

INVESTIGATION OF RTI EFFECTIVENESS

ABSTRACT OF APPLIED PROJECT

An applied project submitted in partial fulfillment  
of the requirements for the degree of  
Education Specialist at Morehead State University

by

Patricia L. Murphy

Committee Chairperson: Dr. Beverly Klecker

Associate Professor of Education

Morehead, Kentucky

2011

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## INVESTIGATION OF RTI EFFECTIVENESS

Director of Applied Project: Benedy M. Pleckw

Public schools throughout the United States are faced with the task of implementing Response to Intervention (RTI) as recommended by the Individuals with Disabilities Act 2004 (IDEA) and No Child Left Behind (NCLB). This was an ex post facto research study using secondary analyses of previously collected data to examine the differences between the performances of students who received interventions during the 2010-11 school year and students who did not receive interventions.

Research hypotheses were tested by computing descriptive statistics including the means ( $M$ ) and standard deviations ( $SD$ ) for each subject according to gender, grade, and treatment versus comparison groups. An independent  $t$  test was chosen to test for statistically significant differences in the data. The population for this study included 150 middle school students in grades 6, 7, and 8 from an eastern Kentucky district. The instrument used was Measures of Academic Progress (MAP) which served as the pretest and posttest for the study.

The initial findings of this study, using the raw data, were positive for both groups. Raw data scores showed that both groups made gains on their mean scores

from pretest to posttest in the reading and math content areas. When independent  $t$  test were calculated there was a statistically significant differences were identified between treatment and comparison groups.

Accepted by: Brenda M Klecher, Chair  
Wanda L. Staley  
[Signature]

APPLIED PROJECT

Patricia L. Murphy, M.A. in Education

Graduate School

Morehead State University

2011

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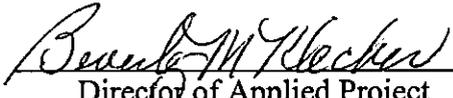
Committee Chair: Dr. Beverly Klecker

Professor of Education

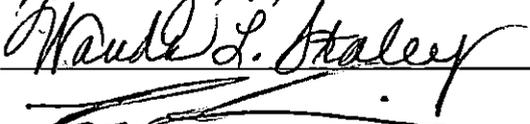
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2011

Accepted by the graduate faculty of the College of Education,  
Morehead State University, in  
partial fulfillment of the requirements for the  
Education Specialist Degree in Counseling

  
\_\_\_\_\_  
Director of Applied Project

Applied Project Committee:

 , Chair  
  
\_\_\_\_\_

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## **CHAPTER I**

### **INTRODUCTION**

#### **Statement of the Problem**

Public schools throughout the United States are faced with the task of implementing Response to Intervention (RTI) as recommended by the Individuals with Disabilities Act 2004 (IDEA) and No Child Left Behind (NCLB). RTI is a data-based process of monitoring student response to changes in instruction. It is designed to provide assistance to students before they fail. The goal of RTI is to quickly identify those who are not achieving benchmark goals, provide scientifically research-based interventions, and monitor student progress data to determine the effectiveness of the interventions. This study was designed to determine if the interventions administered in one eastern Kentucky middle school (EKMS) were effective in improving students' academic performance on the Measures of Academic Progress (MAP) test (Northwest Evaluation Association, 2011).

#### **Purpose of the Study**

This ex post facto research study used secondary analyses of previously collected data (Gay, Mills, & Airasian, 2009) to investigate the differences between the performances of students who received interventions during the 2010-11 school year and students who did not receive interventions. A universal screener, MAP, was administered in the fall and spring to identify students scoring below the proficient level and to monitor student progress throughout the school year. Students who were performing below the proficient level received interventions. The purpose of the

study was to determine whether the Response to Intervention (RTI) was effective in helping students achieve significantly higher scores on MAP during the 2010-11 school year.

### **Significance of the Study**

With the passage of NCLB and IDEA (2004) providing interventions to struggling students became more important than ever. RTI models have become a prominent topic of discussion among educators which has caused schools across the nation to struggle to find personnel, funds, and time within their school schedule to implement a system of interventions. Like many schools in Kentucky and throughout the United States, EKMS has made changes to school policies and schedules to implement RTI as recommended by state and federal policies. Ensuring that all students learn is important for educators at EKMS as they endeavor to ensure Adequate Yearly Progress (AYP) goals are met for NCLB goals. The outcome of this study will help them determine if their RTI program is having a positive effect on student achievement or if additional changes need to be implemented.

### **Statement of Hypotheses**

#### **Research Hypothesis 1**

Middle school students who received RTI in reading will show significantly more improvement on the MAP reading test than students who did not receive RTI.

**Research Hypothesis 2**

Middle school students who received RTI in mathematics will show significantly more improvement on the MAP mathematics test than students who did not receive RTI.

**Null Hypothesis**

**H<sub>0</sub> 1:** There will be no significant difference between the MAP reading scores of middle school students who received RTI and the reading scores of middle school students who did not receive RTI during the 2010-11 school year.

**H<sub>0</sub> 2:** There will be no significant difference between the MAP mathematics scores of middle school students who received RTI and the mathematics scores of middle school students who did not receive RTI during the 2010-11 school year.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### **Introduction to Review of the Literature**

This review of literature offers background information about current legislation recommending the use of interventions, in particular, the No Child Left Behind Act (NCLB, 2001), IDEA (2004), Senate Bill 168, Senate Bill 1, and a variety of related topics regarding RTI and students who need interventions. Information from previous studies on the use and effectiveness of RTI will also be discussed.

Often students who fail academically come from poverty stricken families. Schools with low test scores frequently use their students' low socioeconomic status as the reason for their failure. To avoid failure, learning to read at an early age is essential for academic success for all students. Low performing students in elementary school are not likely to get caught up with their peers if they do not learn to read well by the end of third grade. Many who cannot read at grade level will fail their classes, drop out of school before obtaining a high school diploma, and struggle to find employment. Over 50 percent of the prison population in the United States is illiterate (Bar & Parrett, 2003). A study of Kentucky test scores found that "Achievement gaps among sub-populations of school students, obviously contribute to low graduation rates, low rate of college education, and eventually low career/professional attainment among the disadvantaged sub-groups who lag behind their counterparts in school test scores" (Kentucky Commission on Human Rights [KCHR], 2003, p. 9). The study also found that the largest achievement gaps occurred

for students who had a disability or came from low income homes. According to 2009 Poverty Rates for Kentucky and Counties (2010) EKMS is located in an area where 48% of children under the age of 18 live in poverty. Current legislation attempts to provide equal opportunities for learning and education for all students to resolve this problem.

### **Legislation related to Response to Intervention**

#### **Individuals with Disabilities Education Act 2004**

The Individuals with Disabilities Education Act (IDEA) 2004 also known as Individuals with Disabilities Improvement Act (IDEIA) is a law ensuring services to children with disabilities throughout the United States. This law regulates how state and public agencies provide early intervention services, special education, and related services to youth with disabilities. The reauthorization of the IDEA stresses the use of rigorous instruction and research based interventions (Kentucky Department of Education, 2008). Two significant changes in this law are provisions that allow school districts to spend up to 15% of their IDEA Part B funds on early intervention services (EIS) in general education settings and it forbids states to require school districts to use discrepancy formulas to determine if students are eligible for special education services in the category of specific learning disabilities. In addition, Congress recommended that school districts use a response to intervention (RTI) model in determining eligibility of students with learning disabilities. These changes have affected the ways in which school district personnel educate students in both general and special education (Yell & Walker, 2010).

IDEA 2004 requires that school personnel screen all general education students within the school to identify which students are at risk for developing significant academic or behavior problems. At-risk students who are identified are to receive intervention services. In order for school districts to deliver EIS, school personnel should be able to implement scientifically research-based academic and behavioral programs, determine which students are not responding to the interventions, and provide increasing intensity or research-based interventions to those students (Yell & Walker, 2010).

### **No Child Left Behind Act**

The No Child Left Behind Act (NCLB), Public Law 107-110, was passed by Congress on January 2, 2002 and was signed by President George W. Bush. NCLB revised and reauthorized the Elementary and Secondary Education Act (ESEA) which encompasses Title I. It is the primary federal law affecting education from kindergarten through high school. Forte (2010) stated, "At the end of the day, the No Child Left Behind Act of 2001 (NCLB) is supposed to be about improving achievement among low-achieving students in high poverty schools" (p. 76). This law creates significant changes for states. It is based on four key principals:

- Accountability to ensure disadvantaged students reach academic proficiency
- Flexibility allowing more local control on doing what works based on scientific research
- Research-based education

- Increased parental options

NCLB stresses the use of rigorous instruction and research based interventions as well as the use of effective academic and behavior supports to improve student performance (*United States Department of Education*, “Introduction: No Child Left Behind” n.d.). The major focus is to close achievement gaps by providing all children with a fair, equal and significant opportunity to obtain a high quality education (State of Washington Office of the Superintendent of Public Instruction, n.d.)

NCLB regulations set deadlines for states to expand the scope and frequency of student testing and makes states accountable for ensuring schools make AYP. AYP is the individual state’s measure of progress toward meeting the goal of bringing 100 percent of students up to the proficient level in reading and math by 2014 (Kavale & Spaulding 2008). Schools must meet AYP targets set by the state for all students as well as narrow the gap for subgroups disaggregated by gender, race/ethnicity, poverty level, English-language proficiency and disability status with at least 95 percent student participation in the assessment program. Schools failing to make AYP for two consecutive years or more are considered to be in need of improvement and required to submit to a turnaround plan (Kavale & Spaulding, 2008). Schools that do not meet AYP are required to allow students to transfer schools and the home school district is required to provide transportation. NCLB also requires states to verify that every teacher is qualified to teach in their subject area.

The No Child Left Behind Act has been the source of much controversy in the education community as well as with the public. Zhao (2009) claimed that NCLB places all the responsibility on teachers and wrote that the spirit of NCLB denies the real cause of education inequality which is poverty, funding gaps, and psychological damages caused by racial discrimination. NCLB supporters praise the early identification efforts and tough accountability to educational standards which hold states and schools more accountable for student progress. They believe it will improve the quality of public education for all students. Critics claim the law is unfair and targets teachers for the problems in schools. They contend that the act hasn't been effective in improving education in public education, especially high schools, as evidenced by mixed results in standardized tests since NCLB's 2002 inception (White, n. d.). Education Secretary Arne Duncan addressed Congress March 9, 2011 and said that his department estimated that 82 percent of America's schools could fail to meet education goals set by No Child Left Behind this year (United States Department of Education, 2011).

It is currently September 2011 and NCLB is up for reauthorization; on March 13, 2010 the Obama administration released its blueprint for revising the ESEA which asks states to adopt college and career readiness standards and reward schools for producing significant gains in student achievement. Congress was unable to reach an agreement for revamping the law for reauthorization in the spring of this year, even though President Obama had called for a bill before the 2011-12 school year began. Since Congress failed to pass a bill, the "Obama administration will provide a

process for states to seek relief from key provisions of the law, provided that they are willing to embrace education reform” (United States Department of Education, 2011). Congress will continue to work on the reauthorization this fall. Until Congress reaches a decision about what changes need to be made, schools will continue to be accountable for the specifications under the current NCLB act unless they apply for “relief”. This means states can apply for a waiver to request flexibility from certain NCLB mandates if they agree to transition students, teachers, and schools to a system that supports college and career readiness.

IDEA and NCLB are alike in that they both support identification of struggling students and implementation of early interventions services. Both state instruction should be delivered with increasing intensity at sequential levels and emphasize progress monitoring. NCLB supporters view RTI as standards driven educational reform. This approach is echoed in the IDEA 2004 amendments. Both groups agree that participation from general education is essential for success (Fuchs, Fuchs, & Stecker, 2010).

Even though NCLB and IDEA share some commonalities, they differ in their views of the nature and objective of RTI. The NCLB group visualizes high incidence disabilities disappearing if the right general education is in place. For the NCLB group, “RTI stands for a reformed service delivery system that emphasizes early intervention and the unification of general education and special education, which in turn facilitates adoption of challenging standards and accountability for all” (Fuchs, Fuchs, & Stecker, 2010, p. 304). IDEA supporters promote RTI as a replicable,

linear, and time-sensitive process with fewer tiers of instruction, which serves both prevention and a more valid process of disability identification. They view high-incidence disabilities as valid and they advocate for a distinctive and important role for special education (Fuchs, et al., 2010).

### **Kentucky Senate Bill 168**

As a result of NCLB Kentucky Senate Bill 168 was enacted. “The overall goal of Senate Bill 168 is to hold individual schools accountable for closing their achievement gaps using definite targets and measures” (Kentucky Commission on Human Rights [KCHR], 2003, p. 23). The Bill aims to close the achievement gaps among various groups of students in all Kentucky public schools by the year 2014. Senate Bill 168 led to the amendment of Kentucky Revised Statute (KRS) 158.649. It requires all Kentucky schools to identify achievement gaps between the following subgroups: gender, disability status, socioeconomic status, race, and English proficiency (KRS 158.649, 2010).

### **Kentucky Senate Bill 1**

Getting in line with Obama’s Blueprint for Reform, Governor Steve Beshear signed Senate Bill 1 into law March 26, 2009. This legislation is designed to impact college and career readiness. It mandates for the Kentucky Council on Postsecondary Education (CPE), the Kentucky Board of Education (KBE), and the Kentucky Department of Education (KDE) to develop a cohesive strategy to reduce college remediation rates of recent high school graduates by at least fifty percent by 2014 from the rates in 2010, and to increase the college completion rates of students

enrolled in one or more remedial classes by three percent annually from 2009 to 2014. Four key strategies are identified to promote college and career readiness and degree completion:

- Accelerated Learning Opportunities
- Secondary Intervention Programs
- College and Career Readiness Advising
- Postsecondary College Persistence and Degree Completion

Senate Bill 1 (2009) also requires schools to provide a transitional course or monitored intervention to every student not meeting college readiness benchmarks in English/language arts or mathematics (Kentucky Department of Education, 2011).

### **Response to Intervention (RTI)**

Response to intervention is a data-based approach for developing effective interventions related to the student's academic and behavioral needs. It is a decision-making process for:

- Determining gaps between current and desired results
- Developing, implementing and adapting interventions
- Matching the extent of educational needs to the intensity of interventions
- Implementing interventions at different tiers

RTI is not an intervention; it is a data-based process for developing effective interventions and evaluating outcomes (Reschly & Wood-Garnett, 2009).

Kentucky has developed a framework called *A Guide to Kentucky System of Interventions* to guide schools in developing a comprehensive instructional system that addresses RTI, accelerated learning requirements, closing achievement gaps, high-quality instruction, readiness to learn, and student transitions. The core components of RTI in the Kentucky Systems of Intervention (KSI) include:

- Universal screenings
- Measureable definition of the problem area
- Baseline data prior to intervention
- Development of a written plan specifying accountability
- Progress monitoring
- Comparison of pre-intervention data to post-intervention data to determine effectiveness

A three tiered model of interventions is outlined. First, a universal screener is administered to all students to identify those performing below proficiency. The first level of intervention is Tier 1. Tier 1 of instruction occurs in the regular classroom. It is simply the core instruction delivered to all students. Approximately 80% of students should be successful at this level. If screening results indicate that a student is below proficiency in a specific area, they receive appropriate interventions in the classroom differentiated to meet their individual needs. Progress monitoring is done to determine if the interventions are effective. If not, the student is recommended for Tier 2 interventions (Kentucky Department of Education, 2008).

In addition to Tier 1 core instruction, students in Tier 2 receive increasingly intensive instruction based on their needs as indicated by progress monitoring. Approximately 15% of students need Tier 2 interventions and respond successfully at this level. Tier 2 is usually done in small groups of students focusing on targeted skills. If a student fails to make progress in Tier 2 they then move to Tier 3 (Kentucky Department of Education, 2008).

In Tier 3, the interventions are more intensive, specifically designed to the student's needs, and are usually longer in length than the other tiers. In addition to Tier 3, students continue to receive Tier 1 and 2 interventions. Progress monitoring is done more frequently in this tier. Approximately 5% of students reach this level of instruction and respond successfully (Kentucky Department of Education, 2008).

Traditionally schools' solution to learning emergencies were to give individual teacher response, place in remedial classes, refer for summer school, retain the student, place in alternative school, refer for special education, or simply do nothing. With RTI systems and increased pressure to improve performance on state testing, students receive interventions earlier, which help them to get caught up before they get far behind their peers. They also receive ongoing formal evaluations which allow for more specific intervention recommendations. RTI consists of different tiers and differs in terms of who is responsible for implementing interventions at each tier. Usually the frequency and intensity of interventions increases as student needs become greater or when students fail to respond to less intensive interventions, but each tier typically lasts 6-8 weeks. RTI teams are usually composed of

administrators, district office personnel, special education teachers, school psychologist, and the student's family members. Members need to plan and organize when designing and implementing RTI in their schools (Buffum, Mattos, & Weber, 2009).

Vaughn, et al. (2010) conducted a study on RTI for middle school students receiving Tier 2 reading interventions. The study examined the effectiveness of a yearlong intervention system provided by the researchers and compared them to a similar group of struggling readers who received school-provided, Tier 1, instruction. The interventions emphasized word recognition, vocabulary, fluency, and comprehension. All content area teachers received researcher provided professional development.

The study was conducted in two large cities in the southwestern part of the United States. Students qualifying for free or reduced lunch ranged from 56% - 86% in the larger site and from 40% - 85% in the smaller site. Participants were chosen from sixth grade students who scored below passing on the state test and those who barely scored passing which put them at risk of failing due to measurement error of the test. The study also included a random sample of typical readers who scored at least one standard error of measurement above the passing score. Students received interventions for 50 minutes per day from September to May. To ensure fidelity of interventions, the interventionists were observed two to three times per month and provided feedback (Vaughn, et al., 2010).

Vaughn, et al. (2010) reported that students who participated in Tier 2 intervention showed gains on measures of decoding, fluency, and comprehension, but differences relative to the comparison group were small. Students who received researcher provided interventions scored significantly higher than students who received comparison intervention on measures of word attack, spelling, the state accountability measure, passage comprehension, and phonemic decoding efficiency, though more apparent in particular subgroups. They found that intervention students showed improvement but did not change substantially during the course of the year and suggested that it may be too much to expect students who have been behind for years to catch up to their peers in just one school year. They recommended more research before policy implications can be given.

Edmonds et al (2009), as cited in Vaughn et al. (2010), conducted a meta-analysis of 13 experimental and quasi-experimental studies that looked at the results of decoding, fluency, vocabulary, and comprehension interventions on students in 6<sup>th</sup> through 12<sup>th</sup> grades. They found that the mean weighted average effect size on comprehension outcome was 0.89 in favor of treatment students over comparison students, suggesting that older students with reading problems significantly benefitted from interventions. Word level interventions showed moderate effect size gains in reading comprehension ( $d = 0.34$ ).

Vaughn et al. (2010) also reported that Scammaca et al (2007) extended the Edmonds et al. (2009) meta-analysis to studies that examined reading outcomes in areas other than comprehension. The interventions were conducted with older

students experiencing reading problems and resulted in a mean effect size of  $d = 0.95$  from 31 studies. Some of the studies measured outcomes using researcher developed instruments. However, the average effect size was much lower when standardized, norm referenced measures were analyzed ( $d = 0.42$ ). The highest effect sizes were associated with comprehension and vocabulary interventions. Word study showed moderate effect sizes. Researcher implemented interventions showed higher effect sizes than those implemented by teachers; and effects were higher for middle-grade students than for high school students. Vaughn et al. (2010) noted that effect sizes favoring treatment may have been inflated if the comparison students were not receiving any reading instruction and most of the interventions in the syntheses were short term interventions. Also, insufficient data was available to determine whether the interventions improved student outcomes relative to grade-level expectations.

Wanzek and Vaughn (2008) conducted a study over two consecutive years in six elementary schools in one southwestern school district participating in multi-tiered instruction. The schools were high poverty, Title I schools with a high population of minority students. Study 1 and Study 2 were conducted in sequential years in the same schools with two non-overlapping samples of first grade schoolchildren. As part of a larger study, first grade students who were identified as at risk for reading problems were randomly placed in treatment and comparison groups and were provided intervention in the fall of first grade. After receiving interventions focusing on phonological awareness, phonics, fluency, vocabulary, and comprehension for a 13 week period students exited if they met the exit criteria, if not

they were considered to be low responders and continued with interventions in the spring semester. During the spring semester of first grade, students assigned to the treatment group continued to receive the same intervention with one 30 minute session daily for Study 1 or two 30 minute sessions daily for Study 2. Students in the comparison group remained in the comparison group during the spring semester. Using statistical and descriptive analysis of covariance, ANCOVA, for each study, the researchers found that more students in the treatment groups demonstrated accelerated learning over time than students in the comparison groups. Students in the single-dose and double-dose interventions showed similar results over time. Students in all conditions showed difficulties with reading fluency.

In a study about the effects of individualized and standardized interventions on middle school students with reading disabilities, Vaughn Wexler, Roberts, Barth, Cirino, Romain, & ... Denton (2011) report the effects of a year-long, small-group, Tier 3 intervention which examined 2 empirically derived but conceptually different treatments and a comparison group. The sample for this study included a total of 182 students of which 86% of the students qualified for free or reduced lunch. The researchers randomly assigned all students to treatment or comparison groups. The participants were seventh and eighth grade students from the previous year who received an intervention but did not meet exit criteria. The researchers assigned them to one of two treatments, either standardized or individualized for 50 minutes per day, in group sizes of 5, for the entire school year. Comparison students did not receive researcher-provided intervention. The researchers used multi-group modeling with

nested comparisons to evaluate the statistical significance of time 3 estimates.

Students in both treatments outperformed the comparison students on evaluations of decoding, fluency, and comprehension. Intervention type did not alter the pattern of effects, although students in the standardized treatment did show a small improvement over individualized students on word attack. The results indicate that a 1-year-long intervention will adequately meet the needs of few struggling middle school readers and that most students, especially those with significant reading problems, will require more intensive interventions that last for longer than 1 year. With many struggling readers even 2 years of interventions will not bring them up to grade level.

### **Summary of Literature Review**

After reviewing many articles and other research related to RTI and education, it is apparent that RTI is an important part of today's educational system. Students who struggle with reading and math are a part of every classroom, school, and district throughout the United States. It is the job of educators to identify students at risk and to find ways to provide rigorous instruction and research based interventions to ensure that all children are provided with a fair, equal, and significant opportunity to obtain a high quality education.

This research targeted middle school reading and math interventions to determine if students receiving interventions made significant academic gains. Much of the research that has been done has focused on students in elementary grades. The

outcome of this study will help determine whether RTI at a middle school level has a significant positive effect on student achievement.

### **Definition of Terms**

The following terms were used in the study. In order to provide clarity to the study, the following definitions are offered:

**Response to Intervention (RTI)** - is a data-based process for developing effective interventions and evaluating outcomes (Reschly & Wood-Garnett, 2009). It is the process of monitoring student response to changes in instruction. With RTI, as soon as students show signs that they are having trouble learning they get additional instructional support whether they have a disability or not.

**Low socioeconomic status** - eligibility of a child for federal free and reduced school lunch under the guidelines provided annually by the U.S. Department of Agriculture. Currently, children from families with incomes at or below 130 percent of the poverty level are eligible for free meals. Those with incomes between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals (U.S. Department of Agriculture, 2010).

**Individuals with Disabilities Act (IDEA)** - The Individuals with Disabilities Education Act provides for access to free and appropriate public education (FAPE) to disabled individuals. IDEA refers both to the legislated law and the regulations that were put in place by the Department of Education to further define and interpret the law. IDEA strives to grant equal access to students with disabilities, and to provide additional special education services and procedural safeguards.

**No Child Left Behind (NCLB)** – federal legislation passed by Congress on January 2, 2002 and signed by President George W. Bush. NCLB revised and reauthorized the Elementary and Secondary Education Act (ESEA), which is the primary federal law affecting education from kindergarten through high school. The intent of the law is to improve reading and math test scores in schools across the United States, the law re-authorized a number of federal programs targeted at education reform.

**Eastern Kentucky Middle School (EKMS)** - Acronym used to refer to the eastern Kentucky middle school where students from the study attended school.

**Measures of Academic Progress (MAP)** - Computer adapted tests designed to measure achievement of elementary and secondary students in the areas of Reading, Language, Mathematics, General Science, and Science Concepts. The assessments use a fixed interval measurement so that tests can be compared over time.

**Senate Bill 168** - an Act relating to reducing achievement gaps in public schools. It led to the amendment of KRS 158.649.

**Elementary and Secondary Education Act (ESEA)** - “was passed in 1965 as a part of the "War on Poverty." ESEA emphasizes equal access to education and establishes high standards and accountability. The law authorizes federally funded education programs that are administered by the states. In 2002, Congress amended ESEA and reauthorized it as the No Child Left Behind Act (NCLB)” (State of Washington Office of the Superintendent of Public Instruction, n.d.).

**Adequate Yearly Progress** - Adequate yearly progress (AYP) is the measure by which schools, districts, and states are held accountable for student performance under Title I of the No Child Left Behind Act, the present version of the Elementary and Secondary Education Act (Education Week, 2011).

## **CHAPTER III**

### **METHODOLOGY**

This is an ex post facto research study using secondary analyses of existing data (Gay, Mills, & Airasian, 2009) and was designed to look for differences in MAP reading and mathematics scores of middle school students who did and did not receive interventions during the 2010-11 school year.

#### **Statement of Hypotheses**

##### **Research Hypothesis 1:**

Middle school students who received RTI in reading will show significantly more improvement on the MAP reading test than students who did not receive RTI.

##### **Research Hypothesis 2:**

Middle school students who received RTI in mathematics will show significantly more improvement on the MAP mathematics test than students who did not receive RTI.

#### **Null Hypotheses**

The null hypothesis addressed was:

**H<sub>0</sub> 1:** There will be no significant difference between the MAP reading scores of middle school students who received RTI and the reading scores of middle school students who did not receive RTI during the 2010-11 school year.

**H<sub>0</sub> 2:** There will be no significant difference between the MAP mathematics scores of middle school students who received RTI and the mathematics scores of middle

school students who did not receive RTI during the 2010-11 school year.

### **Informed Consent for the Study**

Informed consent for the study was obtained from Martin county Board of Education after the study was approved by the Internal Review Board at Morehead State University. Each student's reading and math scores were included in the MAP document from Northwest Evaluation Association (NWEA), which was imported into an Excel spreadsheet. Additional columns were added to the spreadsheet to code for gender and treatment group.

Socioeconomic data used to determine a student's eligibility for free or reduced lunch prices was obtained from the local board of education. A non-disclosure agreement was signed to ensure there would be no breach in confidentiality. The number of students who received free or reduced lunch was tallied for each grade level by gender. Also, the number of students with a disability was computed by gender. However, the data was only used for demographic information. It was not used in a statistical analysis.

### **Population and Sampling**

The participants used for this study were enrolled at a single Eastern Kentucky Middle school for the 2010-11 school year. The subjects were students in sixth through eighth grades and were between the ages of eleven through fifteen. Participants took the MAP test in the areas of reading and math in September and March.

**Table 1****Demographic Data for the Participants of the Study**

| 2010-11 | <u>All Students</u> | <u>Male</u> | <u>Female</u> | <u>Treatment</u> | <u>Comparison</u> |
|---------|---------------------|-------------|---------------|------------------|-------------------|
|         | <i>N</i> = 150      | 71          | 79            | 68               | 82                |

Total participants for the study were 150. Seventy-one of those students were male and seventy-nine were female. The total number of sixth grade students for the 2010-11 school year was 45, 19 males and 26 females. One female had a learning disability. Thirty-one were considered to be low SES according to free and reduced lunch status; 13 males and 18 females. The total number of seventh grade students for the 2010-11 school year was 56, 25 males and 31 females. Of those students, six had a disability; 5 males and 1 female. Forty-three were considered low SES according to free and reduced lunch status; 20 males and 23 females. The total number of eighth grade students for the 2010-11 school year was 49, 27 males and 22 females. Of those students nine had a disability; 7 males and 2 females. Thirty-four were considered low SES according to free and reduced lunch status; 18 males and 16 females.

**Instrumentation**

The instrument used for the study was Measures of Academic Progress (MAP) developed by Northwest Evaluation Association (2011). MAP tests are computer adaptive tests designed to measure the achievement of elementary and

secondary students in the areas of: Reading, Language Arts, Mathematics, General Science, and Science Concepts.

Measures of Academic Progress (MAP) assessments are administered via computer and item difficulties adapt in difficulty depending on the student's performance. Once an item is answered, the student achievement level is estimated and another appropriate item is shown to the student. If the student answers a question correctly, a more difficult item is displayed. Conversely, if a student answers a question incorrectly, a less difficult item is displayed. As the items are selected within the test, the estimate of achievement becomes more precise. This iterative item selection process is repeated until the test is completed. The advantage of this type of assessment is that each child is given a custom test better suited to the student and much more accurate than a traditional test (Northwest Evaluation Association, 2003) as cited in (Cronin, J., Kingsbury, G., McCall, M. S., Bowe, B., & Northwest Evaluation Association, O. R., 2005, p. 18).

All scores for the MAP assessment in a subject area reference a single cross grade equal interval scale using Item Response Theory methodology. These scales are reported as RIT scales which is short for Rasch Units. These scales are designed to measure student growth and performance across time (Cizek, 2005).

### **Validity and Reliability**

Three types of reliability were reported. Marginal reliability produced reliability estimates of total scores ranging from .92 to .96 across grades 2-10 for each

subject area. Test-retest reliability shows stability estimates were never lower than .77 and were as high as .94 and usually increased across grade levels. Conditional standard errors of measurement (CSEMs) are reported in RIT units; the CSEMs are small across most of the range of the RIT scale. MAP scores appear to be reasonably reliable (Cizek, 2005).

Validity evidence for MAP comes from two major sources. The MAP technical manual (as cited by Cizek, 2005) indicated that ... “the manner in which the goals and objectives for each test are developed promotes a high degree of alignment between the curriculum and the test content (NWEA, 2005a, p. 52)”. The second source of validity evidence includes criterion-related and concurrent evidence. The primary source of validity evidence consists of correlations between MAP scores and Achievement Level Tests (ALT). ALT is the Northwest Evaluation Association paper pencil version of the MAP assessment. This correlation makes sense because MAP questions are drawn from the same item bank as ALT. Relevant validity coefficients show that ALT scores in Reading, Mathematics, and Language are strongly related to scores on the Iowa Tests of Basic Skills (ITBS). The correlations varied from .77 to .84 in all grades and subjects. Similar results were achieved with ALT assessments and the Stanford Achievement Tests, 9<sup>th</sup> edition (SAT9). Concurrent validity coefficients varied from .78 to .88. When compared with a variety of state assessments in Wyoming, Colorado, Indiana, and Washington, similar results were obtained. All reported correlations showed consistently strong relationships. These

findings show that MAP scores give consistent interpretations over time (Cizek, 2005).

### **Procedure**

A hard copy of Measures of Academic Progress results from the 2010-11 school year was obtained from the school principal of EKMS as well as a list of students who received interventions. In order to be included in the study a student had to have a valid Fall and Spring MAP score for both the Reading and Mathematics assessments. Data from both the Fall and Spring MAP assessments was entered into a Microsoft Excel document with separate column for each subject (reading and mathematics). Microsoft Excel was used to perform independent and Student's  $t$  test on the data.

Both research hypotheses were tested by computing descriptive statistics including the means ( $M$ ) and standard deviations ( $SD$ ) for each subject. Since there were only two groups to be tested, pretest-posttest, an independent  $t$ -test was used to test for statistically significant differences between the two sets of data.

### **Assumptions**

This study investigated the performance of students who received interventions and compared it to the performance of students who did not receive interventions. Ethnically, the students were the same, as there was only one African-American student and the remainder of the sample was Caucasian. However, low SES could be a factor to consider, as approximately 75% of the sample came from a low SES background.

### **Limitations of the Study**

This study has the following limitations:

- The data collected were limited to only the MAP assessment.
- The data were limited as it was collected from only one public middle school in eastern Kentucky. Therefore, the findings might not be generalizable to other schools.
- The study was limited to data from only one academic school year, 2010-2011.

### **Data Analysis**

MAP scores from Fall 2010 and Spring 2011 were combined and coded for treatment and comparison groups, as well as gender in a Microsoft Excel document. The document contained separate columns for Fall Math and Reading RIT scores as well as separate columns for Spring Math and Reading RIT scores by grade level.

All research hypotheses were tested by computing descriptive statistics including the means (M) and standard deviations (SD) for each subject according to gender, grade, and treatment versus comparison groups. An independent *t* test was chosen to test for statistically significant differences in the data. Alpha was set *a priori* at .05.

## CHAPTER IV

### RESULTS

This was an ex post facto research study using secondary analyses of previously collected data to examine the differences between the performances of students who received interventions during the 2010-11 school year and students who did not receive interventions. The research hypotheses indicated below were addressed using descriptive and statistical analysis.

#### **Research Hypothesis 1**

Middle school students who received RTI in reading will show significantly more improvement on the MAP reading test than students who did not receive RTI.

#### **Research Hypothesis 2**

Middle school students who received RTI in mathematics will show significantly more improvement on the MAP mathematics test than students who did not receive RTI.

The average RIT scores for both Reading and Math were compared by grade level for Fall 2010 (Pretest) and Spring 2011 (Posttest). The greatest gains between pretest and posttest for all grade levels were in math. The average increase was 9.70 RIT points for all grade levels combined, with the greatest increase being at the sixth grade level. They showed an increase of 15.98. The mean RIT for Reading and Math pretest and posttest scores as well as standard deviations for each grade level are presented in Table 2.

Table 2

## Pretest Posttest Mean RIT Scores by Grade Level

| Grade | <i>n</i> | Reading                  |                           | Math                     |                           |
|-------|----------|--------------------------|---------------------------|--------------------------|---------------------------|
|       |          | Pretest<br><i>M (SD)</i> | Posttest<br><i>M (SD)</i> | Pretest<br><i>M (SD)</i> | Posttest<br><i>M (SD)</i> |
| 6     | 45       | 214 (10.46)              | 215 (13.11)               | 217.02 (12.72)           | 233 (12.74)               |
| 7     | 56       | 215 (17.25)              | 217 (16.57)               | 220.03 (16.42)           | 225 (14.99)               |
| 8     | 49       | 216 (17.31)              | 221 (18.28)               | 222.84 (16.97)           | 231 (16.26)               |

Note: MAP = Measures of Academic Progress

The means for Fall and Spring Math were compared by gender. Independent *t*-tests were run on Excel but a *t* value was not given. Table 3 shows the means and standard deviations for Fall and Spring math by gender.

Table 3

## Fall and Spring Math by Gender

| Gender | Fall Math |                | Spring Math |               |
|--------|-----------|----------------|-------------|---------------|
|        | <i>n</i>  | <i>M (SD)</i>  | <i>n</i>    | <i>M (SD)</i> |
| Male   | 71        | 211.91 (17.34) | 71          | 220 (16.39)   |
| Female | 79        | 227.35 (14.09) | 79          | 232 (13.73)   |

Females had higher mean scores than males on both Fall and spring Math. However, males made greater gains than females from pretest to posttest with an increase of 8.09. An independent *t* test was used to compare fall and spring Math scores by gender. The results indicate a statistically significant difference on both, for fall  $p < .05$ ,  $d = 0.98$  and spring  $p < .05$ ,  $d = 0.78$ .

Table 4 shows the means for Fall and Spring Reading by gender.

Table 4

**Fall and Spring Reading by Gender**

| Gender | Fall Reading |               | Spring Reading |               |
|--------|--------------|---------------|----------------|---------------|
|        | <i>n</i>     | <i>M (SD)</i> | <i>n</i>       | <i>M (SD)</i> |
| Male   | 71           | 208 (17.99)   | 71             | 211 (18.81)   |
| Female | 79           | 221 (12.83)   | 79             | 224 (13.70)   |

Females had higher mean scores than males on both Fall and Spring Reading. An independent *t* test comparing Fall and Spring Reading scores by gender shows a statistically significant difference with fall  $p < .05$ ,  $d = 0.83$  and spring  $p < .05$ ,  $d = 0.79$ .

Mean and standard deviations for treatment and comparison groups across grade levels for pretest posttest measures are presented in table 5.

Table 5

**Pretest Posttest Mean RIT Scores by Treatment and Comparison Group**

| Group      | <i>n</i> | Subject | Pretest <i>M (SD)</i> | Posttest <i>M (SD)</i> | <i>M diff.</i> |
|------------|----------|---------|-----------------------|------------------------|----------------|
| Treatment  | 68       | Math    | 211.36 (12.74)        | 219.00 (13.00)         | + 7.64         |
| Comparison | 82       | Math    | 227.24 (14.18)        | 232.00 (13.00)         | + 4.76         |
| Treatment  | 68       | Reading | 208.00 (15.25)        | 210.00 (14.50)         | + 2.00         |
| Comparison | 82       | Reading | 221.00 (12.82)        | 224.00 (14.80)         | + 3.00         |

To test the null hypotheses, *t* tests were used to compare treatment and comparison groups. An independent Student's *t* test showed a statistically significant difference,  $p > .05$ ,  $d = 1.18$  on Fall Math RIT scores for treatment versus comparison groups. Independent Student's *t* test on Fall Reading RIT scores for treatment versus

comparison groups showed a statistically significant difference  $p < .05$ ,  $d = 0.95$ . On the Spring Math RIT scores for treatment versus comparison groups, independent  $t$  test yielded a statistically significant difference  $p < .05$ . An independent  $t$  test on Spring Reading RIT scores also showed a statistically significant difference between treatment and comparison groups  $p < .05$ . Therefore, we rejected the null hypothesis that there would be no significant difference between the MAP reading and math scores of middle school students who received RTI and the reading scores of middle school students who did not receive RTI during the 2010-11 school year.

## CHAPTER V

### CONCLUSIONS

#### Discussion

The purpose of this study was to determine whether the interventions being used at EKMS were effective and to expand on the findings of other researchers in the area of RTI effectiveness. Guidelines outlined in NCLB and IDEA (2004) have made providing interventions to low performing students more important than ever. Schools nationwide are struggling to identify appropriate, effective RTI models and to implement them. The outcomes of this study will be beneficial in planning future RTI models for EKMS.

The findings of this study were positive for both groups. Raw data scores showed that both groups made gains on their mean scores from pretest to posttest in the reading and math content areas. The treatment group made greater gains in math than the comparison group with an increase of 7.64 on the mean score versus an increase of 4.76 for the comparison group. A *t* test revealed that the gains were statistically significant for each group. The comparison group made greater mean gains in Reading than the treatment group from pretest to posttest. They showed an increase of 3.00 on the mean score versus the treatment groups 2.00 increase. These outcomes show that intervention students' progress did change significantly,  $p < .05$ , during the course of the school year. Therefore, EKMS should continue to implement their RTI program as students showed statistically significant academic gains.

**Recommendations**

1. A similar study comparing students after they received interventions for an additional school year may be helpful to determine if the duration of interventions makes a difference in student academic gains.
2. This study took place at middle school level. A study comparing students in an elementary school setting after they received interventions for the same amount of time may be helpful to determine if students make academic gains more quickly at a younger age.
3. A longitudinal study of students who received interventions in elementary and made gains necessary to get caught up with their peers and then comparing their scores in middle school to determine if they were able to stay on level with their peers may offer useful information in support of early interventions.

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