is a term that encompasses a broad range of skills, this study will focus on reading skills. A quick Google search for both "reading statistics" and "literacy statistics" will unearth an abundance of statistics that illustrate the negative impact of poor literacy skills on one's life, yet an inadequate number of current research articles exist related to the importance of appropriate reading skills. Given that proficient reading skills are a necessity in order to complete school assignments and adequately navigate society, the demand is absent for additional research articles that explain the significance of effective reading skills, as the benefit of such skills is a given. Moreover, various outcome statistics are dismal relative to adults without reading competence. The Washington Literacy Council stated, "More than three out of four of those on welfare, 85% of unwed mothers and 68% of those arrested are illiterate. About three in five of America's prison inmates are illiterate" (The Literacy Company, 2013). Nevertheless, the few articles and commentaries that are cited can assist in establishing the importance and benefits of proficient reading skills.

Jennings and Whitler (1997) conducted a study to gain insight into the literacy proficiency levels of individuals between the ages of 16 to 65 living in Kentucky. The authors noted that, by determining the literacy levels of individuals across the state,

literacy programs could be designed to meet the specific needs of illiterate individuals. Jennings and Whitler suggested that literacy is tied to the economic well being of both the state and residents of Kentucky. The premise of this study is that the increase of literacy levels of Kentucky citizens will enable them to become more productive contributors to society, thereby, improving the state's economy.

Each participant in the study was administered a literacy skills assessment and was asked questions pertaining to their background. A total of 1,492 participants were included in the sample, chosen via random selection from five regions across Kentucky. Results indicate that average scores of Kentuckians were slightly higher than the national average. However, many Kentuckians are essentially illiterate. Jennings and Whitler (1997) emphasized that literacy impacts education, job attainment, and salary, as well as a parent's involvement with a child's educational progress, among many other things. The study suggests that, while literacy rates in Kentucky are slightly above the national average, it is still important for Kentuckians to place a strong focus on literacy achievement and to initiate programs designed to increase literacy among residents.

A commentary by Shuman (2006) indicated the substantial and often times detrimental effect that befalls students progressing through grade levels without learning how to read proficiently. The author described the unfortunate cycle that sometimes permeates the lives of poor readers who become high school dropouts. As was stated by Shuman, some students who reach the high school level but are unable to read at grade level end up dropping out of school. Dropouts often are unable to obtain jobs with pay adequate to support them and their families. These individuals then may end up relying on government programs for assistance, thereby, of no benefit to their communities.

Shuman (2006) went on to explain that secondary teachers often are not equipped with the knowledge and skills to teach students how to read. While secondary teachers are well versed in their content areas, they often lack the skills to teach fundamental reading. Secondary teachers are now charged with the task of identifying students who can benefit from reading intervention and of learning to implement these interventions due to the number of students reaching the high school level without the fundamental reading skills to comprehend the material in their textbooks. Shuman described tasks that are necessary for secondary teachers in order to assess and teach basic reading skills to students in need of intervention. While this article does not discuss Response to Intervention, the ideas are representative of the general concept of RTI, which is to identify struggling readers; to determine the specific area of difficulty (e.g., reading fluency, reading comprehension); to implement interventions; and to monitor intervention progress.

Williams and Hall (2010) explored reading attitudes among students, and hypothesized that children with positive reading attitudes are more likely to be more proficient readers. The authors administered "…open-ended interview questions…to explore the participants' reading attitudes and factors impacting their attitudes" (p. 37). Forty-six participants were included in the sample, consisting of second, third, and fourth grade students from three elementary schools in a Florida school district. The schools were comprised of an ethnically and economically diverse population. One school was lower performing, and the others were high performing based on results from a Florida summative evaluation, the Florida Comprehensive Achievement Test (FCAT), administered during the students' third grade year.

Results of the William and Hall (2010) interview questions revealed that 80% of responses suggested positive attitudes toward reading. However, the participants enrolled at the lower performing elementary school were more likely to stress the importance of reading to better perform on the FCAT and/or to be promoted to the fourth grade versus those from the other two schools. Williams and Hall remarked on the significance of teachers not overemphasizing the importance of reading merely to meet a short-term goal (e.g., passing the FCAT). Rather, they should instill positive attitudes in children to want to read for pleasure and to understand that reading has a much greater significance than simply passing a summative evaluation. Thus, satisfactory reading skills are necessary for higher-level school work (Shuman, 2006), as well as job applications and other tasks required throughout one's lifetime (Jennings & Whitler, 1997).

Similar to Williams and Hall (2010), Moley, Bandre, and George (2011) emphasized the importance of "Purposeful book selection and intentional instruction…" (p. 253) as a means of promoting positive reading attitudes. Moving children from the idea of reading as a requirement for a good grade (extrinsic motivation) to helping them realize it is a form of entertainment and an enjoyable pastime (intrinsic motivation) is a powerful tool in assisting with the development of a positive attitude and helping them learn social and educational concepts. Similarly, Clark (2011) stated, "…if budding lifelong readers are left alone to discover that reading is a pleasure, not a chore, they move on to other authors and other genres without our intervention" (p. 7). Thus, Clark emphasized that children who develop positive reading attitudes will read more often, as they find the task less aversive, which should improve skills through practice.

As was emphasized by the articles and commentaries previously summarized, learning to read well seriously impacts the future of the reader. This section of the literature review provided an overview on the importance of reading in relation to the impact on all life endeavors and successes (Clark, 2011; Jennings & Whitler, 1997; Moley et al., 2011; Shuman, 2006; Williams & Hall, 2010). The articles expressed suggestions for engaging students in reading and helping them become better prepared to master more advanced concepts. It should be noted that one of the commonalities that emerged from the articles was that a student's attitude toward reading can be positively correlated to, not only their ability to read, but also their desire to read (Clark, 2011; Moley et al., 2011; Williams & Hall, 2010). As is often stated to individuals completing unfamiliar tasks, "practice makes perfect." This applies to not only learning to tie one's shoes or ride a bike, but also to learning to read well. The following section focuses on the importance of implementing early intervention strategies for struggling readers.

The Importance of Implementing Early Interventions for Struggling Readers

While the previous section emphasized the long-term importance of reading, this section will emphasize the importance of identifying struggling readers at the beginning of the school career. While this literature review divides the concepts of the importance of reading and early reading intervention into two separate sections, each of these concepts are intertwined. Early intervention for struggling readers is crucial in improving reading skills. As was emphasized in the previous section, this section will continue to emphasize the importance of learning to read.

The Council for Basic Education in 2001 compiled a collection of reading-related articles by various authors (Poliakof, 2001). Throughout each, the authors clearly and

succinctly summarized the importance of reading with statements such as, "A child who cannot read, cannot be educated to any degree, or participate effectively as a citizen" (Cross, 2001, p. 2). Such statements illustrate that reading is an important skill and is required to progress educationally, as it is one of the first academic skills acquired by students. Some articles spoke to the act of learning to read. Kame'enui and Simmons (2001) stated,

> The technical truth about reading is that learning to read is anything but natural. Instead, it requires unstinting and skillful human intervention and the orchestration of a number of complex actions and skills involving the eyes, the brain, the mind (e.g., motivation, interest, past experience), the speech system, a language system, and a complex writing system. (pp. 3-4)

This statement clearly indicates that the act of learning to read requires skillful, systematic instruction. As many neurological systems are required in the process, time is needed to learn to artfully synchronize those systems to enable reading to become a seemingly natural process. As was identified in the first section, and by the subsequent statement, many struggling readers never acquire proficient skills. Specifically, Lyon and Fletcher (2001) stated,

> …the children who are most likely to have reading difficulties enter kindergarten without sufficient phonological processing skills, and they fail to develop adequate word reading ability….Unfortunately, most children who have these early difficulties learning to read continue to have them throughout their school careers, primarily because they do not receive instruction of good quality soon enough. (p. 12)

An even greater concern for students who struggle to read is the phenomenon known as the "Matthew effect." According to Morgan, Farkas, and Hibel (2008), "The 'Matthew effect' refers to a pattern of increasing advantage or disadvantage following initial advantage or disadvantage" (p. 187). Morgan et al. and Stanovich (2008) credit the terminology of the "Matthew effect" to the Gospel of Matthew in the Holy Bible (i.e., the rich get richer, and the poor get poorer). Stanovich noted:

> The very children who are reading well and who have good vocabularies will read more, learn more word meanings, and hence read even better. Children with inadequate vocabularies - who read slowly and without enjoyment - read less, and as a result have slower development of vocabulary knowledge, which inhibits further growth in reading ability. (p. 37)

McNamara, Scissons, and Dahleu (2005) also referenced the "Matthew effect." The authors utilized a kindergarten screening tool to identify students not meeting kindergarten benchmarks in reading. The struggling students were provided with intervention over the course of the school year. Upon reassessment of their reading skills in the first grade, the interventions were shown to help some of the students progress their skills, and some gained the necessary skills to reach first grade benchmarks. However, others who were identified as performing below benchmark in kindergarten continued to fall behind their average-performing first grade peers after receiving interventions.

The points made by the Council for Basic Education publication and the articles describing the Matthew effect phenomenon (McNamara et al., 2005; Morgan et al., 2008; Stanovich, 2008) identified similar themes related to the importance of reading and providing early intervention to those who struggle (Poliakof, 2001). These articles

provide additional documentation that the early identification of struggling readers, and the subsequent early interventions provided to those readers, will ensure that deficits are remediated before they fall further behind grade-level standards.

Westerlund and Lagerberg (2008) examined the relationship of several factors (e.g., maternal education, mother's communication, maternal age) to the expressive vocabulary skills of 17-, 18-, and 19-month-old children, specifically, the factor of "shared book reading" in comparison to expressive vocabulary. The authors focused on children taken to Child Health Centres in Sweden for their 18-month checkup. Of the possible 2170 participants, 1090 participated in the study. Results were obtained based on the mothers' responses to a questionnaire, in which they were directed to choose one of five categories for the frequency of time spent per week reading to their child. Mothers were given a checklist with 90 common words and were instructed to place a checkmark beside the words their child had spoken. Results indicated that "Frequent reading was strongly and significantly related to expressive vocabulary…" (Westerlund & Lagerberg, 2008, p. 261).

The Westerlund and Lagerburg (2008) study revealed that frequent reading with small children could improve vocabulary attainment. As previously noted, Armbruster et al. (2001) indicated that vocabulary attainment is a key element in learning to read. Research by Hemphill and Tivnan (2008) concurred with the results, illustrating how the early attainment of vocabulary can provide a strong foundation that will lead to increased literacy achievement over time.

Hemphill and Tivnan (2008) investigated whether children who began the first grade with previously developed literacy skills (i.e., early vocabulary skills) would

perform better over time relative to literacy achievement. The authors conducted a longitudinal study, in which participants began in the fall of the first grade year and concluded at the end of the third grade. The study took place in 16 Boston elementary schools comprised of minority and low socioeconomic status participants. Students were assessed in the fall of first grade with the Peabody Picture Vocabulary Test, Third Edition (PPVT-III); the Yopp-Singer Phonemic Awareness Test; two subtests from the Woodcock-Johnson Diagnostic Reading Battery (WDRB), the Letter and Word Identification subtest and the Word Attack subtest; and the School-Home Early Language and Literacy battery (SHELL). These tests were repeated in the spring, along with the Gates-MacGinitie, Primary 1 Comprehension subtest (GMRT-4). During the spring of second grade, students were administered the PPVT-III, the two WDRB subtests, and the GRMT-4 Primary 2 Test of Reading Comprehension. During the spring of third grade, students were administered only the GRMT-4 Primary 3 Test of Reading Comprehension. The study began with 599 participants, but due to attrition and other issues, only 280 of the initial group participated through the entire study. The results indicated that students who begin school with a strong foundation in vocabulary attainment perform better in overall literacy achievement. Specifically, a strong correlation existed between early vocabulary skills and increased reading comprehension ability.

The Hemphill and Tivnan (2008) study produced results indicating that the development of early vocabulary skills can lead to increased reading comprehension. Adding to those findings, Cooke, Kretlow, and Helf (2010) reported that only a few

additional months of early intervention provided to kindergarten students had a positive impact on reading achievement over the course of one year.

The results obtained from Cooke et al. (2010) can be used as an additional basis for documenting the benefits of early intervention reading services. Cooke et al. also examined the effect of early reading intervention on kindergarten students within an RTI framework, specifically whether interventions initiated at the beginning of the fall semester, rather than the spring semester, would significantly affect reading performance over the course of the school year for students in need of Tier II and Tier III interventions. The study involved a sample of kindergarteners from two schools, both of which used the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) subtests of Initial Sound Fluency (ISF) and Letter Naming Fluency (LNF) as the universal screener. Students performing below benchmark on the ISF and LNF subtests (and determined to be in need of Tier II and Tier III interventions) were administered two additional DIBELS subtests, Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF), in an attempt to collect additional data. Monitoring of reading achievement (i.e., administration of PSF and NWF subtests) was measured in the winter and spring for all students at both schools who were identified in the fall of their kindergarten year as in need of Tier II and Tier III interventions. The first school opted to provide reading interventions beginning at the start of the school year (fall semester); the second opted to delay interventions until the start of the spring semester. Results of the PSF and NWF subtest administrations indicated that the students at the first school who received interventions at the start of the school year significantly outperformed the students on the DIBELS assessment who began interventions at the start of the spring semester. Hence,

those who received interventions for a longer period of time made significant gains, versus those who began at the start of the second semester of the school year. This study is vastly important, as it demonstrates that one additional semester of intervention can significantly impact reading ability.

The overall importance of developing proficient reading skills was the focus of the first section of Chapter II. The articles in the current section show that early reading interventions provided to young students positively impact reading skill performance. The next section will focus on methods of providing early reading interventions to young students, with a discussion on Response to Intervention (RTI). RTI implementation was briefly explored, but not expanded upon in the Cooke et al. (2010) discussion. While the basis for RTI was outlined in the first chapter, additional articles will be examined in more detail in the following section.

Response to Intervention

A general description of Response to Intervention (RTI) was included in Chapter I. According to the Bureau of Exceptional Education and Student Services (2006), RTI most often consists of three tiers. Students in Tier I receive core instruction within the general education classroom. In Tier II, students receive supplemental interventions in small group settings in addition to core instruction. Students in Tier III receive intensive one-on-one or small group interventions several times per week in addition to core instruction. Those who continue to fall below grade-level benchmarks after receiving Tier III interventions are considered for possible special education evaluation. Those who make progress are transitioned back to Tier I and may continue to receive minimal supplemental, or no additional interventions, in addition to core instruction. A main

feature of RTI is the use of universal screening assessments administered at regular intervals (e.g., fall, winter, spring) to measure the performance of all students in a particular subject (e.g., reading). Students identified for Tier II or III interventions are frequently monitored for progress to measure the effectiveness of interventions, in addition to the universal screening assessments. RTI can assess and monitor student performance in the areas of reading, writing, math, and behavior; however, in this current study, RTI is discussed only in relation to reading performance.

RTI was first cited in the 2004 reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA, 2004) as a way of assessing for the presence of a specific learning disability. The IDEA (2004) states the following:

> §300.307 Specific learning disabilities.
>
> (a) *General*. A State must adopt, consistent with §300.309, criteria for determining whether a child has a specific learning disability as defined in §300.8(c)(10). In addition, the criteria adopted by the State —
>
> (1) Must not require the use of a severe discrepancy between intellectual ability and achievement for determining whether a child has a specific learning disability, as defined in §300.8(c)(10);
>
> (2) Must permit the use of a process based on the child's response to scientific, research-based intervention; and
>
> (3) May permit the use of other alternative research-based procedures for determining whether a child has a specific learning disability, as defined in §300.8(c)(10).

(b) *Consistency with State criteria*. A public agency must use the State criteria adopted pursuant to paragraph (a) of this section in determining whether a child has a specific learning disability. (p. 46786)

In sum, IDEA (2004) regulations state that, when educational agencies determine whether a student has a specific learning disability in one or more of the eight areas in which a specific learning disability may be present (i.e., basic reading, reading fluency, reading comprehension, mathematics calculation, mathematics problem solving, written expression, listening comprehension, oral expression), a severe discrepancy between intellectual ability and achievement is no longer required for a student to be deemed eligible. Rather, the updated 2004 IDEA regulations indicate that RTI may be utilized to determine eligibility for special education services due to the diagnosis of a specific learning disability.

IDEA's (2004) reference of RTI has been a catalyst for research on the use of RTI in documenting the existence of a specific learning disability. Many articles written on the topic include at least some mention of RTI's relationship to IDEA. Stecker et al. (2008) described that IDEA allows for the use of RTI, versus the discrepancy model. By way of introducing their research, Stecker et al. stated the following:

> Rather than requiring the traditional aptitude-achievement discrepancy approach to identification, which sometimes necessitated years of poor academic achievement before a student might qualify for special education services (i.e., a wait-to-fail model), IDEIA allows for continued poor response to validated instruction as a means for documenting that a student's disability may require specialized services to produce appropriate learning outcomes. (p. 10)

Lose (2007) and Davis, Lindo, and Compton (2007) also introduced RTI research through its relationship to IDEA (2004), thus establishing a pattern. The door was opened to the use of RTI in determining the existence of specific learning disabilities. The stage also was set for research and commentaries on the effectiveness of RTI implementation and its relationship to the identification of specific learning disabilities.

Although IDEA (2004) referenced the use of RTI for assessing and determining the existence of specific learning disabilities, no guidance was suggested for its implementation. Researchers agree upon the principles of RTI; however, the features vary (Barnes & Harlacher, 2008). The following sections review the advantages, concerns, and issues surrounding the features of RTI.

Advantages of the Principles of RTI

RTI was first referenced in special education law (IDEA, 2004), with the goal of providing interventions within the general education environment for the remediation of academic skill deficits prior to referring a student for a special education evaluation (Adkins, 2007; Bureau of Exceptional Education and Student Services, 2006; Demski, 2009; Fuchs, Fuchs, & Compton 2012; Lose, 2008; Samuels, 2005; Stecker et al., 2008; Torgesen, 2009; Wedl, 2005). Of concern is the practice of classifying students as learning disabled who do not need special education services (Bursuck & Blanks, 2010). RTI, however, is not a special education initiative. Rather, it is a general education initiative aimed at preventing the need for special education services. Only when students fail to meet grade-level benchmarks subsequent to interventions within the general education environment, RTI then leads to a possible special education referral.

Wedl (2005) wrote a commentary outlining the evolution, purposes, and implementation components of RTI. In the preface of the article, several advantages of RTI were presented, stating:

> The results of implementing an RTI model will not only be reduced paperwork and Individual Education Plans (IEP's) more focused on the attainment of learning standards, but it also provides a new focus on improving student performance in collaboration with all of those delivering educational services to these children….RTI helps to make student learning the renewed focus. Perhaps this is RTI's most powerful benefit. Students can no longer be just referred out of the classroom. (p. 2)

Wedl asserted that RTI forces school personnel to collaborate in an attempt to address individual student performance, along with educational needs and progress. Through these discussions, student interventions become more individualized, as school personnel work to modify commonly used instructional methods to improve student performance. IDEA (2004) guidelines mandate that RTI procedures be put in place prior to referral for special education evaluations, forcing school personnel to individualize student performance and attempt varied interventions prior to the decision to refer for more intense services.

Torgesen (2009) discussed outcomes of The Reading First program in Florida schools, explaining that implementation of the program is designed to mimic the principles of RTI (Barnes & Harlacher, 2008). Students are provided with core reading instruction, universal screeners are implemented at regular intervals to monitor progress, and struggling readers are identified and provided with supplementary and intensive

intervention as needed. In the first three years of implementation of the Reading First program nearly 10 years ago, the participating schools "…have seen a dramatic reduction in the percentage of students identified as learning disabled in grades K-3" (Torgesen, 2009, p. 39). This decrease could be attributed to the fact that the Reading First model works to reduce and remediate reading skill deficits, and the training teachers receive through the program makes them feel more comfortable in handling the demands of struggling readers, rather than referring them for a special education evaluation. Torgesen further stated, "One of the advantages of the RTI approach to the diagnosis of learning disabilities over traditional discrepancy-based approaches is that it should lead to earlier identification of students in need of interventions" (p. 39).

Lose (2008) also published a commentary reporting that IDEA (2004) named RTI as one approach that may be implemented to assist students performing below grade-level standards. Lose noted that the goals of RTI are "…to limit referrals based on inadequate instruction…and to reduce the number of children identified for learning disability services" (p. 21). According to Lose, with appropriate implementation of RTI, teachers are able to use their training, combined with individualized evidence-based instruction, to remediate the performance of students who display below benchmark academic skills.

While most of the focus on RTI is on the early primary grades, it is useful for all grade levels. Wixson and Lipson (2012) noted that RTI is an excellent method of mastering early reading, writing, math, and behavior goals in the primary grades, as well as a tool to ensure that Common Core State Standards (CCSS) and College and Career Readiness (CCR) standards are achieved prior to graduation from high school and the pursuit of postsecondary goals. RTI procedures can, and should be, implemented within

K-12 classrooms to encourage continued instructional effectiveness through frequent formative assessments such as progress monitoring throughout the school career. Demski (2009) demonstrated that RTI is successful at all grade levels through a description of its implementation in a school district in Pennsylvania, Allentown Central School District. Allentown utilizes a three-tiered intervention model, along with universal screening and progress monitoring data, in making student instructional decisions. The article specifically reported on a middle school in Allentown that implemented a supplemental math course geared toward students in need of Tier II interventions. Students identified for supplemental math interventions were enrolled in this course, in addition to receiving core math instruction. School personnel have observed positive outcomes for middle school students in need of math remediation through the use of a Tier II math course. VanDerHeyden, Snyder, Broussard, and Ramsdell (2007) provided an illustration on the success of RTI with students enrolled in kindergarten through 12th grade, as well as its success with preschool students. Through the implementation of an RTI framework (e.g., core instruction, universal screening, interventions, and progress monitoring) with pre-kindergarten students, results of the VanDerHeyden et al. study suggested, "…that the use of curriculum-based measurement probes as universal screeners might lead to enhanced decision making about children who are at risk for reading difficulties, particularly when combined with brief classwide interventions designed to address opportunities to learn systematically" (p. 246).

Concerns and Issues with the Features of RTI

Prior to IDEA (2004) and the emphasis on RTI, concerns had been articulated relative to RTI (Vaughn & Fuchs, 2003). At that time, Vaughn and Fuchs were uneasy

about issues such as the instructional strategies to be used, the teacher training to be required, and the point at which a specific learning disability could be appropriately identified. Since that time, additional concerns and issues have been raised through the implementation of RTI.

Of primary concern are the many possible features of RTI that may vary, even within the same state. Werts, Lambert, and Carpenter (2009) evaluated the results of a survey of special education directors from school districts in North Carolina. From the 46 usable questionnaires, results showed that, "…there is little consensus on the procedural steps for implementing an RTI process" (p. 251). While these results provide data from only one state, Jenkins, Schiller, Blackorby, Thayer, and Tilly (2013) assessed the practices of 62 elementary schools in 17 states. Large differences were found regarding the amount of time for the implementation of interventions in tiers, the degree of intervention intensity, and whether interventions were conducted simultaneously or sequentially.

Fuchs et al. (2012) noted that RTI implementation often sounds fairly straightforward. It appears relatively simple to compile and evaluate data at Tier I prior to making decisions on transitioning students to Tier II and III. However, difficulties are encountered when attempting to implement RTI in a school with hundreds of children and limited personnel. The authors discussed the advantages of using more than one universal screening measure at Tier I to reduce false positives (i.e., children mistakenly identified as performing below benchmark and requiring Tier II interventions). By encouraging the use of multiple measures, differentiation may be easier between students who do or do not require supplemental interventions. Fuchs et al. also suggested that

initial administrations of multiple screeners could provide the data needed to determine the effectiveness of supplemental interventions at Tier II for the intense needs of some students or whether those students would benefit from skipping to Tier III to receive the most intensive interventions. Furthermore, they posed questions regarding the implementation of Tier III services and how they might relate to the delivery of special education services.

Burns, Scholin, Kosciolek, and Livingston (2010) expressed concerns regarding methods that could used to advance students from one tier to the next. They evaluated two methods (i.e., dual discrepancy and evaluation of aimlines) for moving students from Tier II to Tier III with 30 second graders, and concluded that the chosen method would lead to significant differences in the selection of student to be transitioned to Tier III. Wanzek and Vaughn (2009) raised the question of the approach to be taken when students make very little progress with the interventions in each tier. Their case study of three students illustrated the difficulties that can arise in making decisions with "real" cases.

The type of intervention to be used also is a feature that varies among schools. Torgesen (2009) noted that a great deal of time spent with an incorrect type, and/or frequency of interventions, may prevent a student from receiving the correct type of early intervention for academic gains early on. In order to ascertain a specific aspect of interventions, Wanzek and Vaughn (2008) evaluated outcomes based on interventions with various amounts of time versus different intensity levels. The treatment group consisted of 172 elementary students and found that, in general, those students who received more intensive interventions obtained better outcomes. Clearly, more research

is needed on such components of interventions. In addition, ensuring the fidelity of any intervention was identified as a critical component that has not received an extensive amount of attention (Keller-Margulis, 2012).

Numerous articles describe personal views and reactions to the implementation of RTI in schools. White, Polly, and Audette (2012) reported on one elementary school's implementation of RTI. School personnel were overwhelmed with the rapid implementation of all aspects of RTI, as little time was provided to consider and discuss strategies. For some, duties were added without the elimination of any current responsibilities. Others were thrust into unwanted leadership roles, and disagreements arose on the perceptions of the importance of various features. Such concerns were echoed by Sanger, Friedli, Brunken, Snow, and Ritzman (2012), who related issues with insufficient training to implement and improve RTI practices, and the lack of collaboration among team members.

Fuchs and Bergeron (2013) provided qualitative information from teachers who experienced the implementation of RTI in their schools. They encountered challenges related to time (e.g., scheduling interventions); buy-in by school personnel (e.g., convincing them to change their current methods); communication among educators; difficulties with the administration; and scoring of universal screenings for all students. O'Connor and Freeman (2012) investigated implementation complications of RTI from the perspective of the school psychologist, which included issues related to ineffective leadership, a mindset by school personnel that RTI is another passing fad, and the lack of individuals who possess the expertise to manage and interpret large amounts of data.

The research suggests that consideration be given to ways in which RTI can be successful. Ongoing professional development is critical in providing school personnel with the necessary skills to implement, facilitate communication and collaboration, and enhance staff buy-in of RTI (Fuchs & Bergeron, 2013; O'Connor & Freeman, 2012; Sanger et al., 2012). Principal leadership also is critical to ensure follow-through by teachers (O'Connor & Freeman, 2012; White et al., 2012). In an attempt to improve the efficiency of measuring and monitoring student performance, and to enable it to be teacher-friendly, Ysseldyke (2005) recommended the implementation of RTI technology resources (e.g., commercially available data management systems). Finally, Noll (2013) emphasized the importance of high quality instruction at the Tier I level and ensuring that teacher training and knowledge are utilized to the maximum extent possible.

CHAPTER III: METHODOLOGY

The purpose of this research is to determine whether a relationship exists between the MAP (NWEA, 2009) reading assessment, which is a universal screener used to assess reading skills, and the reading tests of the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III, Woodcock et al., 2001), a diagnostic test often used to assess students' reading abilities. Additionally, it is anticipated that, if a relationship is found between these tests, data-based cutoff scores for the MAP-PG and the MAP can be developed to enhance the screening process. Students who perform at or below the established cutoff scores determined for the MAP and MAP-PG will be identified as needing early intervention services in order to increase their reading proficiency skills.

Through the creation of a data-based system for identifying students in need of reading interventions, the goal is that the students who display the most severe need for intervention services will be identified early (e.g., in first grade). If the most needy students are targeted for intervention services, then the school's limited reading intervention resources will be expended in a more efficient manner. In addition, if a significant correlation exists between the MAP and WJ-III tests, information from this research can be used by school districts to make more effective instructional decisions through the implementation of RTI. If a significant correlation between the MAP and the WJ-III is not found, that may suggest that the MAP is not an effective assessment instrument that can be used by school districts to make informed instructional decisions within a school's RTI program.

This section of the dissertation contains information related to the targeted school district, from which data for this study were collected. Specifically, information related

to the participant characteristics are discussed, as well as a description of the procedures utilized for this study. The materials used to assess each of the participants also are described in detail. Finally, the data analysis plan is described in order to prepare the reader for the presentation of results to be reported in the following chapter.

Participants

Thirteen elementary schools are located within the targeted school district; however, only four were used as the sample, as hit rate data (defined in Chapter I) was available only for the four schools. These four schools were selected for convenience purposes, as hit rate data could be obtained only from the students enrolled at these schools. One school was located in the southern part of the district, two were centrally located, and one was located in the east end of the district.

In an effort to evaluate the representativeness of the four target schools to the district as a whole, data on the number of students receiving free and reduced lunch, and the percent of students identified with disabilities, were obtained. The results are presented in Table 1. Independent sample *t*-tests revealed that the four schools combined did not differ significantly from the combined enrollment of students at the nine other elementary schools within the district in terms of the number of students receiving special education services, $t(11) = .434$, $p = .673$, or identified as eligible to receive free and reduced lunch, $t(11) = .387$, $p = .706$. Thus, these data suggest that the students in the four elementary schools were representative of the total population of those enrolled in all elementary schools within the district. Therefore, the results from this study likely will generalize to the district as a whole.

Table 1

Demographic Data for the Elementary Schools in the District

Elementary School	Demographic Variables		
	Total Enrollment	Percent with Disabilities	Percent of Free and Reduced Lunch
		Targeted Schools	
School A	476	23.9	63.0
School B	511	24.7	53.6
School C	470	22.1	51.5
School D	471	20.0	23.1
Mean	482	22.7	48.0
		Comparison Schools	
School E	527	22.6	75.5
School F	541	24.4	53.8
School G	516	17.2	35.5
School H	420	28.1	61.9
School I	164	29.3	72.0
School J	488	19.3	36.7
School K	539	21.5	58.8
School L	535	19.1	25.6
School M	536	21.5	77.1
Mean	474	21.9	53.8

The participants in this study included second grade students enrolled at the four targeted elementary schools, with approximately 305 second grade students enrolled. Opt-out consent forms were used, which were approved by the Institutional Review Board (IRB) at Western Kentucky University (see Appendix). Opt-out consent forms also were sent to the homes of all second grade students enrolled in the four schools, with an explanation to parents that they complete the consent form and return it to the school within five business days of the specified date on the form if they chose not to allow their child to participate in the study. If the consent form was not signed and returned to each participant's teacher within five business days, the investigator assumed that the consent was given by the parent to include the child in the project. The reading tests of the WJ-III were administered to a randomly selected sample of 100 students whose guardian(s) gave consent. Any student who did not have MAP scores on file for the fall, winter, and spring of their first and second grade years (a total of six scores for each participant) were automatically excluded from administration of the WJ-III.

Of the 305 second grade students enrolled at the four targeted elementary schools, 71 did not have all six MAP scores on file for the fall, winter, and spring of their first and second grade years. Therefore, only 234 were eligible to be administered the reading tests of the WJ-III. Thirty-three of those had guardians who returned the opt-out consent form, indicating that the investigator could not include them in the research. This left 201 eligible second grade students to participate in the study, of whom 100 were randomly selected. Specifically, 24 students each from Schools A, C, and D and 28 from School B were selected and included in the study. Of these 100 students, 49 were male and 51 were female; two were Hispanic, two were African American, two were of two or

more races (combined race), and 94 were Caucasian. Within the sample, 25 students received special education services for a disability, and 75 were identified as not having a disability. Due to privacy concerns of the school district, the free and reduced lunch status of the participants in the sample could not be shared with the examiner. The participants' ages ranged from 7- through 9-years. Specifically, the sample consisted of 29 7-year-olds, 65 8-year-olds, and six 9-year-olds.

Materials

Two instruments used to assess reading are the focus of this study: two versions (i.e., MAP-PG and MAP) of the reading test of the Measures of Academic Progress (MAP, NWEA, 2009) and the reading tests of the Woodcock-Johnson Tests of Achievement (WJ-III, Woodcock et al., 2001). The reading tests of the WJ-III consist of five subtests. Two of the subtests (i.e., Letter-Word Identification, Word Attack), when combined, establish the Basic Reading composite score. Two additional subtests (i.e., Passage Comprehension, Reading Vocabulary), when combined, produce the Reading Comprehension composite score. Only the Reading Fluency subtest is used to obtain a reading fluency score. As discussed in the Introduction, the reason for assessing the areas of Basic Reading, Reading Comprehension, and Reading Fluency was because these are the three areas of reading that a student may qualify as having a specific learning disability (IDEA, 2004).

Measures of Academic Progress (MAP). The MAP is an assessment tool utilized to assess students in the areas of reading, language usage, mathematics, general science topics, and science concepts and processes (NWEA, 2008). However, in the

current study, only MAP reading scores will be the focus. The MAP reading test is a computer-adaptive test (NWEA, 2009), of which:

> …each student is administered a test with items chosen for the student as the test progresses. Individual tests are constructed by selecting items from banks of Rasch-calibrated items. As a student proceeds through a test, the difficulty of items presented is adapted to the student's level of performance on all previous items. This has the effect of maximizing the information in the test score. Since each test item has been calibrated to the same scale using item response theory, scores from different tests in the same domain can be interpreted in the same manner; all test scores refer to the same underlying scale. (NWEA, 2008, p. 2)

NWEA (2009) produces both the Measures of Academic Progress (MAP) and the Measures of Academic Progress for Primary Grades (MAP-PG). MAP-PG is designed for students in grades K-2, and MAP is designed for students in grades 2-12. NWEA (2009) states the following:

> The MAP for Primary Grades system uses the same measurement scales that are used in the MAP system, which allows a direct connection between the fundamental skills assessed in the MAP for Primary Grades system and the learning of a student in later years. (p. 1)

The targeted school district chose to administer the MAP-PG to only kindergarten and first grade students, while those enrolled in grades 2 through 5 were administered the standard MAP reading test. Both the MAP and MAP-PG produce the same type of score, called the RIT, or Rasch UnIT, score. According to the MAP Proctor Handbook (NWEA, 2010), RIT scores are used:

> …to measure student achievement and student growth. The RIT score relates directly to the curriculum scale in each subject area. It is an equal-interval score, like feet and inches, so scores can be added together to calculate accurate class or school averages. RIT scores range from about 100 to 300. RIT scores make it possible to follow a student's educational growth from year to year. (p. 1)

The MAP-PG, which was given to the participants of this study while in the first grade, is administered via the computer. Students wear headphones and all test directions are presented via audio recordings. The MAP-PG consists of two parts, which are administered on separate dates to prevent the fatigue of examinees. The RIT score is obtained upon completion of both parts of the test. An example of an item on the MAP-PG has a picture of a bowl of soup, and the audio stated, *"Put the letter S in the bowl of soup."* The examinee is shown six letters and must click on the letter S. A second example shows a picture of four books with different titles, and the audio stated, "*Which book would you learn about turtles and rabbits?"*

During the students' second grade year, the entire MAP reading assessment was conducted in one session. The MAP is administered via the computer, but the students must read directions on the screen without the aid of an audio recording. Items on the MAP ask questions such as, "*Which is a fact, not an opinion*?" and "*What is the correct way to divide the word dictionary into syllables?"* After each question was presented, the examinee was instructed to choose one of four options.

According to the MAP Technical Manual (NWEA, 2009), reliability is traditionally measured in three ways: test-retest, parallel forms, and internal consistency. However, as the MAP assessment is computer adaptive, it was not possible for the test

developers to compute these typical forms of reliability for the MAP tests. Rather, a novel method was used for determining reliability. As was stated in the Technical Manual, "One useful way to express this form of reliability is to frame it in the context of correlations between two tests administered from two different but related item pools and those administered twice but from different item pools" (p. 36).

As an illustration, MAP published two sets of reliability scores. Because second grade students in Kentucky are the focus of the current study, only reliability data reported by NWEA for Kentucky second grade students are shared. In accordance with the above reference, the first set of data originated from "…correlations between two tests administered from two different but related item pools…" (NWEA, 2009, p. 36). The scores of 3,187 Kentucky students, who were enrolled in second grade during spring of 2007, were correlated between the MAP Reading Goals Survey test in the spring and fall of 2007. The correlation between these test administrations was $r = .83$. No reliability data was listed for second grade students in Kentucky that compared fall 2007 to spring 2008 scores. The scores of 3,186 Kentucky students, who were enrolled in the second grade during spring 2007, were correlated between the MAP Reading Goals Survey test administered in the spring of 2007 and the spring of 2008. The correlation between these test administrations was $r = .79$.

The second set of reliability data came from tests that had been "…administered twice but from different item pools" (NWEA, 2009, p. 36). The scores of 952 Kentucky students, who were enrolled in the second grade during fall of 2007, were correlated between the MAP Reading Goals Survey test in the spring and fall of 2007, with a correlation between these test administrations of $r = .88$. The scores of 1,008 students,

who were enrolled in the second grade during fall of 2007, were correlated between the MAP Reading Goals Survey test in the fall of 2007 and the spring of 2008. The correlation between these test administrations was r = .82. The scores of 906 students, who were enrolled in the second grade during spring of 2007, were correlated between the MAP Reading Goals Survey test in the spring of 2007 and the spring of 2008, with a correlation between these administrations of r = .85.

The MAP Technical Manual did not provide specific concurrent, predictive, or criterion-related validity for Kentucky students in the second grade who were administered KY state content-aligned MAP tests and KY state accountability tests (e.g., Kentucky Core Content Test, KCCT; Kentucky Performance Rating for Educational Progress, K-PREP). The third grade was the closest grade level to second grade that provided validity data. Although third graders are not the focus of this study, the validity data will be included to provide a measure of potential reference. The concurrent validity for a sample of 2,383 Kentucky third grade students was r = .66. The criterion-related validity for the same sample of students was r = .51. Predictive validity was not listed.

Woodcock-Johnson III Tests of Achievement. The WJ-III is used to measure the academic achievement of students across multiple domains (e.g., reading, math, writing, listening comprehension, oral comprehension); however, for the purposes of this study, only the reading achievement tests of the WJ-III will be discussed. Five reading subtests are included in the Woodcock-Johnson III Tests of Achievement (WJ-III, Woodcock et al., 2001). Those subtests consist of Letter-Word Identification, Word Attack, Passage Comprehension, Reading Vocabulary, and Reading Fluency. According to the examiner's manual, these five subtests can be combined in such a way that they

comprise what are referred to as "clusters" by Mather and Woodcock (2001). These clusters consist of Basic Reading Skills, Reading Fluency, and Reading Comprehension, which match the three areas for which students can be identified as having a specific reading learning disability through IDEA (2004). Descriptions of each subtest and cluster can be found in Table 2, from the information taken verbatim from the WJ-III Tests of Achievement Examiner's Manual (Mather & Woodcock, 2001, pp. 17, 47, 48, 49, 53, 54, 60, 61, 63, 64, 79, 80, 81, 82).

McGrew and Woodcock (2001) calculated reliability coefficients for the reading clusters and subtests. Split-half reliability coefficients, a form of internal consistency, were calculated for all subtests and clusters, with the exception of the Reading Fluency subtest, which reported test-retest reliability coefficients because it is a "speeded test" (McGrew & Woodcock, 2001, p. 38). The reliability coefficients reported in Table 3 are for only ages 7, 8, and 9, as the students who participated in the study ranged in age from 7 to 9.

Concurrent validity data among the WJ-III reading achievement tests and two other reading achievement tests, the Kaufman Test of Educational Achievement (KTEA) and Wechsler Individual Achievement Test (WIAT), were provided in the Technical Manual (McGrew & Woodcock, 2001). In a comparison of the WJ-III and the KTEA, concurrent validity was reported for Basic Reading skills (r = .66), Reading Comprehension skills (r = .62), and an overall Reading Composite score (r = .76). In a comparison of the WJ-III and the WIAT, concurrent validity was reported for Basic Reading skills (r = .82), Reading Comprehension skills (r = .79), and an overall Reading Composite score (r = .67).

Table 2

Description of Woodcock-Johnson III Tests of Achievement (WJ-III) Reading Subtests

Cluster/Subtest	Description of Test	Description of Tasks
Basic Reading	Measure of sight vocabulary, phonics, and structural analysis	N/A
Letter-Word Identification	Measure of reading decoding, including the ability to identify letter names of several uppercase and lowercase letters and the ability to identify words	The Letter-Word Identification subtest requires that the examinee state either the letter or the word indicated by the examiner. For example, the examiner may ask the examinee to point to a letter, such as *t,* or say a particular word, such as *far*. The examinee must pronounce words fluently in order to receive credit.
Word Attack	Measures a subject's ability to apply phonic and structural analysis skills in pronouncing phonically and orthographically regular nonsense or non-words	The Word Attack subtest requires that the examinee decode nonsense words (words that are not real). For example, words such as *tobs* or *obs*. The examinee must pronounce the words fluently in order to receive credit.
Reading Comprehension	Measure of comprehension, vocabulary, and reasoning	N/A
Passage Comprehension	Measure of reading comprehension and lexical knowledge	The Passage Comprehension subtest indicates the starting point for examinees based on their grade level. For second grade students, the starting point is *Sample Item B.* For the first few items, the examinee is instructed to look at

(continued)

Cluster/Subtest	Description of Test	Description of Tasks
		a picture and to read a sentence to decide what word will go in the blank space. For example, an item may show a picture of a duck beside an elephant. The sentence beside the picture may state, "*The elephant is bigger than the ___.*" The test booklet indicates the responses that may be used to fill in the blank to be scored correctly. Later items consist of a passage that the examinee must read in order to choose a correct response for the word missing from the blank. The examinee must use context clues from the passage to choose the correct word. For example, "*When my dog gets sick, I take her to the* ___." The correct response would be veterinarian, animal doctor, pet hospital, etc.
Reading Vocabulary	Measures an aspect of reading comprehension at the isolated word level	This test consists of three parts: Synonyms, Antonyms, and Analogies. On the Synonym section, a word is written and the examinee has to name a synonym for the word. On the Antonym section, a word is written and the examinee has to name an antonym for the word. On the Analogies section, the examinee has to complete analogies.
Reading Fluency	Measure of reading speed and rate	The Reading Fluency subtest allows the examinee three minutes to read up to 98 statements within the student response test booklet and to decide if the statements are true or false. If a statement is false, the examinee circles the letter *N*; if the statement is true, the examinee circles the letter *Y*. Examples of statements include (a) *The sky is green*, and (b) *Grass is blue*.

Computer scoring software provided by the test's publisher was utilized to compute scores for each of the subtests that were administered (Schrank & Woodcock, 2001). The WJ-III produces standard scores with a mean of 100 and a standard deviation of 15. Standard scores may range from 0 to over 200, and the test allows for the calculation of both age- and grade-based scores (Mather & Woodcock, 2001). For this study, age-based norm scores were used because, in Kentucky, the discrepancy model used to determine the presence of a learning disability is based on the age of the student, not the grade level.

Table 3

Correlation Coefficients for the Reading Subtests and Clusters from the Woodcock-Johnson III Tests of Achievement

Area Assessed	Age 7	Age 8	Age 9
Cluster			
Basic Reading Skills	.97	.97	.95
Reading Comprehension	.96	.94	.92
Subtest			
Letter-Word Identification	.97	.96	.94
Word Attack	.92	.92	.89
Passage Comprehension	.96	.92	.91
Reading Vocabulary	.93	.90	.88
Reading Fluency	.89	.89	.89

Note. All coefficients are split-half reliability coefficients, except Reading Fluency, which lists test-retest reliability coefficients.

Procedure

The superintendent of the school district of interest initially granted permission for the lead investigator to proceed with the research project. Specifically, permission was obtained from the superintendent for the investigator, a full-time employee of the targeted school district, to access participants' first grade MAP-PG reading test scores from the fall, winter, and spring administrations. Additionally, MAP reading test scores were obtained for fall, winter, and spring administrations of current second grade students at the four targeted elementary schools. Permission also was granted by the superintendent for the lead investigator to oversee the administration of the reading tests of the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III), to a sample of these second grade students in May 2011.

The elementary school principals and teachers of the participants were informed of the research via email. Each of the four targeted elementary schools had four second grade classrooms, which means that a total of 16 classrooms were involved in this study. In mid-April, the lead investigator sent an email to the principals at each of the four targeted elementary schools to request permission to proceed with the research project within their school buildings. All principals gave their consent. Approximately one week later, the lead investigator sent an email to the second grade teachers at each school, informing them of the research project and requesting their assistance in distributing consent forms to their students; principals were carbon copied on each email.

A folder was delivered to each of the second grade teachers, which included instructions for distributing the opt-out consent forms, with adequate forms for every student in each classroom. The day following the delivery of the folders, an email was

sent to each teacher reminding them to pass out the opt-out consent forms by the end of the school day. The teachers also were reminded to give opt-out consent forms to any absent students when they returned to class. The teachers were told to place the returned signed opt-out consent forms back in the folder previously received from the lead investigator. Teachers were asked to respond to the email sent by the lead investigator by a specific date, in order to confirm that the opt-out consent forms had been distributed. If confirmation was not received via email, site visits were conducted to ensure that all consent forms had been sent out. The lead investigator was able to determine the dates that opt-out consent forms were sent home with students, including those absent on the day they were initially distributed, to ensure that all parents had a minimum of five business days to return the signed form to the school, if they did not wish their child to participate in the study.

A visit was made to each of the four elementary schools to collect the opt-out consent forms that had been returned. Each second grade classroom with students who participated in the study was entered into a drawing to win a pizza party. Toward the beginning of May during that school year, the teachers and principals were contacted to inform them of the pizza party winner, and the party was held at the end of May prior to the last day of the school year.

The reading tests of the WJ-III were administered at each of the four targeted elementary schools within a two-week period in May. Prior to each school visit to administer tests, the principals and second grade teachers were contacted at least a day ahead of the visit to confirm the test schedule and timeline. The reading tests of the WJ-III were administered to a random sample of 100 students whose consent forms were not

returned. The participants were individually pulled out of class during regular school hours and escorted to a location approved by the principal, after which the test examiner explained the testing procedures. Participants were given the option to agree or disagree to be tested and were asked to complete an assent form. All children agreed and were assessed with the five reading subtests from the WJ-III (i.e., Letter-Word Identification, Word Attack, Passage Comprehension, Reading Vocabulary, Reading Fluency). The lead investigator conducted the majority of test administrations, while an appropriately qualified employee of the school district administered one test. Test administration was approximately 30 minutes in length. After completion, each participant received a small prize (i.e., mechanical pencil, eraser, and pencil grip) and was escorted back to class.

The lead investigator was a certified employee of the targeted school district and, therefore, had access to all students' MAP scores. By mid-May, MAP scores for second grade students enrolled at the four-targeted elementary schools had been obtained from the online NWEA MAP score database. These data allowed for the comparison of test scores between the first and second grade MAP administrations to determine whether a significant and positive correlation existed.

The results of the overall findings of this project will be shared with the superintendent of the school district and the principals of the participating elementary schools. However, only the lead investigator will have access to the individual scores on the WJ-III, thus maintaining confidentiality.

Data Analysis Plan

Four research questions will be addressed through this research. The data analysis is described with each question.

1. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III administered in spring of second grade? This question assessed the predictive validity of the MAP-PG first grade scores using the tests on the WJ-III as the criterion measures. Pearson correlations were conducted using SPSS data analysis software.
2. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the fall, winter, and spring MAP reading tests in the second grade? This question assessed the predictive validity of the MAP-PG first grade scores using the second grade administration of the MAP as the criterion measure. Pearson correlations were conducted using SPSS data analysis software.
3. Do spring scores on the MAP reading test for second grade students significantly correlate with the WJ-III tests administered in spring of second grade (i.e., Basic Reading, Reading Comprehension, or Reading Fluency)? This question assessed the concurrent validity of the MAP second grade scores using the WJ-III tests as the criterion measures. Pearson correlations were conducted using SPSS data analysis software.
4. The area from the WJ-III (i.e., Basic Reading, Reading Comprehension, Reading Fluency) with the highest correlations from the MAP scores were further analyzed by conducting scatterplots and regression analyses using SPSS data analysis software. The scatterplots and regression analyses

answered the question: What would be the best cutoff scores on the MAP-PG reading test administered in the fall, winter, and spring of first grade and on the MAP reading test administered in the fall, winter, and spring of the second grade that indicate a severe need for intervention services in the area of reading, as indicated by second grade WJ-III scores less than the 16th percentile?

Several tables and figures provide a pictorial display of the results of this study. A table of correlation coefficients comparing the fall, winter, and spring MAP-PG and MAP reading scores for both first and second grade test administrations is displayed. A table of correlation coefficients comparing WJ-III Basic Reading, Reading Comprehension, and Reading Fluency scores to the fall, winter, and spring MAP-PG and MAP reading scores for both first and second grade test administrations is displayed. Figures of scatterplots assist in better illustrating the relationship between MAP and WJ-III scores, as the x-axis consists of MAP-PG and MAP reading scores, and the y-axis depicts WJ-III Basic Reading, Reading Comprehension, and/or Reading Fluency scores.

The fourth research question addressed in this study attempts to determine a data-based cutoff score on the MAP reading test to minimize false positives when determining students at risk for developing reading deficits, and in making the decision to provide reading interventions. Specifically, a WJ-III cutoff score at one standard deviation below the mean (the 16th percentile) is used as the criterion to evaluate the percentage of scores on the MAP assessment that fall at or below this level of WJ-III score. Sensitivity and specificity percentages also are reported. The determination of a data-based cutoff score

should reduce the number of students who were evaluated for possible special education services.

Summary

Results from the research questions will be presented in Chapter IV. Data are analyzed in the format that was presented within the Data Analysis Plan. The Discussion section will then focus on the implications of the research, suggestions will be made for the Kentucky school district from which the sample was obtained, and possible future research options will be proposed.

CHAPTER IV: RESULTS

The purpose of this study was to identify the relationship between the Measures of Academic Progress (MAP, NWEA, 2009) reading assessment and the reading tests of the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III, Woodcock et al., 2001). Specifically, this research project addressed four questions. The first addressed whether the MAP-PG reading tests administered in the fall, winter, and spring of first grade predict performance on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III administered in spring of second grade. The second question addressed whether the scores on the MAP-PG reading test administered in the fall, winter, and spring of first grade predict performance on the fall, winter, and spring MAP reading tests administered in the second grade.

The third research question examined the concurrent validity of the MAP reading test by determining the correlation between it and the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency tests administered in the spring of second grade. Finally, the initial part of the fourth research question sought to determine the area from the WJ-III (i.e., Basic Reading, Reading Comprehension, Reading Fluency) that has the highest correlations with the MAP reading test. That area from the WJ-III was further analyzed through regression formulas and scatterplots. The scatterplots will be used to demonstrate results based on the 20th percentile cutoff scores on the MAP used by the school district, and determine whether better cutoff scores on the first and second grade versions of the MAP reading tests can be established through the regression analyses to indicate a severe need for intervention services in the area of reading. Finally, the data were analyzed for sensitivity, specificity, positive predictive value, and negative

predictive value to provide descriptive outcomes of using the current cutoff scores at the 20th percentile and the adjusted cutoff scores, based on the regression analyses.

Through identification of the relationship between the MAP and WJ-III reading tests, additional information will be determined for making instructional decisions within a Response to Intervention (RTI) framework. Overall descriptive results will be provided in this chapter prior to a description of each specific research question. Table 4 lists the mean MAP scores and standard deviations from each of the six test administrations. These RIT scores are from the same 100 students who were followed longitudinally. RIT scores have equal intervals to allow the tracking of growth from grade to grade. As can be seen in Table 4, the students' scores showed appropriate growth over the two-year period, with the exception of second grade fall scores. As often happens, it appears students' reading abilities regressed over the summer months. Mean scores obtained by the participants on the WJ-III using age norms were as follows: Basic Reading – 102.41 (*SD* = 11.67); Reading Comprehension – 94.76 (*SD* = 12.74); and Reading Fluency – 103.96 (*SD* = 12.97). The WJ-III uses standard scores with a mean of 100 and a standard deviation of 15. Overall, the obtained WJ-III scores suggest that the current sample of students have average reading abilities, which implies that the sample used for this study can be considered as representative of the larger population of students.

Research Question One

The first research question assessed the predictive validity of the MAP-PG first grade scores using the reading tests on the WJ-III as the criterion measures. This question asks: Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the Basic Reading, Reading Comprehension,

Table 4

Participants' Mean MAP Reading Test RIT Scores

MAP Administration	Sample Mean	*SD*
First Grade MAP-PG Fall	161.07	10.55
First Grade MAP-PG Winter	170.78	13.89
First Grade MAP-PG Spring	179.28	14.55
Second Grade MAP Fall	175.50	16.58
Second Grade MAP Winter	184.72	16.03
Second Grade MAP Spring	190.10	15.43

and Reading Fluency tests of the WJ-III administered in spring of second grade? The Pearson correlations between the fall, winter, and spring MAP-PG reading test scores are significantly and positively correlated with the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency scores. The correlations would be considered at a moderate level (Slavin, 2007; Spatz, 2011). See Table 5 for the correlation coefficients.

Research Question Two

The second research question assessed the predictive validity of the MAP-PG first grade scores using the second grade administration of the MAP as the criterion measure. This research question asks: Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the fall, winter, and spring MAP reading tests in the second grade? The Pearson correlations between the first grade fall, winter, and spring MAP-PG reading test scores and the second grade fall, winter, and

Table 5

Correlations between First Grade Fall, Winter, and Spring MAP-PG Reading Scores and the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency Scores

	WJ-III Clusters/Subtest		
MAP-PG Administrations	Basic Reading	Reading Comprehension	Reading Fluency
First Grade Fall	.61	.68	.62
First Grade Winter	.62	.71	.62
First Grade Spring	.62	.72	.67

Note. All correlations are significant at $p < .001$.

spring MAP reading test scores are significantly and positively correlated (see Table 6). The correlations are at a moderate to strong level (Slavin, 2007; Spatz, 2011).

Research Question Three

The third question assessed the concurrent validity of the spring MAP second grade scores using the WJ-III reading tests as the criterion measures. This research question asks: Do spring scores on the MAP reading test for second grade students significantly correlate with the WJ-III tests administered in spring of second grade (i.e., Basic Reading, Reading Comprehension, and Reading Fluency)? While this question is concerned only with the spring MAP scores as compared to the WJ-III scores, the fall and winter MAP scores are included as well in Table 7 for informational purposes. The Pearson correlations listed in Table 7 indicate the concurrent validity coefficients are significantly and positively correlated and at a moderate to strong level (Slavin, 2007; Spatz, 2011).

Table 6

Correlation Coefficients between First Grade MAP-PG Scores and Second Grade MAP Scores for Fall, Winter, and Spring

	Second Grade MAP Scores		
First Grade MAP-PG	Fall	Winter	Spring
Fall	.77	.78	.79
Winter	.74	.75	.79
Spring	.66	.70	.75

Note. All correlations are significant at $p < .001$.

Table 7

Correlations between Second Grade Fall, Winter, and Spring MAP Reading Scores and the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency Scores

	WJ-III Clusters/Subtest		
MAP Administrations	Basic Reading	Reading Comprehension	Reading Fluency
Second Grade Fall	.69	.68	.61
Second Grade Winter	.70	.77	.69
Second Grade Spring	.67	.75	.66

Note. All correlations are significant at $p < .001$.

Research Question Four

The area from the WJ-III (i.e., Basic Reading, Reading Comprehension, Reading Fluency) with the highest correlations with the MAP scores was determined in order to answer the fourth research question: What would be the best cutoff scores on the MAP-PG reading test administered in the fall, winter, and spring of first grade and on the MAP reading test administered in the fall, winter, and spring of second grade that indicates a severe need for intervention services in the area of reading, as indicated by second grade WJ-III scores less than the 16th percentile? After reviewing the Pearson correlation coefficients in Tables 5 and 7, it is evident that the area of Reading Comprehension from the WJ-III had the highest correlations with the MAP scores from first and second grades. For five of the six MAP administrations, Reading Comprehension had the highest correlation. Only the Basic Reading area had a higher correlation from the second grade Fall MAP assessment, although it was a very slight difference (i.e., .69 vs. .68).

As Reading Comprehension is the area determined to have the highest correlations with the MAP-PG and MAP reading tests, scatterplots were created to display the relationship between only these variables. Thus, six scatterplots were created to illustrate the results and are presented in Figures 1 through 6. It was the intent of Research Question 4 to ascertain the best MAP-PG and MAP cutoff scores for determining that a student is in need of more intensive interventions. Simple linear regression analysis was used to make that determination by inserting variables into the slope-intercept formula whereby a specific RIT cutoff score for the MAP-PG and MAP assessments could be determined. Those specific cutoff scores are presented in Table 8, along with corresponding percentile ranks. It should be noted that the cutoff score

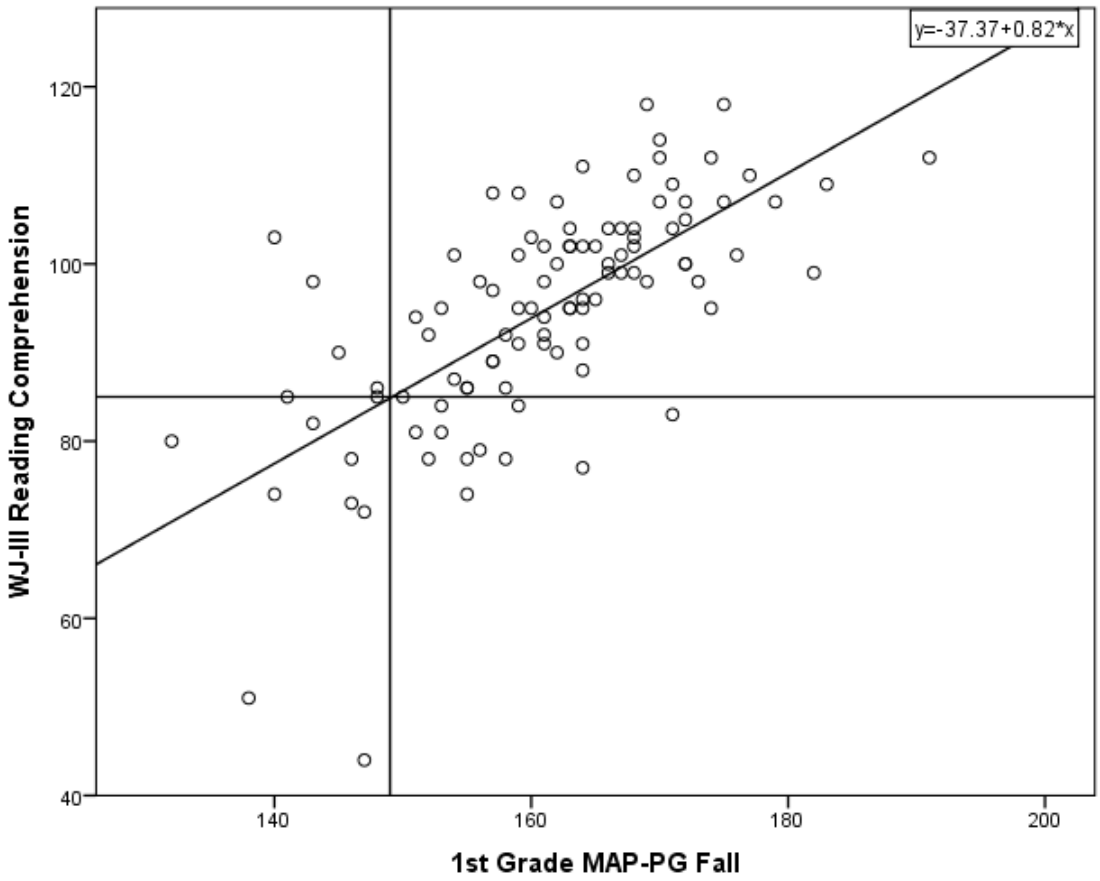

Figure 1. Regression analysis of first grade fall MAP-PG scores plotted with second grade WJ-III Reading Comprehension scores.

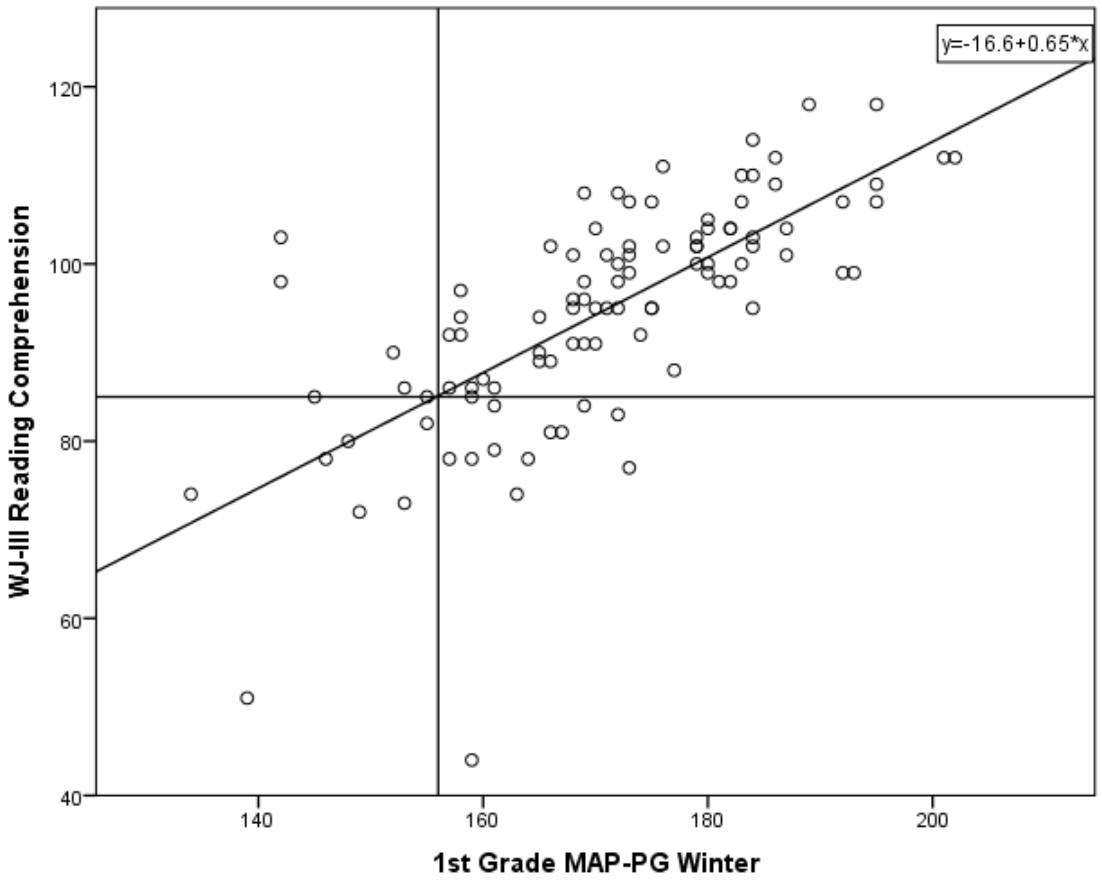

Figure 2. Regression analysis of first grade winter MAP-PG scores plotted with second grade WJ-III Reading Comprehension scores.

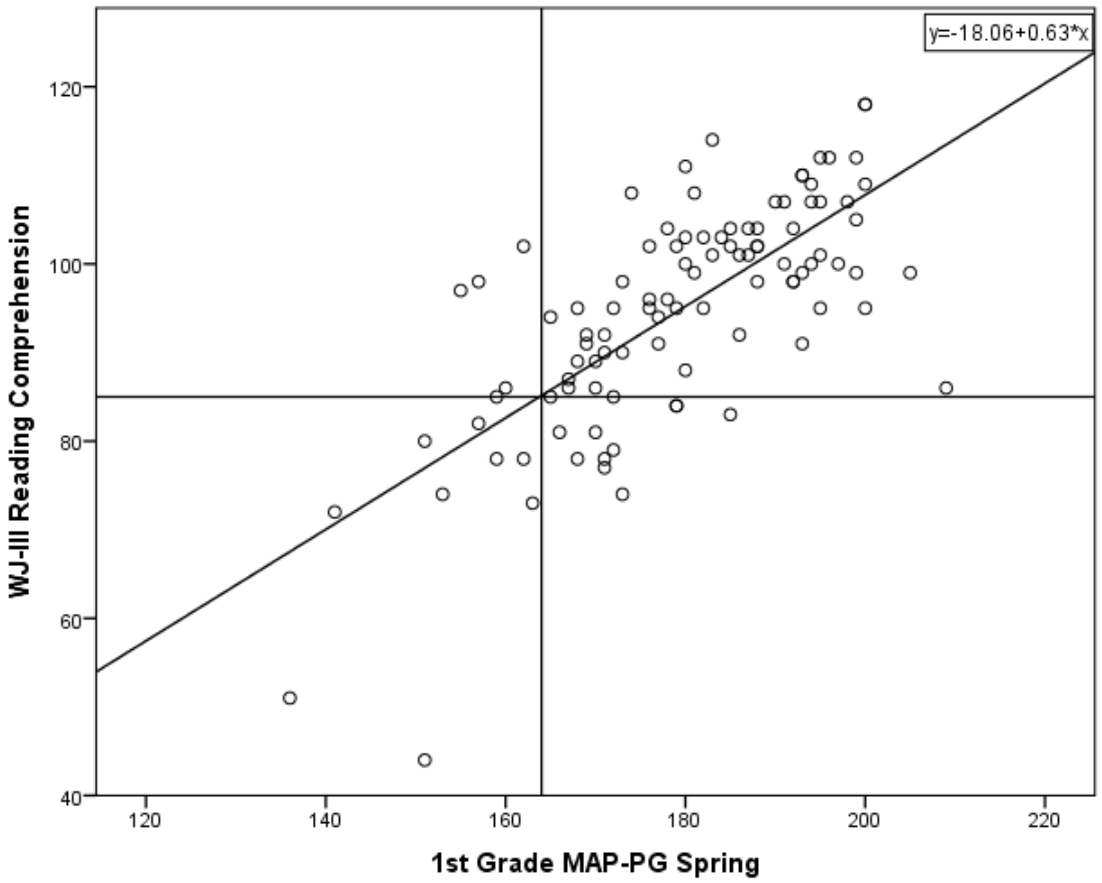

Figure 3. Regression analysis of first grade spring MAP-PG scores plotted with second grade WJ-III Reading Comprehension scores.

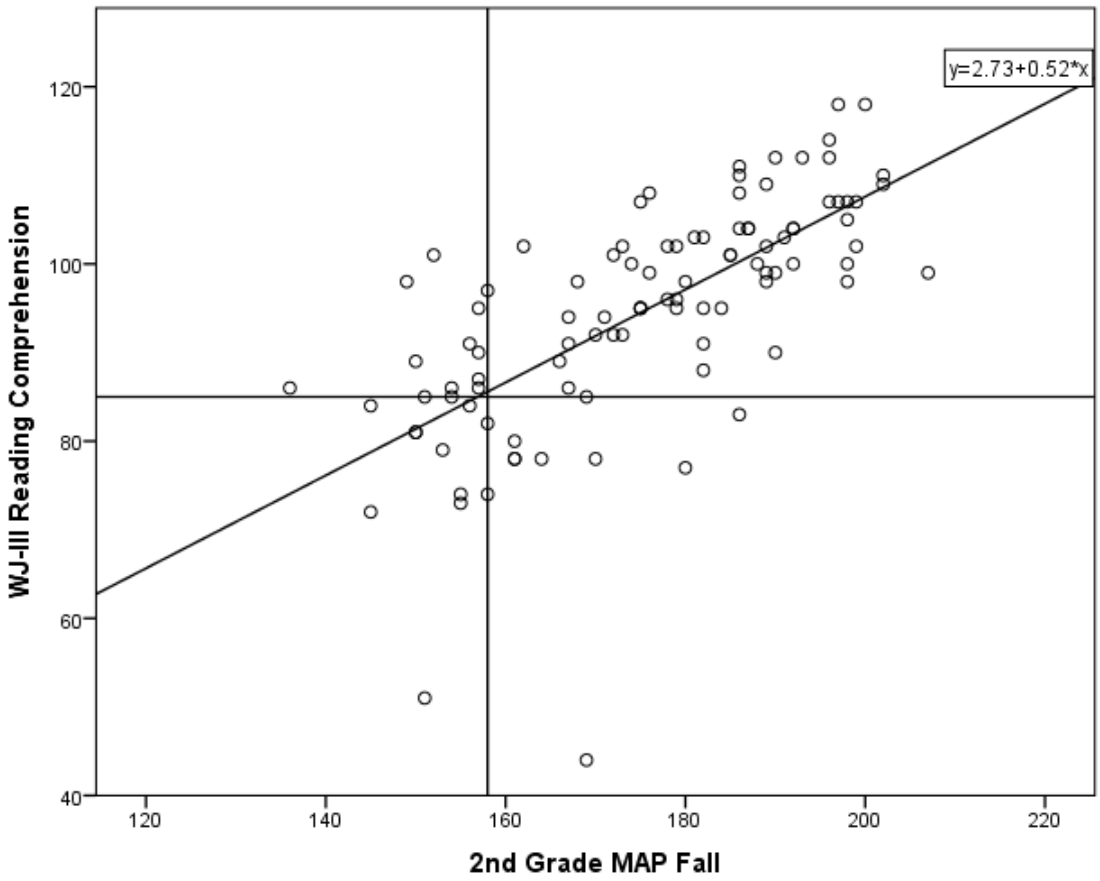

Figure 4. Regression analysis of second grade fall MAP scores plotted with second grade WJ-III Reading Comprehension scores.

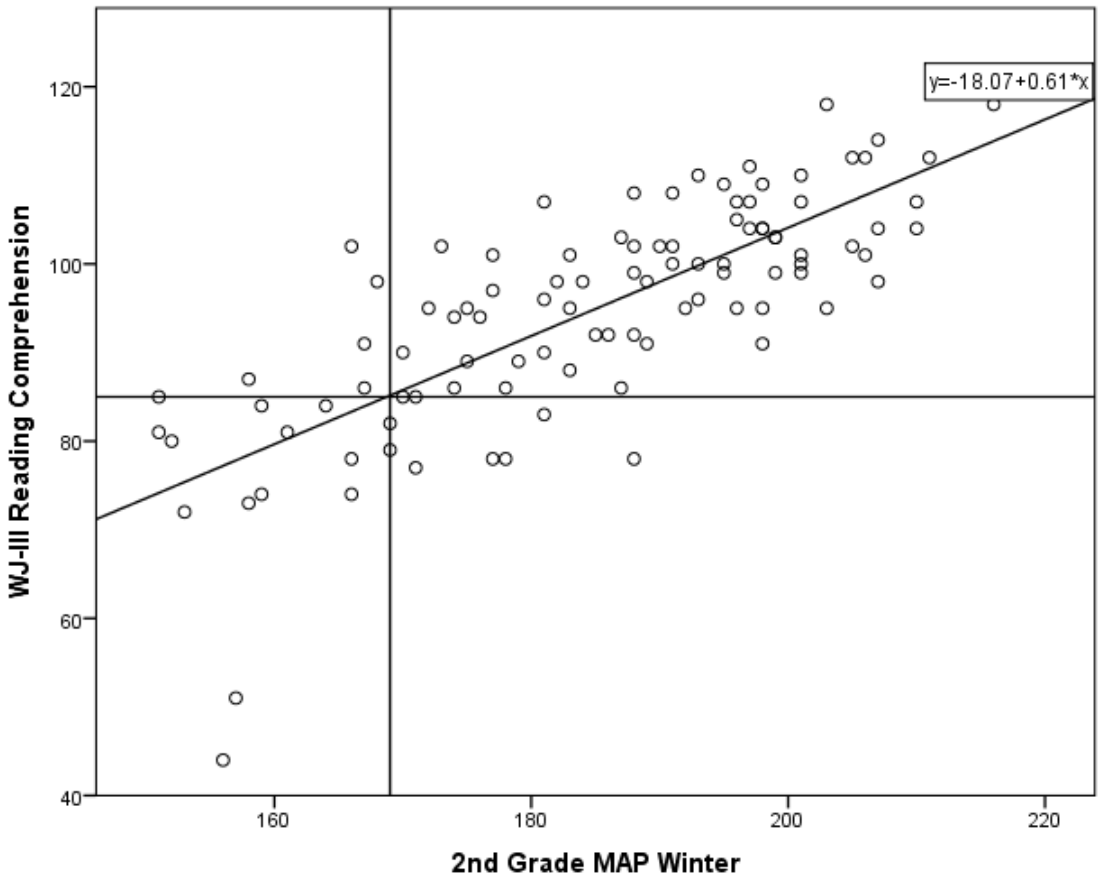

Figure 5. Regression analysis of second grade winter MAP scores plotted with second grade WJ-III Reading Comprehension scores.

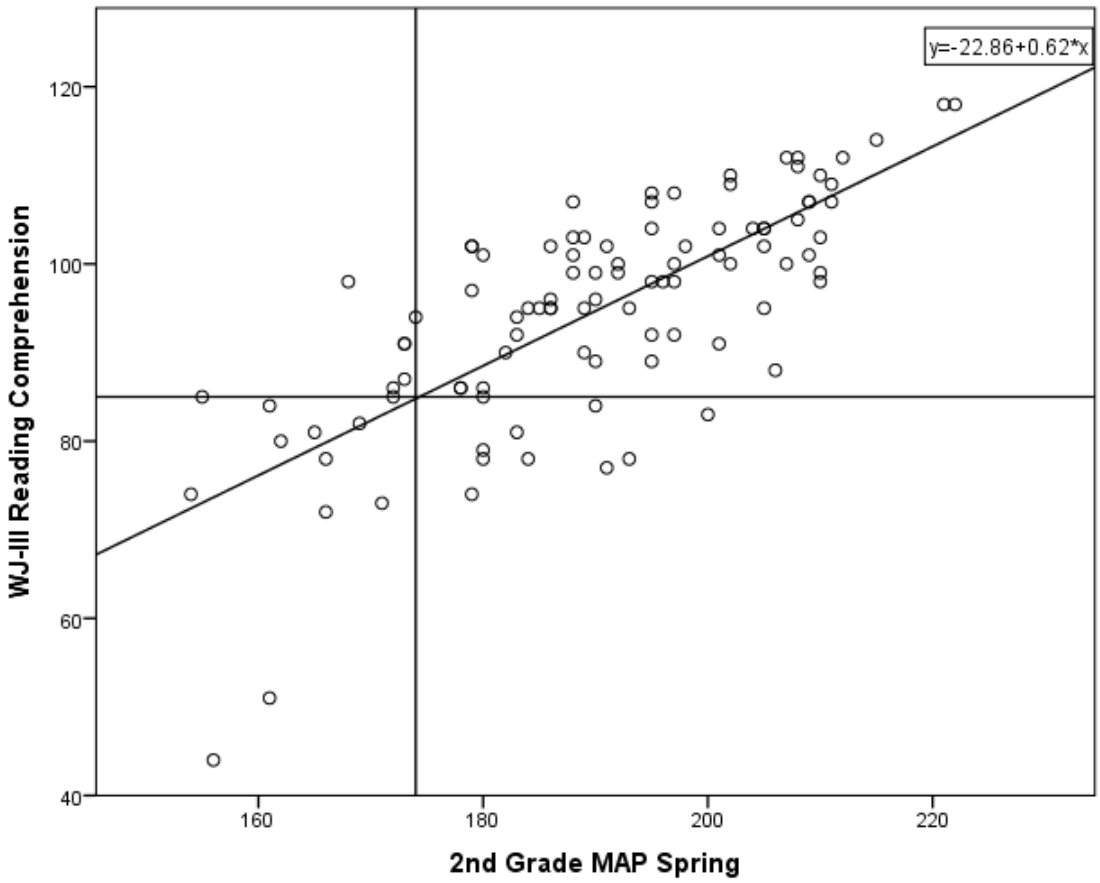

Figure 6. Regression analysis of second grade spring MAP scores plotted with second grade WJ-III Reading Comprehension scores.

Table 8

Recommended MAP Cutoff Scores and Percentile Ranks based on Regression Analysis

Grade - Time	Cutoff Score	Percentile Rank
First - Fall	149	20
First - Winter	156	14
First - Spring	164	20
Second - Fall	158	13
Second - Winter	169	17
Second - Spring	174	15

remained at the 20th percentile (what the school district was already using) for fall and spring of first grade. For all other assessments, the recommended cutoff score is less than the 20th percentile.

Each scatterplot in Figures 1 through 6 includes a vertical line representing the recommended cutoff score for that grade level and time of year based on the results of the simple linear regression analysis and a horizontal line representing the 16th percentile on the WJ-III Reading Comprehension cluster. The 16th percentile on the WJ-III was used as the criterion score, as that percentile is equivalent to a standard score of 85, which is one standard deviation below the mean of 100 (Woodcock et al., 2001). The slope-intercept formula used in the analyses was $Y = mX + b$ (Spatz, 2011). In each case, Y was equal to the 16th percentile on the WJ-III, which is a score of 85. The variable "m"

was equivalent to the slope of the line (a constant), and "b" was equivalent to the intersection of the line with the y-axis.

To provide additional descriptive analyses for the original 20th percentile and adjusted (based on regression analysis) cutoff scores, the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were determined for each cutoff score. According to Akobeng (2006), "The usefulness of diagnostic tests, that is their ability to detect a person with disease or exclude a person without a disease, is usually described by terms such as sensitivity, specificity, positive predictive value, and negative predictive value…" (p. 338). In the context of the current study, diagnostic tests are not used to predict diseases but, instead, a screening test (i.e., MAP) is used to determine the need for additional reading intervention.

The terms will be defined for clarity. Akobeng (2006) defined sensitivity as "…the proportion of people with disease who will have a positive result" (p. 339). In the context of the current study, sensitivity takes all the students who scored low (i.e., < 85) on the WJ-III Reading Comprehension cluster and determines the percentage of those who had a low score on the MAP reading assessment. Akobeng defined specificity as "….the proportion of people without the disease who will have a negative result" (p. 359). In terms of the current study, specificity takes all the students who scored above the cutoff score of 85 on the WJ-III Reading Comprehension cluster and determines the percentage of those who had a MAP score above the cutoff score.

Akobeng (2006) defined positive predictive value (PPV) as "…the proportion of people with a positive test result who actually have the disease" (p. 340). In relation to this current study, PPV takes all the students who scored below the MAP cutoff score and

determines the percentage who also had a score below 85 on the WJ-III. Akobeng defined negative predictive value (NPV) as "…the proportion of people with a negative test result who do not have disease" (p. 340). In the context of this study, NPV takes all the students who scored above the MAP cutoff score and determines the percentage who also had a score above 85 on the WJ-III.

Table 9 presents accuracy results for the original cutoff scores at the 20th percentile used by the school district as part of their RTI process. In addition to sensitivity, specificity, PPV, and NPV, the overall accuracy is included. Overall accuracy consists of the combined total percent of students identified as True Positives (i.e., a score below the MAP cutoff and a score below 85 on the WJ-III) and True Negatives (i.e., a score above the MAP cutoff and a score above 85 on the WJ-III). Cicchetti, Volkmar, Klin, and Showalter (1995) presented criteria for judging the sensitivity, specificity, and predictive values. According to the researchers, less than .70 is considered Poor; Fair values range from .70 to .79; Good values range from .80 to .89; and Excellent is considered greater than .90.

Table 9 lists accuracy results for the MAP cutoff scores at the 20th percentile, compared to one standard deviation below the mean on the WJ-III Reading Comprehension cluster. Accuracy results are explained in terms of sensitivity, specificity, positive predictive values, and negative predictive values. The following is an example of interpreting the values for students based on the MAP cutoff score for those students in the fall of their first grade year. A fall reading MAP-PG RIT score that falls at the 20th percentile during the fall of the first grade year is 149.

Table 9

Accuracy of MAP Scores at the 20th Percentile Compared to One Standard Deviation below the Mean on the Woodcock-Johnson III Reading Comprehension Cluster

	Percent				
Time - Cutoff	Sensitivity	Specificity	PPV	NPV	Overall
First Grade					
Fall - 149	42.1	92.6	57.1	87.2	83.0
Winter - 159	52.6	84.0	43.5	88.3	78.0
Spring - 164	47.4	93.8	64.3	88.4	85.0
Second Grade					
Fall - 163	73.7	82.7	50.0	93.1	81.0
Winter - 171	78.9	88.9	62.5	94.7	87.0
Spring - 177	52.6	90.1	55.6	89.0	83.0

Note. PPV = Positive Predictive Value; NPV = Negative Predictive Value

Of the 100 first grade students who were administered the MAP reading assessment in the fall, 19 received a score less than 85 on the WJ-III. Eight of the 19 also scored less than or equal to the MAP cutoff score of 149 (i.e., true positives), while 11 of the students scored greater than the MAP cutoff score of 149 (i.e., false negatives). Therefore, the sensitivity of the MAP cutoff score at the 20th percentile (i.e., 149) for a student in the fall of the first grade year, compared to a score of less than 85 on the WJ-III, is 42.1%. A sensitivity value at this level is considered poor (Cicchetti et al., 1995). A high sensitivity value for the MAP cutoff score of 149 would indicate that a high

proportion of students in need of reading interventions were correctly identified as such with the MAP assessment. However, a low sensitivity indicates that many students are in need of receiving additional reading interventions but are not identified as such. In other words, a low sensitivity value of this degree indicates that a high percentage of students are in need of receiving additional reading interventions but are not correctly identified as needing these interventions based on their MAP reading score. To increase sensitivity, the MAP cutoff score would need to decrease. By increasing sensitivity, the number of false negative results will be minimized, and the majority of students who actually have a reading skill deficit will be identified as such with a highly sensitive universal screening assessment.

Of the 100 first grade students who were administered the MAP reading assessment in the fall, 81 received a score greater than or equal to 85 on the WJ-III. Seventy-five of these students were identified as being "true negatives" based on their MAP and WJ-III reading test performance, or they received a score greater than 149 on the MAP assessment and a score greater than or equal to 85 on the WJ-III. Six of these students were identified as being "false positives," i.e., they received a score less than or equal to 149 on the MAP, but greater than or equal to 85 on the WJ-III. Therefore, the specificity of the MAP cutoff score at the 20th percentile (i.e., 149), compared to a score of less than 85 on the WJ-III, is 92.6%. A specificity value at this level is considered excellent (Cicchetti et al., 1995). This specificity score indicates that the number of identified false positives is very low. A high proportion of students were correctly identified as not in need of reading skill intervention.

Of the 100 first grade students who were administered the MAP reading assessment in the fall, 14 received a score less than or equal to 149. Only eight of these 14 students were "true positives," i.e., they received a score less than or equal to 149 on the MAP and less than 85 on the WJ-III. The remaining six of these 14 students were "false positives," indicating that, while they received a score that was equal to or less than 149 on the MAP, they received a score of 85 or greater on the WJ-III. The proportion of first grade students with a low MAP score (i.e., less than or equal to 149) who truly scored low on the WJ-III (i.e., less than 85) was 57.1%. A predictive value at this level is considered poor (Cicchetti et al., 1995). A low positive predictive value such as this indicates that almost half of the students who scored low on the MAP assessment (i.e., less than or equal to 149) received a high score on the WJ-III (i.e., greater than or equal to 85).

Of the 100 first grade students who were administered the MAP reading assessment in the fall, 86 of them attained a MAP score greater than 149. Seventy-five of these 86 students attained a MAP score greater than 149 and a WJ-III score greater than or equal to 85, which indicates that they were "true negatives." These students received a high score on both the MAP and the WJ-III. Only 11 of these 86 students were identified as "false negatives," i.e., they received a MAP score of 149 or greater, but a WJ-III score less than 85. The proportion of first grade students with a MAP score greater than 149 who were measured to also have a WJ-III score greater than or equal to 85 was 87.2%. A negative predictive value at this level is considered good (Cicchetti et al., 1995).

Table 10 presents accuracy results for the MAP cutoff scores adjusted based on regression analyses. The values for the adjusted MAP cutoff scores remained at the 20th

percentile for both the fall and spring of first grade. The remainder of the MAP cutoff scores decreased. See Table 8 for the percentile ranks of the adjusted MAP cutoff scores configured using regression analyses. Calculating the cutoff scores utilizing regression analysis generally caused the sensitivities of the MAP score cutoffs to decline. As expected, as the sensitivity decreases, the specificity increases because decreasing the score cutoff will capture fewer students who qualify as in need of reading interventions. Therefore, fewer students will receive the reading interventions they may require. Given that the MAP scores are utilized to rule out the need for additional interventions in struggling students, it appears that it may be preferential to use a standard cutoff score such as the 20th percentile, rather than calculating individual cut-off scores using regression analysis for each MAP test administration. However, with the use of a larger sample size, the cutoff scores calculated using regression analysis might have produced higher sensitivity scores. These results should be considered with caution based on the small sample size of this study.

Table 10

Accuracy of Adjusted MAP Cutoff Scores based on Regression Analysis to One Standard Deviation below the Mean on the Woodcock-Johnson III Reading Comprehension Cluster

	Percent				
Time - Cutoff	Sensitivity	Specificity	PPV	NPV	Overall
First Grade					
Fall - 149	42.1	92.6	57.1	87.2	83.0
Winter - 156	36.8	92.6	53.8	86.2	82.0
Spring - 164	47.4	93.8	64.3	88.4	85.0
Second Grade					
Fall - 158	57.9	84.0	45.8	89.5	79.0
Winter - 169	73.7	92.6	70.0	93.8	89.0
Spring - 174	52.6	90.1	55.6	89.0	83.0

Note. PPV = Positive Predictive Value; NPV = Negative Predictive Value. Scores from Fall and Spring of first grade did not change from Table 8.

CHAPTER V: DISCUSSION

The purpose of this research project was to determine whether a relationship exists between the Measures of Academic Progress (MAP, NWEA, 2009) reading assessment and the reading tests of the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III, Woodcock et al., 2001). The targeted school district in this study uses the MAP assessment as a universal screening measure to assess student reading achievement level three times per year: fall, winter, and spring. The reading tests of the WJ-III Tests of Achievement often are used to assess the reading levels of primary grade students who have been referred for a special education evaluation. By determining that a relationship exists between the MAP and WJ-III reading assessments, the data within this study will inform the targeted school district, as well as other school districts across Kentucky and in other states, on the method to efficiently and effectively determine cutoff scores and make instructional decisions within an RTI framework for transitioning students between tiers. This research project addressed four questions:

1. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III administered in spring of second grade? This research question assessed the predictive validity of the MAP-PG first grade scores using the tests on the WJ-III as the criterion measures.
2. Do scores on the MAP-PG reading test administered in first grade (i.e., fall, winter, spring) predict performance on the fall, winter, and spring MAP reading tests in the second grade? This research question assessed the

predictive validity of the MAP-PG first grade scores using the second grade administration of the MAP as the criterion measure.

3. Do spring scores on the MAP reading test for second grade students significantly correlate with the WJ-III tests administered in the spring of second grade (i.e., Basic Reading, Reading Comprehension, and Reading Fluency)? This research question assessed the concurrent validity of the MAP second grade scores using the WJ-III tests as the criterion measures.
4. The area from the WJ-III (i.e., Basic Reading, Reading Comprehension, Reading Fluency) with the highest correlations from the MAP scores was further analyzed by conducting scatterplots and regression analyses to answer the question: What would be the best cutoff scores on the MAP-PG reading test administered in the fall, winter, and spring of first grade and on the MAP reading test administered in the fall, winter, and spring of second grade that indicates a severe need for intervention services in the area of reading, as indicated by second grade WJ-III reading scores less than the 16th percentile?

This research represents a two-year longitudinal study of early primary students. MAP-PG scores were obtained for those students enrolled in the first grade during the 2009-2010 school year. MAP scores were obtained for this same group of students who were enrolled in the second grade during the 2010-2011 school year. One hundred of the second grade students were randomly selected and assessed with the WJ-III reading tests during May 2011. The proceeding sections include a recap of the results gleaned from each question, as well as a discussion of the results. Limitations of this study and recommendations for future research also will be addressed.

Research Question One

The first research question sought to determine the predictive validity of the MAP-PG reading test when compared to the WJ-III reading tests. Specifically, the purpose was to determine whether scores on the MAP-PG reading test administered in first grade correlated with the Basic Reading, Reading Comprehension, and Reading Fluency scores of the WJ-III administered in the spring of second grade. Pearson correlations indicated a moderate relationship between the MAP-PG reading test scores and scores obtained on the Basic Reading, Reading Comprehension, and Reading Fluency tests of the WJ-III. These findings determined that first grade test scores on the MAP-PG are related to later student performance on the WJ-III. Given that the MAP-PG is a computer-based test, and the first grade students are hearing the information rather than reading it themselves, these results are important in the sense that the MAP-PG can be used with confidence by schools. It should be noted that the correlations between first grade MAP-PG scores and the WJ-III Reading Comprehension cluster scores were slightly higher than for either Basic Reading or Reading Fluency in the fall, winter, and spring. This indicates that the MAP-PG assesses Reading Comprehension to a higher degree than Basic Reading or Reading Fluency skills.

Research Question Two

The second research question assessed the predictive validity of the MAP-PG reading test administered in the first grade, when compared to the MAP reading test administered in the second grade. As the first grade version of the MAP assessment includes audio that is heard by the student via headphones, and the second grade version of the MAP assessment requires reading without the accommodation of audio, it was

questionable whether the first and second grade versions of the assessment would be strongly correlated. Results indicate that a moderate to strong correlation was found between the MAP-PG scores from the first grade and MAP scores from the second grade. The lowest correlation was between the first grade spring MAP-PG scores and the second grade fall MAP scores. This finding is curious, as those two MAP administrations were consecutive. The relatively lower correlation may be the result of the novelty of the assessment task in the fall of second grade, as it was the first time the students took the test without audio. Most likely, however, the lower correlation can be attributed to the fact that the MAP scores, on average, dropped between spring of the first grade and fall of second grade. The drop may be due simply because most children do not receive reading instruction during the summer months when school is not in session. Indeed, other research has shown that students regress in academic skills over the summer months (e.g., Reece, Myers, Nofsinger, & Brown, 2000). These results provide additional evidence that students can benefit from more exposure to reading or structured tutoring at home and/or through a summer reading program in an attempt to prevent a loss of reading skills during long periods of school breaks.

Research Question Three

The third research question assessed the concurrent validity of the spring MAP second grade reading scores compared to the WJ-III reading tests, which also were administered in spring of the sample's second grade year. Results indicate a moderate to strong correlation between spring second grade MAP scores and the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency scores. Consistent with most of the MAP and WJ-III comparisons, the correlation between spring second grade MAP

scores and the WJ-III Reading Comprehension cluster score was slightly higher than for either Basic Reading or Reading Fluency. This indicates that the MAP assesses Reading Comprehension to a higher degree than Basic Reading or Reading Fluency.

Although not directly related to the third research question, the highest correlation between the WJ-III Reading Comprehension cluster and the MAP reading tests occurred at the winter second grade administration. Logically, it would seem that the highest correlation between the MAP and WJ-III assessments would occur during the spring, as this is the time when the WJ-III was given and students have received the most reading instruction. It would make sense for correlations to be lower during the fall, as students generally regress over the summer when they receive no reading instruction for two to three months. Perhaps the reason for the highest correlation during the winter months is because, during the spring, students are overloaded with summative assessments. Frequent assessments may exhaust students and hinder their ability to perform to their highest extent possible. However, during the winter, generally the only assessment that a student receives is a universal screening assessment. While the correlation between the MAP given in the winter of second grade was highest with the WJ-III Reading Comprehension score, it was only slightly higher (i.e., 0.77 vs. 0.75) than the spring MAP correlation. Research with an increased sample size should be conducted to further explore whether the higher correlation in the winter remains consistent or possible reasons can be determined for the difference.

Research Question Four

The fourth research question sought to determine whether better cutoff scores could be utilized as part of the school district's RTI process. One area of the WJ-III (i.e.,

Reading Comprehension) was correlated more highly with the MAP assessments than with other areas (i.e., Basic Reading, Reading Fluency). Using this knowledge, MAP cutoff scores for transitioning students from Tier I to Tier II of RTI were calculated only for the area of Reading Comprehension using simple linear regression. The regression analyses indicate that the school district used appropriate cutoff scores (i.e., at the 20th percentile) for first grade fall and spring MAP-PG administrations. For all other administration times, the cutoff score dropped below the 20th percentile and ranged between the 13th and 17th percentiles. Thus, the recommended cutoff scores are not dramatically different than the arbitrarily chosen scores used by the school district. However, based on the current results, the targeted school district can now use data-based cutoff scores appropriate to a student's age and time of year.

Additional descriptive information was determined regarding the accuracy of referring students for more intensive interventions using a pre-established cutoff score (i.e., at the 20th percentile) and a cutoff score based on regression analysis. Providing data related to sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) will assist districts in determining the probability of making "correct" instructional decisions for students. The determination of "correct" decisions for this study was based on a WJ-III Reading Comprehension score at the 16th percentile. Using a higher or lower cutoff score would change the results from this study. Ideally, correctness would have been determined by analyzing which students eventually were classified as learning disabled in reading. Such a study, however, would have required a much larger sample of students over a longer period of time.

To recap definitions presented in Chapter IV, sensitivity measures the proportion of students who scored low (i.e., below the cutoff scores) on both the WJ-III Reading Comprehension cluster and the MAP reading assessment, compared to all students who scored low on the WJ-III. Specificity measures the proportion of students who received a high score (i.e., above the cutoff scores) on both the WJ-III Reading Comprehension cluster and the MAP reading assessment, compared to all students who scored high on the MAP reading assessment. The analyses of the data indicate relatively poor sensitivity rates, even after adjustments in MAP cutoff scores were made based on regression analysis. In general, these data reveal that the use of simple linear regression analysis to determine cutoff scores increased specificity, but not sensitivity. Sensitivity values were poor for all administration times, except second grade winter, when sensitivity was measured as fair. Conversely, after the adjustments in cutoff scores, specificity values were measured as excellent for all administration times, except second grade fall, when specificity was measured as good. According to Akobeng (2006), a trade-off always exists between sensitivity and specificity. For instance, if sensitivity increases, then specificity decreases, and vice versa.

Due to the small sample size of this current study, it was difficult to achieve a more accurate sensitivity level, particularly because many of the 100 students who were assessed with the WJ-III scored within the Average and Above Average ranges, in comparison to those who received a low score on the assessment. On the positive side, as the results revealed, if students are assessed with the MAP and have a high score, they likely will not need additional reading interventions. Thus, having higher specificity rates suggests that the results of this study may help achieve one of the overall goals of

the research, which was to decrease inappropriate transitions through the tiers and referrals for special education services. Students will continue to be assessed with the MAP and found to have a low reading score who will have at least an average WJ-III Reading Comprehension score. Given that the MAP is intended as a universal screener, however, it is functioning as it should. It is better for a screener to over-identify students as possibly needing intervention or further assessment, than to miss students who require additional attention.

Limitations

A limitation of this study is related to the small sample size. As previously noted, not only does the small sample size potentially affect the strength of the correlations, it also severely affects the sensitivity values when low numbers of low performing students are included. With a larger sample of students, correlations and sensitivity values may have been drastically different. For instance, no correlations between the MAP and WJ-III fell within the .80 or .90 range. The moderate correlations may very well be accurate, although it is possible that, with a larger sample of students, a better representation of the normal curve would have resulted in relation to student scores on the MAP and WJ-III. A larger and broader range of students, in terms of reading abilities, may have increased sensitivity values. Regardless of the effect of an increased sample size on correlation and sensitivity values, the fact remains that the results of this study should be regarded with caution, due to the small sample size and the fact that data were collected from students in one school district in Kentucky. Therefore, the results of this study reflect only issues of RTI implementation specific to early primary grades in the targeted district. This will

limit the generalizability of the results from this study to other districts across Kentucky and the nation.

Based on the correlations between the MAP reading assessment and the WJ-III Basic Reading, Reading Comprehension, and Reading Fluency areas, overall, the Reading Comprehension cluster had the highest correlations with the MAP. As a result, cutoff scores were determined for only the area of Reading Comprehension. It was not determined whether the correlations for Reading Comprehension were statistically significantly higher than the Basic Reading and Reading Fluency areas. However, it appears the MAP reading assessment may not adequately measure Basic Reading and Reading Fluency skills. Teachers and other school personnel need to ensure that they are pinpointing their students' areas of difficulty in reading (i.e., Basic Reading, Reading Comprehension, Reading Fluency) to be certain that they are providing the students with appropriate reading intervention in the area of need. It is very likely that, if a student scores low on the MAP reading assessment and a teacher provides the student with a reading intervention that improves basic reading skills, then the intervention will appear not to have worked since the student's area of struggle may actually be a comprehension issue rather than one of basic reading.

The cutoff score of one standard deviation below the mean on the WJ-III (i.e., 16th percentile or standard score of 85) was arbitrarily chosen to represent below average reading abilities. If a cutoff score indicating a more severe reading difficulty had been chosen (e.g., 1.5 or 2.0 standard deviations below the mean), the classification accuracy percentages (e.g., sensitivity, specificity) would have been different. However, a lower cutoff score on the WJ-III may better reflect students identified as Learning Disabled in

Kentucky. The small sample size prevented analyses using stricter cutoff scores on the WJ-III.

Recommendations for Future Research

The MAP assessment also is used as the universal screening assessment for math, and the WJ-III is commonly used to diagnose Math Reasoning and Math Calculation disabilities. Of interest would be the determination as to whether a relationship exists between the MAP math assessment and the WJ-III tests of math achievement. It would also be helpful to discover whether the MAP math assessment correlates higher with a specific area of math (i.e., Math Reasoning or Math Calculation) over another.

Pearson correlations between the MAP reading assessment and WJ-III reading tests indicate that correlations decreased between first grade spring MAP administration and second grade fall MAP administration. Correlations were generally higher during the winter of the second grade, versus spring of the second grade. The hypothesis was that the lapse in instruction between spring and fall decreased student reading achievement over the course of summer break. It also was hypothesized that correlations were highest during the winter, versus the spring, due to the many summative evaluations given in the spring at the end of the school year. That is, students are more likely to become overwhelmed and worn out with test taking, which will affect performance on the universal screener that is administered in the spring. These phenomena may be checked for accuracy if this study is replicated with a larger sample.

Finally, the fourth edition of the Woodcock-Johnson Tests of Achievement will be released in the summer of 2014. The current study could be replicated using the new version to determine whether similar results will be obtained. Also, as previously

suggested, it may prove helpful to model a similar study after the current study to analyze the relationship between the MAP math assessment with the new Woodcock-Johnson math tests.

Conclusion

The current study provides recommendations for the targeted school district in terms of instructional decisions within their RTI framework. The results also may provide useful information to other school districts of similar size and demographic makeup to the targeted school district.

The implementation of RTI represents a vast change to both the special education and general education settings. No longer can a general education teacher simply refer a student for special education without first assessing reading level in comparison to peer reading levels, conducting systematic interventions, and measuring intervention progress. With the IDEA's (2004) reference to RTI, general education teachers are now forced to deliver reading interventions before a team can meet to recommend that a student be referred for more intensive services, which sometimes involves a referral to special education and a subsequent comprehensive evaluation. However, despite RTI implementation, many students with adequate reading skills are inappropriately transitioned through the RTI tiers, to ultimately be referred for a special education evaluation. Hence, the very low hit rate (i.e., 33%) of the targeted school district.

Additional research should focus on determining the factors that may contribute to low hit rates. Goodman and Webb (2006) examined data in a Texas school district and speculated possible reasons for students being deemed as non-responsive to RTI interventions and referred for special education services. In their study, 66 students were

referred for special education services for a suspected reading disability, and only 21 qualified for a disability when the aptitude-achievement discrepancy model was used. Thus, the hit rate was approximately 32%. Goodman and Webb offered suggestions for the reasons students who did not perform low enough in reading to qualify for special education services with a reading disability were advanced through the RTI tiers of intervention and eventually referred for special education. One suggestion was that students may not have put forth their best effort with the interventions, but they made an effort when they knew they were being assessed for a reading disability.

Another suggestion was that general education teachers may possess a lack of faith in the RTI system. Teachers may choose to ignore the universal screening measure and progress monitoring data and continue to advance students through RTI tiers without solid evidence for doing so. Goodman and Webb's (2006) discussion also implied that general education teachers may possess a lack of knowledge regarding the RTI system. For example, teachers may not understand the process of using universal screening measures to identify reading achievement levels, how to identify and implement research-based interventions, and/or how to monitor student progress after intervention implementation. It is possible that this lack of understanding also may at times inappropriately lead to the advancement of students through RTI tiers.

At this point, it is unknown whether any students tested in the current study were referred for a suspected reading disability in the targeted school district. Similar to the Goodman and Webb (2006) study, it is possible that students assessed with the MAP assessment did not perform to the best of their ability, as they knew their scores did not count for a grade. Perhaps these students did not perform well on the MAP assessment

because they found it difficult to pay attention to a test administered on a computer, in comparison to working one-on-one with an examiner during the WJ-III administration. As suggested by Goodman and Webb, it is possible teachers lack an understanding or confidence in the RTI system. A lack of confidence in the universal screening data and RTI process may encourage teachers to progress students through the tiers of RTI in order that a school psychologist can "check and see" if a reading disability is present. The current results indicate that teachers can be confident in the MAP screening data.

Regardless of the reason for so many students to be transitioned through the RTI tiers, referred for a special education evaluation, and tested, only to find that they perform within age expected levels, data demonstrates that inappropriate transitions through the tiers decrease special education hit rates and are a costly use of resources. No matter what the cutoff score is for moving students from Tier I to Tier II of RTI, extraneous variables, such as lack of student motivation on the MAP test or lack of fidelity of intervention implementation, cause a student to be inappropriately transitioned through the tiers of RTI. Additional research on the RTI process clearly is needed.

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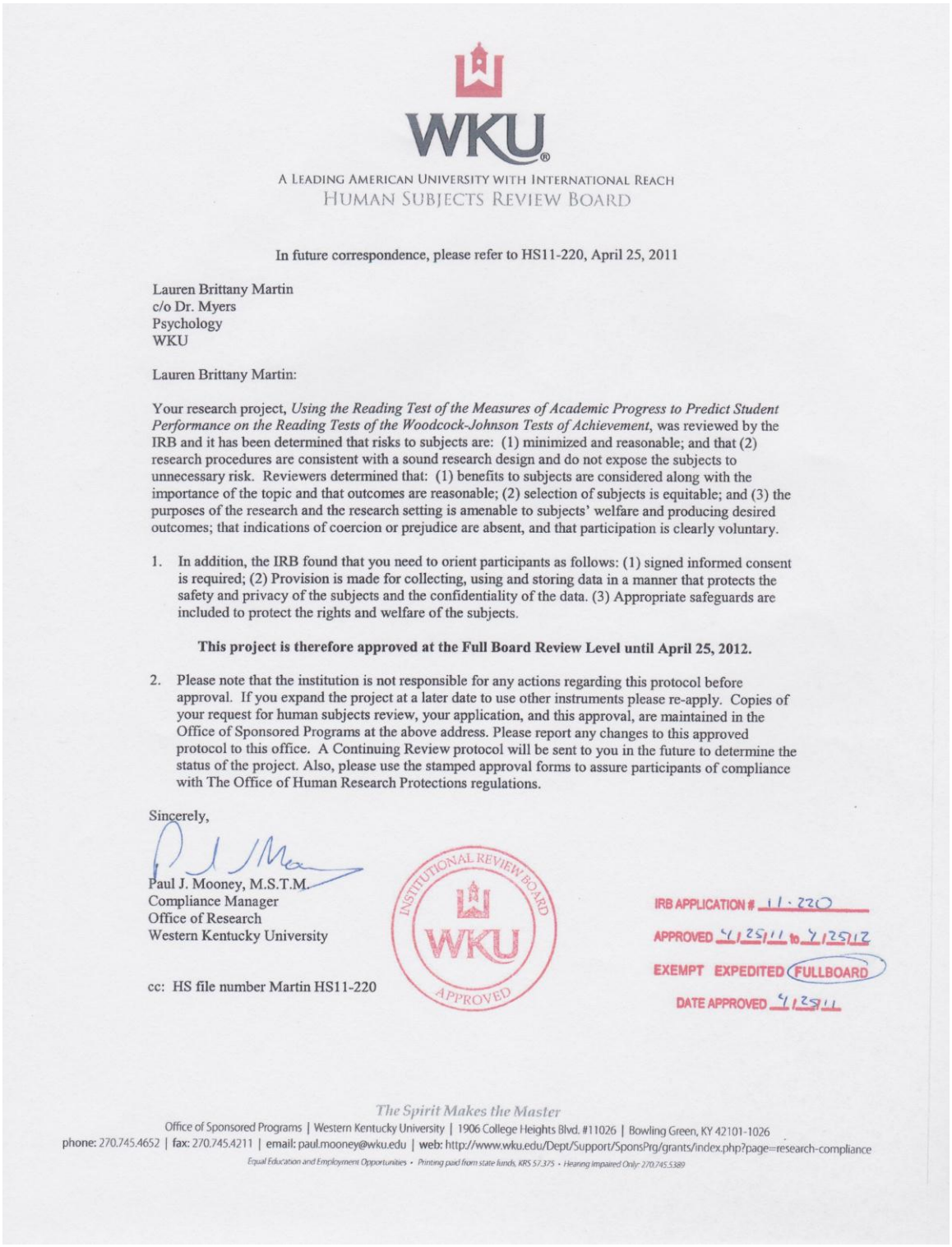
APPENDIX: INSTITUTIONAL REVIEW BOARD APPROVAL



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HUMAN SUBJECTS REVIEW BOARD

In future correspondence, please refer to HS11-220, April 25, 2011

Lauren Brittany Martin
c/o Dr. Myers
Psychology
WKU

Lauren Brittany Martin:

Your research project, *Using the Reading Test of the Measures of Academic Progress to Predict Student Performance on the Reading Tests of the Woodcock-Johnson Tests of Achievement*, was reviewed by the IRB and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the IRB found that you need to orient participants as follows: (1) signed informed consent is required; (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data. (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

This project is therefore approved at the Full Board Review Level until April 25, 2012.

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Sponsored Programs at the above address. Please report any changes to this approved protocol to this office. A Continuing Review protocol will be sent to you in the future to determine the status of the project. Also, please use the stamped approval forms to assure participants of compliance with The Office of Human Research Protections regulations.

Sincerely,

Paul J. Mooney, M.S.T.M.
Compliance Manager
Office of Research
Western Kentucky University

cc: HS file number Martin HS11-220

INSTITUTIONAL REVIEW BOARD WKU APPROVED

IRB APPLICATION # 11-220
APPROVED 4/25/11 to 4/25/12
EXEMPT EXPEDITED FULLBOARD
DATE APPROVED 4/25/11

The Spirit Makes the Master

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