EFFECTIVE SCHOOLS RESEARCH: A META-ANALYSIS OF PROGRESS MONITORING

AND THE IMPACT ON STUDENT ACHIEVEMENT

A DISSERTATION

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

DOCTOR OF EDUCATION

BY

DEBRA C. PRENKERT

DISSERTATION ADVISOR: DR. JOSEPH R. MCKINNEY

BALL STATE UNIVERSITY

MUNCIE, INDIANA

MAY 2015

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Dean of Graduate School   Date

BALL STATE UNIVERSITY
MUNCIE, INDIANA
MAY, 2015

ABSTRACT

Dissertation: Effective Schools Research: A Meta-Analysis of Progress Monitoring and the Impact on Student Achievement

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This limited meta-analysis on the Effective Schools Research topic of progress monitoring included 11 studies with 13 effect sizes. Twelve of the effect sizes focused on students at the elementary level and one focused on middle school, of the 11 studies, 6 used a randomized controlled study as their methodology. The studies included in this meta-analysis represented an assortment of dissertations, journal articles, and studies published for research organizations. All of the studies gave an effect size and sample size, were published after 2001, and had to include progress monitoring and a culminating assessment in order to be included in the study.

Utilizing the technique of subgroup analysis, two moderator variables were considered in this study. The dichotomous variable of reading and mathematics showed a substantial difference in relationship to the impact of progress monitoring on student achievement. The subject area of mathematics $g=.543$ had a much larger effect-size than the subject area of reading $g=.142$. Unfortunately, when investigating the subgroup of poverty no relationship could be determined from these studies between the amount of poverty and the impact progress monitoring has on student achievement. Additionally, when meta-regression was utilized to examine the continuous variable of free and reduced-price lunch, although there was a negative

slope, no correlation between the effects of poverty and progress monitoring could be determined within the studies in this meta-analysis.

Additional research in the area of progress monitoring is still needed and is outlined within this study. As tools and software continue to be developed in the area of progress monitoring this study gives guidance to consider for educators and the impact that it has on student achievement.

DEDICATION

To my husband Jamie Prenkert- who has helped me to see my potential

ACKNOWLEDGEMENTS

Going through the process of working on a doctorate and writing a dissertation is sometimes compared to a marathon. However, having completed two marathons in my life, I know that the endurance required for this journey took more personal determination, stamina, and support from others than any of my running adventures (yes this includes the Red Eye Relay which is 100 miles overnight in hot hilly Bloomington). Therefore, I would like to take the opportunity to acknowledge the many people who helped me throughout this journey.

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in MCCSC and throughout this dissertation. Thank you for all of the texts, phone calls, conversations, and friendship. Thank you for pushing my thinking and for making me laugh and see the humor when I was overwhelmed. Your mantra of "we got this" kept me pushing through the tough times. You make me a better educator, and I hope we can continue to collaborate for many years to come.

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CHAPTER I: INTRODUCTION

The stakes for schools to perform are higher than ever. With the passage of No Child Left Behind in 2001, states have closely monitored the Adequate Yearly Progress[1] of English Language Arts and Mathematics in American Schools. In 2014, the Department of Education encouraged states to apply for an Elementary and Secondary Education Act (ESEA) Flexibility Waiver to work in conjunction with the 2014 mandate of No Child Left Behind (NCLB). The approved waivers allow states to restructure the mandates and consequences associated with the 2001 NCLB legislation. Both the ESEA Flexibility Waiver and the NCLB legislation have amplified the attention of school performance and what schools are doing to increase student achievement and become effective schools. An example of this is some states have assigned letter grades that are assigned to individual schools and school districts based on data and growth reflected from year to year. In addition to the mandates and consequences imposed on districts by the Federal Government to increase student achievement, districts also have a moral imperative to implement the research that has been shown to increase student achievement. Schmoker (2006) compares this issue in education to the medical community. He suggests that medical professionals act immediately when learning about medicines and techniques to help patients live longer. Schmoker challenges educators to help students live better lives by implementing what research has shown to improve student achievement (2006). The moral imperative is raising the bar and closing the gap for all students by focusing on actions and purpose to improve the lives of children and ultimately society (Fullan, 2011). One purpose of

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[1] A term used to measure the academic performance of schools and districts under the accountability of the No Child Left Behind Act (NCLB) of 2001. The term includes the progress of all students including subgroups to determine if academic progress has been made by students. Each state determines the cutoff scores for their statewide assessment (Education Week, August 3, 2004).

the school should be to improve student achievement and if certain strategies have demonstrated by research to show greater gains, it should be the job of the educators to utilize the high leverage strategies with their students.

Despite this moral imperative, policy makers and schools do not necessarily consider the research base when making decisions. Researchers argue that overall literature and studies are not representative of high poverty households and therefore, policy that is created has not adequately addressed the procedural and social issues including both teacher and student agency (Woodside-Jiron & Gehsmann, 2009). In fact some experts argue that the reason schools have not improved within the last 30 years is because the schools do not implement the most important and influential strategies that have a great impact on student achievement (Schmoker, 2011).   In response to the waivers and the pressure to perform, many states have implemented their own high-stakes assessments for primary grade students. Examples of policy-making ignoring substantial research includes implementation of statewide exams that primary students must pass in order to proceed to the next grade level. Texas, Florida, and Tennessee have each passed legislation that prohibits students from being promoted to the next grade unless proficiency is demonstrated on a high stakes assessment. In Indiana, a third grade IREAD 3 test was recently implemented and given to all third grade students. Legislation was passed that stated that all third grade students must pass the IREAD 3 in order to move onto fourth grade in the area of reading, unless a child qualifies for a good cause exemption[2]. The goal behind the legislation is worthy of respect, ensuring that all students read and read well by the end of third

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[2] The three good cause exemptions include: a student who has already been retained for two years throughout his or her schooling, an English Learner Student who has a Individualized Learning Plan (ILP) and it states that the student should move on to the next grade because the reason for failure on the test was due to language, and a Special Education Student who has an Individualized Education Plan (IEP) that states that the case conference committee has determined that it would be in the best interest of the child to move on to the next grade.

grade. However, the way the state is carrying out the legislation (retention of students) is not best practice, as research does not support the effectiveness of retention. In fact, Leckrone and Griffith (2006) argue that retaining students is not the answer to increasing student achievement. There is a wide body of research that argues that retention does not support student growth and actually has negative effects on students (Smith & Shepard, 1987, 1989; Tuck, 1989). While there are numerous harmful effects from lower scores in subsequent years in student achievement to damaging side effects of peer groups and socialization, the biggest drawback is the fact that retention doubles the risk of students dropping out of school (Foster, 1993). Jimerson, Carlson, Rotert, Egeland, and Stroufe, (1997) show that there are "no long-term benefits in either academic learning or social and behavioral adjustment" to retaining students. Therefore, schools across the country are scrambling to make growth, show adequate yearly progress, and prepare students for standardized tests to dodge retention for students. While it is clear that retention is not the answer, what is not clear are the exact strategies schools need to implement based on effective schools research in order to increase student achievement. Additionally, even when research demonstrates certain strategies have a greater impact on student achievement those same strategies are not utilized by teachers and administrators in education and are often absent within educational policy.

PROBLEM STATEMENT

In the educational profession it is especially difficult to pare down strategies and teaching techniques that are effective. One reason it is difficult is because the education pendulum swings back and forth and the programs, practices, professional development, and curriculum that

follow shift based on the current political environment (Cohen & Spillane, 1992). The education

pendulum represents the best practices in education during that moment in time.

Schools need a single resource that compiles research that has been analyzed to

determine the high leverage strategies implemented by high poverty students in order to increase

student achievement. Often educators do not consult or have access to the research because it is

not presented in a user-friendly format.   The data is cumbersome to comb through and educators

do not have time to dig through existing studies to determine the high leverage strategies. A

meta-analysis of effective schools research will assist schools in determining which strategies to

implement first and the impact that each strategy will have on student achievement.   A

compilation of effective schools research will provide educators timely information that will help

them prioritize the strategies including resources, personnel, and professional development that

will help educators find the answers to becoming effective schools and increase student

achievement.

Effective schools research has taken place over the past several decades. This research is

intended to help inform educators of best practices in education and the impact various variables

have on student achievement. Progress monitoring and collaboration with a focus on learning

are two areas of effective schools research that have been analyzed in this dissertation. While

these two variables are frequently listed as leading indicators of effective schools, this

dissertation will provide evidence about the nature of the relationship between these areas and

student achievement.

SIGNIFICANCE OF THE STUDY

The research conducted in this study will analyze effective schools and the strategies they utilize with a specific focus on students living in poverty. In education, teachers and administrators are always on the look out for the next strategy, book, or conference that will help boost student achievement and solve all of the instructional problems that exist. While one book or conference may not solve all of the academic issues that exist in schools, a wide body of research on which characteristics from the effective schools research that have the greatest impact on students in effective schools does exist and when this data is analyzed and reported on it can give educators the information needed in order to increase student achievement.

PURPOSE OF THE STUDY

Effective schools research has shown that certain strategies or characteristics are more common in higher performing schools. By utilizing the research technique of meta-analysis to synthesize the research of effective schools, positive strategies that schools possess will emerge. Specifically, this study will provide information about whether the effect size of the characteristics from the effective schools research in the area of progress monitoring changes for schools with over 40% of the students receiving free or reduced-price lunch. Data from this dissertation will also show if progress monitoring has a greater impact on student achievement in different subject areas such as reading or math. These analyses are salient as school districts receive cutbacks in funding because schools have less money to utilize for staffing, professional development, and instructional programming. According to *The Center on Budget and Policy Priorities*, 35 out of the 48 states that publish comparative data on K-12 school funding have decreased their per pupil funding in 2013 compared to fiscal year 2008 (Oliff, Mai, & Leachman, 2012). Indiana was one of four states that did not report their state funding because the way they

publish their state funding it is challenging to make correct past comparisons (Oliff, Mai, & Leachman, 2012). Teachers and administrators need to know where to invest their time, energy, and resources in order to have the greatest impact on student achievement.

The purpose of this study is to ascertain which characteristics of effective schools research in the area of assessment with a focus on progress monitoring have the greatest impact on student achievement on high poverty students. Although research has been published in the area of effective schools, this study will provide research in one place giving educators a rank order of high leverage characteristics of schools that have demonstrated elevated academic achievement with impoverished students.

RESEARCH QUESTIONS

The research questions below are based on the effective schools research. While nine different characteristics are frequently cited as high leverage strategies for effective schools, this study focused on the two specific areas of collaboration with a focus on student learning and progress monitoring. These areas were selected because according to Figure 2.1 on page 25 these characteristics are more frequently cited as effective strategies by authors of effective schools research.

1) Does progress monitoring have a positive effect size on student achievement?

2) Did the effect size differ when considering students who receive free and reduced price versus paid meals in the area of progress monitoring?

3) What was the effect size gap between progress monitoring and student achievement in the subject area of mathematics and reading? Does one subject area produce higher results than the other subject area?

4) Of the two characteristics of the effective schools research, collaboration with a focus on learning and progress monitoring, which strategy produces a higher effect size in student achievement for students living in poverty?

5) Did the effect size differ when considering students who receive free and reduced-price lunch versus paid meals in the areas of collaboration with a focus on learning and progress monitoring?

6) What was the effect size gap between the two effective schools research characteristics of collaboration with a focus on student learning and progress monitoring on student achievement for students living in poverty?

These questions were answered by using existing data sets along with the methodology of meta-analysis. The data used in this study was both published peer-reviewed data and non-peer reviewed data from 2001 until present. Data were coded to control for confounding variables and the analysis generated an effect size for each variable. The effect size assisted in answering the over-arching question, which characteristics from the effective schools research are most important for a school to possess for students living in poverty?

DEFINITION OF TERMS

- *Students living in poverty*: Students who receive free or reduced-price lunch
- *Instructional Leadership*: Led by the principal who has a strong knowledge base in curriculum, instruction, and assessment and utilizes shared leadership, which builds capacity for leadership among staff and teachers (Marzano, 2005).
- *Universal Screener*: Assessment given to all students to see which students need to be progress monitored more closely.
- *Progress Monitoring*: Assessing students more frequently and checking for their understanding of the content using quick probes (National Center on Student Progress Monitoring).
- *Formative Assessment*: Assessments given throughout the instructional plan in order to inform the teacher if his or her instruction needs to be altered.
- *Summative Assessment*: Assessments given at the end of an instructional period to determine the level of mastery achieved on the presented content.
- *Professional Learning Community (PLC)*: Educators work together to collaborate around shared content or students to ask the four critical questions and focus on the three big ideas (Dufour, Dufour, & Eaker, 2008).

- *Four Critical Questions of PLC*: 1) What do we want students to know and be able to do? 2) How do we know when they have learned it? 3) What do we do when they have not learned the content? 4) What do we do when they have learned the content? (Dufour, Dufour, & Eaker, 2008).
- *Three Big Ideas of a PLC*: Focus on student learning, Focus on Collaboration, and Focus on Results (Dufour, Dufour, Many, 2010).
- *ELA*: English Language Arts- This typically includes the curriculum that supports Reading. Many curriculums integrate writing and phonics within the curriculum to support reading.
- *Effect Size*: The statistic used to represent the magnitude or direction of the research findings in a meta-analysis (Lipsey & Wilson, 2001, p. 34)
- *Meta*-Analysis: Quantitative procedures that a research synthesist may use to statistically combine the results of studies (Cooper, Hedges, & Valentine, 2009)

For the purpose of clarity the definition of poverty used in this dissertation will be considered students who receive free or reduced-price lunch. The United States Department Agriculture (USDA) of Food and Nutrition Services determines the income eligibility each year as required by section 9 of the National School Lunch Act. Therefore the rate changes each year and is posted on their website. Any child at a participating school may purchase a meal through the National School Lunch Program. "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, for which students can be charged no more than 40 cents. (For the period July 1, 2014, through June 30, 2015, 130 percent of the poverty level is $31,005 for a family of four free meals; 185 percent is $44,123 reduced-price meals (USDA, 2015)."

I also want to focus on three additional terms that have shown to be top characteristics of effective schools according to the literature review and graphic representation outlined in Figure 2.1. These terms will be discussed in chapter 2. The three most common characteristics are:

instructional leadership, monitoring student progress, and professional learning community/collaboration.

The definition for instructional leadership includes a description of a strong principal at the building. The principal specifically has a strong knowledge base in the area of curriculum, instruction, and assessment. The principal is aware of the needs within the building and leads accordingly by making decisions according to best practices in the area of instruction and is considered the instructional leader within the building as opposed to a business manager. While many experts have suggested common characteristics of instructional leaders, four critical roles of an instructional leader are: 1) Resource provider or a leader who can provide support and resources to the teachers when needed, 2) instructional resource a leader who can provide advice and information regarding the improvement of instruction, 3) communicator a leader who openly communicates with teachers and the greater school community, and 4) visible presence in the building (Smith & Andrews, 1989). Although teacher leaders may possess instructional leadership, the building principal should also have knowledge regarding curriculum and be able to communicate and ensure resources are allocated in the correct area to support the instruction within the building (Marzano, 2005). An instructional leader also facilitates teaching and learning and collaboration in the areas of instruction among teachers using rationale supported by research (Blase & Blasé, 1999). Over the past several decades instructional leadership, which was often previously led solely by the principal, has morphed into shared leadership (Hallinger, 2003), which involves empowering teachers and leading with a shared vision. This shift in thinking was due to the reorganization and decentralization of schools (Ylimaki, 2007). It is when the principal and the teachers work together for a common vision of increasing student achievement that shared leadership has been shown to be most effective (Printy & Marks, 2006).

The definition of instructional leadership for this dissertation included both instructional leadership as led by the principal and distributed leadership, which builds capacity for leadership among staff and teachers (Harris & Spillane, 2008).

A salient characteristic of effective schools research outlined in the literature review is in the area of monitoring student progress. This is a category that has evolved over the years. Assessment is a key factor in instruction and student progress. Both formative and summative assessments are important, but high quality formative assessment with explicit feedback is critical for moving students forward in their learning (Dunsworth & Billings, 2009). Within the last decade the testing boom has occurred in the field of education. Students are frequently tested using universal screeners and benchmarks. Based on the scores from the universal screener that is given to every student, the bottom 25% or more are often assessed more frequently. The testing of students more frequently is often called progress monitoring. Students are given quick probes based on key areas that promote learning to determine if the student is making adequate progress within the current form of instruction or intervention. Monitoring student progress can also be done by giving all students common formative assessments over the same identified standards. Both the assessments and the probes that are given as progress monitoring tools can be standardized such as DIBELS and AimsWeb or they can be teacher created depending upon the school or district. The information from the progress monitoring is helpful to determine which students understand the content and who needs additional time to learn the content. James Popham defines the use of assessments not as tests but as a planned process in which teachers are evaluating what students know and do not know, and adjusting their instruction accordingly. Of course instructional adjustments are a crucial piece in progress monitoring in order for learning to occur (Popham, 2008). Although monitoring student

progress can take multiple forms, the ultimate outcome is learning what the student knows and what they do not know in order to alter the instruction given to the student.

Another strong characteristic of effective schools is a combination of both professional learning communities concept and collaboration. There are four key questions that teachers typically ask when working as a professional learning community. These questions include the following (Dufour, Dufour, & Eaker, 2008):

1) What do they want the students to know and be able to do? (Critical Curriculum)

2) How will they know when the students know it? (Assessment)

3) What will they do if the student still doesn't know it? (Intervention)

4) What will they do if the student already knows the material? **(**Enrichment)

The discussion takes place between teachers who share students or share content. The collaboration is an ongoing process between teachers where they analyze student data, student results, and alter instruction based on the four critical questions of a professional learning community. The categories of professional learning community and collaboration with a focus on learning have been grouped together because the term professional learning community is a relatively newer term for teachers collaborating around the three big ideas of focus on learning, focus on collaboration and a focus on student results (Dufour, Dufour, & Many, 2010). Although the category name of professional learning community did not exist in earlier decades in effective schools research, the idea of collaborating and working together to share ideas, teaching strategies and information in order to improve student learning has always been a powerful tool for teachers. Not only have American educators noticed that collaboration is a key component to student learning, but 85% of administrators in Scandinavian countries as well as Hungary, Ireland, and Switzerland provide their teachers time to collaborate and perform action

research in order to determine which strategies impact student learning and share their research

with colleagues in order to increase student achievement (Darling-Hammond, 2010).

ORGANIZATION OF THE STUDY

      In the following chapters I will first introduce the need for this study, the historical

perspective of effective schools research, the poverty that exists within American Schools and

the response to poverty in the funding and creation of Title I. Additionally, the effective schools

research and correlates of effective schools will be shared and the studies that support each

correlate of effective schools. Literature is presented in the area of school reform and as well as

expert leaders in the effective school research field throughout the last several decades. The

debate over effective schools and the exact strategies the schools have utilized in order to

become effective has existed for several decades. Researchers and educators continue to

examine data closely to detect which strategies have the greatest impact on student achievement.

In chapter three, I explain the research technique of meta-analysis and the need for this form of

methodology in this type of research. In chapters 4 and 5 results are shared and the implications

for future research.

CHAPTER II

The review of literature in this chapter outlines the historical perspective of poverty, effective schools, the leading theories and correlates associated with effective schools during the past and present, and examines the concerns associated with the effective schools movement in history.

POVERTY IN EDUCATION THROUGHOUT THE UNITED STATES

According to President Obama, equity in education by way of the achievement gap is the "civil right issue of our time (Cooper, 2011)." Education has been identified to be a key factor in what separates the rich from the poor, the high achieving from the low achieving, and the number of economic opportunities available throughout a lifetime (Barr & Parrett, 2007). The number of American students living in poverty has increased over the years. In 1999, the percentage of children living in poverty was 16.6%. (U.S. Census Bureau, 1999) by 2003 the number of children living in poverty grew to 18% (U.S. Census Bureau, 2005) and by 2011 the percentage of children living in poverty increased to 21.9% (U.S. Census Bureau, 2012). The growing number of children living in poverty has affected the number of students who come to school ready to learn. Additionally, it has been well documented that poverty has "harmful effects" on a child's social, emotional, and academic welfare and growth (Presswood & Presswood, 2008).

In 1966, sociologist James Samuel Coleman published a report titled Equality of

Educational Opportunity (Coleman, Campbell, Hobson, McParland, Mood, Weinfeld, & York,

1966). The report became known as the Coleman Report and was commissioned by the United

States Department of Education. The Coleman Report suggested that schools (and the resources

and teachers within the school) played a small role in student achievement. The information

from this report was misinterpreted into: Public schools do not impact student achievement and

that the achievement of students comes mainly from the student's home and culture (Kiviat,

2000).

Christopher Jencks (1977) also published a study where he looked at the background

variables of birth, childhood, and schooling to determine the degree of adult success. He

discovered that the background variables of educational attainment and adolescent test scores did

positively effect adult success as related to occupations that earn more money. Interestingly no

single personality trait impacted economic success more than a cognitive test. He also stated,

"education is the best single predictor of both occupational status and earnings (38)." This body

of research supported the idea that education does make a difference.

However, the effect of the way the Coleman Report was interpreted still exists today in

the American education system. An example of this is that some educators still believe that a

child's background and socio-economic status defines them. The inaccurate message that was

sent to educators and society from the Coleman Report has perpetuated the cycle of low

expectations for children of poverty (Barr & Parrett, 2007). In addition to low expectations,

policies, procedures, and educational programming for low-income students have differed

drastically compared to their high socio-economic counterparts. High poverty schools typically

have a lower per-pupil funding and are less likely to have highly qualified teachers (Kozol, 1992;

Lankford, Loeb & Wyckoff, 2002). The lack of equity in curriculum offerings, the higher mobility in teachers of schools in poverty, lack of experienced or highly qualified teachers, and students with limited preschool education are all characteristics of higher poverty schools which lead to lower performance of students who attend high poverty schools. Policymakers and leaders need to have the courage to create policies that help address the inequity in education (Anyon, 1997). Additionally, high poverty schools also have an increase in referrals to special education and pullout programs and fewer educational opportunities than higher socio-economic status schools (Barr & Parrett, 2008). All of these characteristics make it challenging to stop the cycle of high-poverty students from performing poorly in school and has led to an achievement gap.

Assessment data from the International Adult Literacy Survey shows that America outperforms other countries in one area: variability in our score distributions (ETS, 2007). This means that the spread of scores is greater in the United States compared to other industrial countries. Our scores are more dispersed and we have a bigger range in the gap between high and low scores. In fact by fourth grade the average high-poverty student is already three years behind their peers in high-income communities according to Teach for America (Achievement First, 1999-2012). Data collected from the U.S. Department of Education's Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K) shows that high-poverty children start at noticeably lower cognitive level than the higher socio-economic status children. Unfortunately, the children are often sent to high poverty schools, which often do not have the resources, and the situation becomes magnified and the high poverty students fall further behind (Lee & Burkam, 2002).

Because of the number of children in poverty, the documented "harmful effects" that children in poverty may have, and the residual educational effects from the Coleman Report it is way past time for the American Education System to eliminate the myth that students of poverty can not catch up and to help educators leverage resources to help students maximize their learning. While it may be true that students of poverty come to school with a disadvantage, it is just not true that they are destined to stay behind their peers. Studies have shown that students living in poverty can perform at the same levels or higher than their more affluent peers (Reeves, 2000). The work of Reeves and the 90/90/90 schools has demonstrated throughout the United States that students of poverty can produce high achievement (Reeves, 2000). He includes schools from Milwaukee to Virginia in his citations of schools that have high student academic performance regardless of their high poverty students. Another source of research on high poverty, high performing schools include the work of Kati Haycock from the Education Trust. Each year awards are given to schools for "Dispelling the Myth." Their website www.edtrust.org lists their full list of award winning schools under their resource section and even gives updates of the schools that won in previous years.

Susan Neuman, who previously served as the U.S. Assistant Secretary of Elementary and Secondary Education, states that we have to refocus our priorities including resources and funding to models of reform that work. Her research includes an in-depth analysis at programs throughout the United States that have been successful. These programs include: Philadelphia's Books Aloud program, California and Texas' after school enrichment programs, Charlotte, NC Bright Beginnings program and Early Head Start Programs throughout the United States. She concludes that the seven principles that educators need to follow are (2009):

1) Actively target the neediest children.

2) Begin early in children's lives.

3) Emphasize coordinated services, particularly for children whose families present multiple risks.

4) Focus on boosting academic achievement through compensatory high-quality instruction.

5) Deliver instruction by trained professionals, not by aides or volunteers.

6) Acknowledge that intensity matters, defending against any dilution of program quality as a waste of public resources.

7) Always hold educators accountable for results and for children's achievement.

While this list outlines whom to target, when to target, and the individuals who should deliver the services, it does not actually state the strategies that should be used with the students in order to increase student achievement. While the above principles are commonly outlined in some fashion by various researchers, the actual strategies that educators should use with students and that have the most positive effect on student achievement is often an afterthought and therefore: the basis for this dissertation. Educators need to know where to invest their time, resources, and money in order to close the achievement gap. Impoverished students may need extra support and additional compensatory education, but as educators the focus needs to be on strategies that make a difference. A meta-analysis on effective schools with data compiled from high-performing, high poverty schools that demonstrates which strategies contributed to the academic achievement through meta-regression controlling for various characteristics will provide insight that educators throughout our society crave. It is no secret that the United States has an achievement gap based on socio-economic status and race (Lee and Burkam, 2002), and the gap does not appear to be narrowing according to the New York Times Publication by Tough (2006).

However, the information outlined in chapters four and five of this dissertation will provide information regarding the effect that two strategies have on student achievement for high poverty students. This information will help educators close the achievement gap and has the potential to help break the cycle of poverty for students across the United States.

HISTORICAL PERSPECTIVE OF EFFECTIVE SCHOOLS

As mentioned above, the Coleman Report was interpreted to believe that students of poverty are not able to learn regardless of which teaching strategies educators implement in school with students. Although it is unclear the actual number of teachers that read and believed that the Coleman report was valid, Fenstermacher and Soltis (1998) suggest in their popular pre-service teacher text that educators were concerned with the thought that schools and teachers had little effect on student achievement of students in poverty. The research presented in the Coleman report led researchers and educators throughout the country to respond to the report by conducting their own research. The researchers began analyzing data from surveys and achievement to support the idea that schools do have an impact on student achievement. Several State Departments of Education including New York and Maryland, as well as schools from Michigan and Delaware also began conducting research regarding a school's influence on student achievement (Purkey & Smith, 1982). According to Purkey and Smith, these states used regression analysis to compute a "residual score." Purkey and Smith subtracted their expected mean achievement from their actual achievement to produce a residual score. They did this by looking at the outliers of both schools with positive and negative student achievement and controlling for socio-economic status. Methodological challenges that exist with that type of regression are the limited number of data sets that were used in this research and weight of the

scores given to different assessments across various states. The researchers then gave surveys

and completed case studies on the schools with the highest and lowest scores to determine the

reasons for their scores (1982). Purkey and Smith had concerns with the State Department

studies mentioned above. Areas that concerned them included consistency in the way the studies

were performed and discrepancies within the data. For example, not every study and state

sampled a similar population based on socio-economic factors, race, and type of school settings

(urban, suburban and rural schools). However, Purkey and Smith did agree that consistent data

from those studies suggested that the following areas increase student achievement: classroom

management, teacher expectations, and principal leadership (1982).

TITLE I: A RESPONSE TO POVERTY

President Lyndon B. Johnson initiated passage of the Elementary and Secondary

Education Act (ESEA) in 1965 as he attempted to fight the war on poverty. Previous Presidents,

including John F. Kennedy had pursued unrestricted general aid for various schools but President

Johnson's ESEA was popular because it had a larger impact on more people, schools, and

children (Kirst & Wirt, 2009). The funding is designated to schools based on the number of

students who qualified for free and reduced-price lunch. The money is purposely intended to

supplement and not supplant. Students with low socio-economic status are to get extra support,

resources, and instruction in order to help level the playing field. The main goal of Title I is

improving the academic achievement of the disadvantaged according to the United States

Department of Education (Ed.gov, 2004**).** Since the initial passage of ESEA in 1965, the act has

been reauthorized seven times (http://febp.newamerica.net/background-analysis/no-child-left-

behind-overview). In 1994 when it was re-titled Improving America's Schools Act and tied to

Goals 2000 a push for standards developed across the Nation. Perhaps the most dramatic

reauthorization came in 2001 with the No Child Left Behind Act (NCLB), which was signed into

effect in January 2002. NCLB had mandates and consequences for Title I schools (schools that

take the Title I money) that and did not make adequately yearly progress (AYP). Standardized

assessments were also associated with NCLB and data collected and disaggregated by various

subgroups such as race, socio-economic status, and special education. At the time of this

writing, NCLB has not been reauthorized since 2002, President Obama did funnel money

through the economic stimulus funds called the American Recovery and Reinvestment Act

through Title I formulas. Although there has been some funding attached to ESEA, the mandates

that have accompanied the Act have not been fully funded. Districts accepting Title I money

have compliance mandates to follow that can often be costly. Examples of these mandates were

school choice and supplemental educational services, which were initially attached to schools

that did not make AYP under NCLB.

The effectiveness of Title I has been questioned and researched over the years. Recent

research has produced data from 19 states that looked at the academic achievement of students

who received Title I compared to students who did not receive Title I services in grade 4, 8, and

high school, usually grades 10 or 11, to verify if gaps between the students receiving assistance

narrowed (Kober, McMurrer, & Silva, 2011). Their findings included that gains were made by

Title I students and that since 2002, the gap has narrowed more often than widened and when

gaps did narrow it was because the Title I students improved at a faster rate than non-Title I

students (Kober et al., 2011). The National Assessment of Title I summary of key findings

reported similar evidence to support that Title I services were having a positive impact on

student achievement. The report stated that the percentage of students who showed proficiency

or above, on their state standardized assessment was 78% or above. Both state assessments and NAEP scores also indicated that the gap is narrowing for low socio-economic students who receive Title I services (Institute of Education Sciences, 2007). Although Title I funding has gone a long way to support school districts in an attempt to close the gap for high poverty students, funding alone can not close the gap. The funding must be targeted to the correct resources. Traditionally, Title I has dispersed funds without mandating that research based interventions be implemented. The research in effective schools must be utilized in order to ensure that the funding is attached to the correct interventions, strategies, and characteristics in order to improve student achievement. Those strategies have been researched and lead by the effective schools movement, which began in the late 1970's and early 1980's.

EFFECTIVE SCHOOLS RESEARCH LEADS TO SCHOOL IMPROVEMENT

As data were collected and analyzed from the late 1960's- 1990's patterns started to emerge of specific characteristics and qualities that increased student achievement thus contradicting the Coleman Report that schools do indeed have an impact on student achievement. In fact, as early as 1979 in *Educational Leadership* Ronald Edmonds stated,

> It seems to me, therefore, that what is left of this discussion (school reform) are three declarative statements: We can, whenever and wherever we choose, successfully teach all children whose schooling is of interest to us; We already know more than we need to do that; and Whether or not we do it must finally depend on how we feel about the fact that we haven't so far.

Edmonds' statement implies that over 30 years ago the research to support effective schools existed. The statement raises concern because it gives the impression that our society does not seem to care about certain populations of students as evidenced by the achievement gap. School improvement models began to form based on the data from the effective schools research

and the seminal work of Ronald R. Edmonds, Lawrence W. Lezotte, Beverly Bancroft, and Wilbur Brookover (Lezotte & Bancroft, 1985). These authors were among many that led experiments and analyzed data from effective schools and ultimately led the effective schools reform movement. The contributions they made to the field of effective schools research and identifying characteristics of effective schools is groundbreaking. In 1982, Ronald Edmonds outlined five qualities of effective schools based on the research of characteristics of effective schools that was completed by Brookover and Lezotte (1977), Edmonds (1979), and Rutter (1979):

1. Principal leadership, with a focus on instruction

2. Instructional Focus

3. Healthy climate (that is safe and promotes learning)

4. Teacher expectations that all students can learn

5. Using student achievement as the standard for evaluation of programs (Edmonds, 1982). These five qualities became the foundation for other studies in the effective schools movement. In addition to the characteristics outlined by Edmonds, he also suggested that although not all students will be able to perform academically at identical levels, schools should have an equal percentage of its students from a diverse spectrum of income with grade level understanding (Edmonds, 1982) thus creating the impetus for the disaggregation of data. Lawrence Lezotte and Beverly Bancroft agreed with Edmonds work and echoed the sentiment that all students can learn and that schools have the information they need in order to increase student achievement (Lezotte & Bancroft, 1985). Each of these studies specifically highlight the achievement gap between students with diverse incomes because the research was in response to the Coleman Report.

As schools began to adopt the characteristics and ideas of Edmonds, Lezotte, and other

prominent researchers in the effective schools movement, many challenges arose. For example,

most of the studies had been completed on schools that were already effective, so the

implementation of these characteristics on schools that were not effective proved to be a

challenge (Lezotte & Snyder, 2011). This was a major critique of the effective schools research.

The research also did not always say what categorized the school as effective. Sometimes the

study might give a percentage of students who scored well on a test or graduated as an indicator

of success, but this was not always clearly defined within the research. Additionally, the research

had not suggested how the schools should implement or go about changing their habits to ensure

that all of the characteristics were followed with fidelity. Studies also began to form around

sustainability of the reform efforts. The need for "longitudinal monitoring and assessment of

pupil achievement in the area of feedback" was also a necessary component to sustaining change

(Clauset & Gaynor, 1982). As the effective schools movement continued additional longitudinal

studies confirmed that the Coleman Report did not accurately represent the impact a school has

on student achievement. Additionally the Coleman Report did not look at difference within

schools only across schools. Subsequent research in response to the Coleman report confirmed

that individual schools have a significant impact on student achievement.

As schools and educators began to have increased access to the data from effective

schools research, it was important for schools to not only know which strategies are effective,

but which strategies are not effective and should be avoided (Edmonds, 1979). The shift in

thinking, resources, professional development, and even teacher training continues to be a work

in progress. Lezotte (1992) accurately stated that the effective schools movement created a

"paradigm shift in American public education." Many authors concur that along with the

effective schools research an open mind and willingness to implement change has to occur.

Shifts in thinking that allow for new strategies and ideas to actively engage students must occur

in order to make learning meaningful for students and to ultimately increase student achievement

(Reagle, 2006).

CORRELATES OF EFFECTIVE SCHOOLS

The characteristics of effective schools have been defined and redefined over time.

Lawrence Lezotte and Kathleen McKee Snyder have defined the word correlates to mean the

characteristics demonstrated by the effective schools. They explain that as the body of research

grows in this area the need for additional explanation is imperative (Lezotte & Snyder, 2011).

They classify the current correlates of effective schools into seven areas that a school must

demonstrate in order to exhibit high student achievement.

1. High expectations for success

2. Strong instructional leadership

3. Clear and focused mission

4. Opportunity to learn/time on task

5. Frequent monitoring of student progress

6. Safe and orderly environment

7. Positive home-school relations

Several books, many articles, and professional development surrounding these correlates

exist. Each correlate is defined and research-supported strategies are identified in order to

promote the correlate within a single school and district. Questions and observations related to

the correlate are also shared to help educators identify with each correlate.

FIGURE 2.1 Characteristics and Selected Authors of Effective Schools

Characteristics of Effective Schools/ Authors	Edmonds 1982	Sizer 1984	Goodlad 1984	Purkey & Smith 1985	Zigarelli 1996	Kyriakides 2010	Lezotte & Snyder 2011	Daggett 2011	Reeves 2012	Marzano 2013	Total	Rank Order
Curriculum				✓					✓	✓	3	
Policy						✓			✓		2	
Sense of Community				✓							1	
School Based management				✓							1	
Teacher & Principal Preparation			✓								1	
Resources		✓	✓	✓					✓		4	
PLC– Positive Collaboration		✓	✓	✓	✓	✓		✓	✓	✓	8	2
Effective/Focus on Instruction	✓					✓		✓	✓	✓	4	
Teacher Quality/Satisfaction					✓	✓			✓		3	
Staff Development				✓							1	
Staff Stability				✓							1	
Positive Home/School Connection		✓		✓	✓		✓		✓	✓	6	
Safe & Orderly Schools	✓	✓		✓		✓	✓			✓	6	
Monitoring of Student Progress to evaluate Program	✓	✓		✓	✓	✓	✓	✓	✓	✓	9	1
Time on Task/Opportunity to Learn		✓		✓			✓				3	
Clear &Focus Mission/Goals			✓				✓	✓	✓	✓	5	
Instructional Leadership	✓	✓	✓	✓	✓		✓	✓	✓	✓	9	1
High Expectations	✓			✓		✓	✓	✓			4	

Many researchers have studied the characteristics or strategies most prevalent in high performing schools. The qualities outlined in Figure 2.1 represent the findings of key studies led by selected authors.[3] It is important to note that the authors and their work selected within Figure 2.1 includes a wide variety of both peer-reviewed and non peer- reviewed studies. The authors included in the graphic representation were selected because they represent authors who have contributed to educational research over the years specifically in the area of effective schools. These authors were also selected based on the fact that they were frequently cited when the words "effective schools research" was entered as a search filter on the electronic database of ERIC. I also attempted to represent research from various decades in order to better analyze how or if characteristics of effective schools have changed throughout time. Although this chart clearly does not list every important author of effective schools research throughout time, it represents a sampling of the authors of various time periods and the characteristics identified of effective schools during that time period.

The characteristics identified on Figure 2.1 also represent a broad definition of each characteristic. The authors identified for this representation used various terms and wording to represent similar ideas. For example, the words collaboration, designated time for teachers to work together, Professional Learning Community have all been grouped together for coding purposes on Figure 2.1. Similarly, the category of monitoring student progress also included assessment of students. These two areas were combined because monitoring student progress is a form of assessment and both of them inform instruction. While some categories could be

[3] While it is accurate to say that the names of authors listed in Figure 2.1 determined the characteristics to be important qualities of effective schools based on research identified in the citation portion of the paper, Figure 2.1 does not encompass the entire body of work created by that cited author.

grouped together, other categories did not seem to fit well into each other and therefore a separate category was created.

As each category is defined below, I list various studies that contributed to one or more of the author's studies that led to this category being placed on Figure 2.1. I have highlighted a few studies from each characteristic on Figure 2.1 that have contributed to the author(s) identification of that strategy making a difference on student achievement.

Of the ten researchers selected for Figure 2.1, four listed high expectations as a trait that is necessary for effective schools. This category covers both the belief that teachers think students can achieve and reach expectations and the teachers' collective sense of efficacy (Goddard, Hoy & Hoy, 2000; Bandura, 2012). Collective efficacy in teachers is linked to an increase in student achievement; when teachers believe and have confidence in themselves as teachers in the content and the way they deliver it, student achievement increases (Scribner, 1999; Goddard, Hoy & Hoy, 2000; Bandura, 2012). This is relevant because there is quantitative data to detect the impact of collective efficacy on student achievement. They used socio-economic status, proportion minority and school size as variables (Goddard & Goddard, 2001). Even accounting for those variables their results represented a one standard deviation increase in perceived collective efficacy (Goddard & Goddard, 2001). Studies have been replicated and collective efficacy continues to show a positive impact on student achievement. One study that links teacher expectations to student achievement in the area of reading was conducted by Rubie-Davis (2007) in Auckland, New Zealand. Her research took place in eight different primary schools. The teachers involved in the study were placed into one of three different categories based on input from the recommending principal: High Expectation Teacher, Average-Process Teacher, and Low Expectation Teacher. The teachers were observed twice throughout the year

by two researchers. One of the researchers completed a structured observation protocol and the other researcher recorded a running record. Rubie-Davis discovered that teachers with high expectations saw a "mean (or average) effect size increase in the area of reading of 1.27, 1.28, and 1.44 compared to average process teachers 0.27, 0.18, -0.08, and low expectation teachers which produced mean effect size gains of 0.20, -0.02, and -0.03(p. 293)." The mean or average effect size represents the strength of the relationship observed in a particular study (Lipsey & Wilson, 2001).

While analyzing Figure 2.1 it becomes clear that the top three most cited characteristics of effective schools based on the research from the authors selected above represent the following correlates instructional leadership, monitoring of student progress, and professional learning communities/collaboration. Interestingly instructional leadership and monitoring of student progress tied with nine citations each for the most cited characteristics in the effective schools research displayed in Figure 2.1. All but one of the authors selected in the table above listed these top two characteristics. Professional Learning Communities along with collaboration and working with other teachers was the next highest characteristic represented in the chart. While the top two characteristics of instructional leadership and monitoring of student progress were cited by Ronald Edmonds. The third highest characteristic of professional learning communities/collaboration was not on the original list. One reason that this trait is somewhat surprising is that the field of teaching is a fairly isolated occupation. The topic of collaboration has been a shift in education that has noticeably developed within the last several decades. An article published by Dan Lortie (1977) suggested that informal networks and networking could increase the potential to diversify practices and shared ideas across schools and districts. Lortie also concluded that networking would increase problem solving capacity and encouraged

teachers, principals, and superintendents to increase collaboration in order to increase problem solving. The idea of collaboration and even the term professional learning communities has been a recent term given to educators who focus on the idea of collaboration, student learning and student results. Therefore instructional leaders should be creating "a new collaborative culture based on interdependence, shared responsibility, and mutual accountability (Dufour & Marzano, 2011)."

It is not surprising that instructional leadership has been cited as one of the most common characteristics of effective schools according to figure 2.1. There are many books that have been written about school leadership and the impact that it has on student achievement. In fact a meta-analysis was recently performed on this very topic. The meta-analysis included 69 studies from the United States over a timeframe of 23 years.   The studies included schools at all three levels elementary, middle, and high school and accounted for outliers. The studies used teacher-rating scales regarding the instructional leadership in his or her building and then compared it to student performance (Marzano, Waters, & McNulty, 2005). Although both the authors of the study and the modern founder of meta-analysis, Gene Glass, have concerns about averaging results of a meta-analysis, it is important to note that their results showed an average correlation of .25 between instructional leadership and student achievement (Marzano, Waters, & McNulty, 2005). Chapter 3 in the book School Leadership that Works explains how a correlation of this size would impact student achievement.   They give an example of a principal who is in the 50th percentile in student achievement and also in the 50th percentile of leadership capacity. They state that "by increasing the leadership capacity by one standard deviation" the student achievement would elevate to the 60th percentile (Marzano, Waters, & McNulty, 2005). The potential impact for instructional leadership on student achievement has been well documented

throughout the years by authors and more recently provided additional evidence by researchers using student data to support the idea that instructional leadership does have a positive impact on student achievement. Since this area has been so heavily researched and reported on, this study does not include information in chapters 4 and 5 on instructional leadership and the impact it has on student achievement.

Another area that has been highlighted as having a high impact on student achievement is monitoring student progress and altering instruction. The altering of instruction based on frequent assessments and quick temperature checks to see how the student is performing has recently been given the new name of progress monitoring. However, this concept is not new and the terms formative assessment and assessing for understanding have been used interchangeably over the past several decades as a way to increase student achievement. Formative assessment is one of the most influential ways to increase student achievement and motivate student learning (Cauley & McMillan, 2010). The rationale behind progress monitoring is to use assessments as a tool to measure student achievement to determine the student growth using various instructional strategies and interventions (Stecker, Lembrke, & Foegen, 2008). In order for assessment to be effective, there needs to be alignment of curriculum, instruction, and assessment (Dunsworth & Billings, 2009). This means that the curriculum is aligned to the standards and that a teacher's instruction is covering those standards when the teaching occurs. Furthermore, the assessment must also cover what has been taught and accurately represent the instruction and content presented to the students. In a time where high-stakes testing and accountability promote summative assessments as measurements of effective instruction, it is critical to implement formative assessments and an adaptive instruction model into the curriculum. Formative assessment allows for re-teaching, corrective interventions, and targeted

instruction in order to offer multiple opportunities and extended learning time for the learning to occur. Not only has the research shown that formative assessment can increase student achievement but it also increases the student's belief that they are responsible for their own learning and motivation to learn (Zimmerman & Dibenedetto, 2008).

The results of a study performed by Bangert-Drowns, Kulik and Kulik that contained 35 studies that examined frequent classroom testing and the impact it had on criterion referenced exams showed that frequent classroom assessments do have a statistically significant (t $(34)=$ 3.94, p < .001) effect on criterion referenced assessments (1991). Of the 35 studies 29 of them showed positive effects with an overall effect size of 0.23. This means that the teachers that routinely used classroom assessments to inform instruction raised their achievement on criterion tests by .23 standard deviations. This translates to an average student scoring in the 59th percentile or outperforming 59% of the students who were not frequently exposed to classroom assessments (Banger-Drowns, Kulik & Kulik, 1991).   The data to support frequent assessment and monitoring of student learning exists. However, it is not just the amount of testing that makes a difference in how students perform, but what the teacher does with the data to inform or alter his or her instruction is ultimately a critical characteristic of increasing student achievement.

The term Professional Learning Community (PLC) is a more recent term in the educational community. However, the ideas behind a professional learning community have been around since the inception of school. As defined in chapter 1, a professional learning community is:

An ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve. Professional learning communities operate under the assumption that the key to improved learning for students is continuous job-embedded learning for educators (Dufour, Dufour, & Many, 2010).

The process of a PLC is to focus on student learning and collaborating with colleagues to increase student achievement. The process of collective inquiry and action research means that a team of teachers work together to problem solve issues that surround student achievement. After the teachers have problem solved they collect data or conduct action research to determine if the intervention and solution are producing the desired results of the collective inquiry or issue concerning student achievement. A major variable of the PLC process is the element of time. Teachers must be given time to collaborate and discuss the PLC process. Even assessment experts have determined that giving teachers time to work collaboratively where they can share ideas, materials and resources can benefit student achievement (Guskey, 2007). According to the All Things PLC website, there are hundreds of schools that have increased their student achievement by using the collaboration process described above. These schools represent elementary, middle, and high schools. These schools all fulfill the three criteria to be displayed on their website http://www.allthingsplc.info/evidence/evidence.php. The three criteria that must be evident are all schools will demonstrate a commitment to learning for all students and the PLC concepts, they must implement these concepts for at least three consecutive years, present clear evidence of improved student learning in the form of data, and describe the practices, cultures, and structure of the school (All Things PLC, 2013).

In a study designed to determine the impact of student test scores in relationship to the attitudes and beliefs of the stakeholders such as administrators, parents, and teachers in under-performing and over-performing schools the key factors in student achievement were parent communication and collaboration (McCoach, Goldstein, Behuniak, Reis, Black, Sullivan, & Rambo, 2010). This information was gathered from surveys, which indicated that increased collaboration between teachers and administrators resulted in more time to focus on student

results and less on adult drama and tension between teachers and administrators (McCoach et al., 2010). The data obtained from the teacher surveys also showed that schools that focused more on collaboration correlated to the teachers feeling more support by the organizational structure of school. Higher levels of peer collaboration showed higher levels of student achievement (McCoach et. al, 2010). Although the terminology for collaboration among teachers may have changed throughout the years from teacher prep time, to team planning time, to Professional Learning Communities, the idea that a group of teachers working together to share ideas, resources and information to improve student achievement appears to be another common characteristic of highly effective schools.

A final characteristic according to Figure 2.1 that appears to be a common quality among effective schools research is a safe and orderly school environment. It is common for this term to also be referred to as a positive school culture or climate. Anthony Muhammad (2009) writes and speaks about school culture and how it is a safe place for students to take risk and "a place where the adults believe that all children can learn" and even perhaps more importantly "all children will learn because of what we (the adults) do." While it might be easy to claim the above statements, it is an entirely different practice to believe in the statements and pull the resources and support to the areas that need it the most. Some may argue that school culture is not the same as safe and orderly schools; however, they fit under the same umbrella. A culture of respect between students and staff is part of safe and orderly schools. The Division of School Safety in the Arizona Department of Education conducted a study in which 12 secondary schools were selected to be a part of a focus group. Both students and teachers made up the focus groups. The qualitative data collected from the focus group determined the following items made them feel safe at school: Visible/physical characteristics such as security cameras and

security guards, organization and school discipline, and school staffing relationships (Bosworth, Ford, & Hernandez, 2011). The study also looked at the Standardized Achievement Tests in the state of Arizona to compare it with the data of students' perceptions of feeling safe. The results of the study showed that high achieving schools did keep students that participated in the focus groups from feeling unsafe; however, both teachers and students felt safe when they were in schools where they believed the adults were "caring and helpful and the rules were clear, consistent, well communicated, and consistently applied (Bosworth, Ford, and Hernandez, 2011). Of course there are more obvious violent acts of crime in schools such as Littleton, Colorado at Columbine High School, Paducah, Kentucky and most recently Newtown, Connecticut. Many experts believe that the media has played a large role in desensitization to violence, which has increased the physical and aggressive behavior in students in schools. Schools must be vigilant about watching for the warning signs, develop and implement professional development in school culture and recognizing triggers of violence, work with social services, and collaborate as a team to solve issues surrounding violence and creating a healthy school climate (Barr & Parrett, 2008). When students feel safe and secure they are more likely to take risks in his or her learning. Creating a culture of respect for an entire school takes time and a growth mindset (Dweck, 2006); but is a common characteristic of highly effective schools. A growth mindset means that a person is open to change and willing to learn and grow.

STUDIES TO SUPPORT THE CORRELATES

Additional studies exploring the earlier work in the effective schools movement continues to yield fairly consistent results. In 1996, Michael A. Zigarelli published an empirical study using data that he analyzed from the National Educational Longitudinal Study from 1988,

1990, and 1992. Zigarelli examined the variables of the effective school research. He selected

six variables based on the work of Edmonds from 1979, Block from 1983, Purkey & Smith from

1983, Cole & Witcher from 1992, and Downer from 1991.   Zigarelli used linear regression

analysis to control for the most common variables that he extracted from the authors listed

above. He segregated the results into six categories based on the regression analysis of teacher

assessments. The student data was collected from a reading comprehension test created by the

Educational Testing Service (ETS). The data also included very thorough surveys completed by

students, teachers, parents, and administrators in the schools. The teacher assessments were

conducted by the Department of Education in conjunction with the National Opinion Research

Center and Educational Testing Service. These surveys contained professional questions about

the teachers educational background. The student surveys contained valuable information

regarding the student's background information and school information. Zigarelli concluded that

the most important characteristics of effective schools were: "employment of quality teachers,

teacher participation and satisfaction, principal leadership and involvement, a culture of

academic achievement, positive relations with the central school administration, and high

parental involvement (Zigarelli, 1996, p. 103)." Furthermore, Zigarelli suggests that there is no

evidence to support the idea that teacher autonomy and additional teacher education make any

difference in student achievement (1996). Additionally, principal management issues also did

not contribute to effective schools according to Zigarelli's research (1996). The characteristics of

effective schools would support the work mentioned previously of Edmonds and Lezotte. Both

Edmonds and Lezotte mention the qualities of principal leadership, teacher expectations, focus

on instruction, and healthy safe climate/culture as being predominant traits of highly successful

schools.

ADDITIONAL SCHOOL REFORM AND THEIR LEADERS

One of the more popular published reports about school reform is the Nation at Risk document from 1983. This report commissioned by the Excellence Commission requested a group of experts to write about the quality of the education in American schools. While there are some positive comments about the pride of American schools, the report sends the overwhelming message that we are becoming a nation at risk. It suggests that other countries are matching and outperforming our schools due to the increased mediocrity of our educational system and that the educational attainment will not surpass the next generation as it has traditionally done in the past (National Excellence Commission, 1983). School reform movements have developed throughout the years. Theodore Sizer looked at K-12 education and his ideas reinforced the concept of putting the students first. He wrote books including the *Horace Trilogy* and *Horace's Compromise* and gave Congressional testimony to remind the public of the importance of educational reform (Littky, 2009). He believed that in order for change to occur in education, people needed to rethink the structures and examine the priorities and resources in education (Sizer, 1984). He also suggested that school improvement would not occur with mandates being placed upon schools, but by reflective decision-making in policy and practices. In 1984, he created the Coalition for Essential Schools (CES). This organization has created 14 CES Benchmarks that break down into seven practices for classroom teachers and seven organizational practices. In conjunction with the 14 benchmarks there are 10 guiding principles and seven organizational practices that make up the philosophy of the organization. These benchmarks, principles, and practices reflect the Coalition's approach to school reform and showcase the best practices and work gleaned from the field and from CES research

(http://www.essentialschools.org/items/5). The Coalition uses the benchmarks, principles, and practices as tools to help guide schools and districts as they focus their efforts to increase student achievement. The practices include: Access, Opportunity, and Post Secondary Preparation, Family Engagement and Community Partnerships, Continuous School Improvement, Culture of Fairness and Trust, Maximizing Resources for Equitable Outcomes, Professional Learning Community, and Transformational Leadership (http://www.essentialschools.org/items/5).

John I. Goodlad also conducted research in the 70's and 80's and co-founded the Center for Educational Renewal with researchers and colleagues Roger Soder and Kenneth Sirotnik in 1985. The bulk of his published writing from the 1970's appeared in his seminal piece called, A Study of Schooling in the United States (Goodlad, 1979). An important note about his writing in the Study of Schooling is that it makes observational claims and gives recommendations of what Goodlad saw across the United States during that time period through the use of teacher surveys and questionnaires, rarely was student achievement collected as the way to show if something was working.   This is noteworthy because it is indicative that during the time period of the 70's and 80's student data was not always used to indicate effectiveness of the school. Another technique he used was to find exemplars in a subject area and then write about the gaps missing in that area of study. In 1973, he published Curriculum Decisions a Conceptual Framework and gave opinions about what curriculum should encompass based on observations within schools, but not on student achievement data. In 2009, the institute morphed into the Goodlad Institute for Educational Renewal. The institute focuses on schools and teachers preparing students to be well-rounded and productive citizens. According to the center's website http://www.bothell.washington.edu/research/centers/goodladinstitute, The institute believes that:

> By developing examples, ideas, leaders, and networks that highlight the public
> democratic purposes of education, the Goodlad Institute aims to energize a new national

conversation about what high-quality education means in a democracy and how to achieve it.

Goodlad was optimistic that educators would learn from the research of the 1960's, 1970's, and 1980's in order to do a better job implementing change in American Schools. He targets the root of school reform by suggesting that it is about change. In Goodlad's article, *Improving Schooling in the 1980s: Toward the Non-Replication of Non-Events,* he discusses with Ron Edmonds the idea that we have the knowledge base on school effectiveness; we just are unable to get the change to occur in schools (1983). Goodlad outlined the need for better principal and teacher preparation, strong instructional leadership and clear and focused goals (1984) based on observations, interviews, and questionnaires he gave to schools he visited throughout the United States. He also stated that positive relationships with central office in order to align the resources with the needs of the individual schools are key to school reform (Quinby, 1985).

The 1980's continued to produce effective schools research. During 1985, Purkey and Smith wrote about the effective schools characteristics. In their Effective School Review (1982), Purkey and Smith criticize the literature published on effective schools by stating that it is often derived by "non-experimental data" and that their research casts a broader net by including "outlier studies, case studies, surveys and evaluations, at studies of program implementation, and at theories of organizations of schools and other institutions (p.5)." However, they go on to add in the same article that the "lack of empirical data in many of the studies, preclude us (Purkey and Smith) from carrying out any sort of quantitative synthesis (p.5)." Purkey and Smith share in their research that they look closely at the following case studies previously publish: Weber from 1971, Venezsky and Winfield from 1979, Glenn from 1981, California State Department of Education from 1980, Brookover and Lezotte from 1979, and Levin and Starke 1981, which totaled 43 schools. Although Purkey and Smith argue that the methodology was different in each

study and the clarity of the studies was questionable, they developed their own list of 13

characteristics for school reform. Purkey and Smith's list of variables for effective schools

included nine organizational structures:

1) School site management

2) Leadership

3) Staff stability

4) Curriculum articulation and organization

5) Staff development

6) Parent involvement and support

7) School-wide recognition of academic success

8) Maximized learning time

9) District support

And 4 process-form variables, which include:

10) Collaborative planning and collegial relationships

11) Sense of community

12) Clear goals and high expectations commonly shared

13) Order and Discipline.

While these 13 variables are very close to the ones presented by Brookover and Lezotte (1977),

Edmonds (1979), and Rutter (1979) and the more recent updated list created by Lezotte and

Snyder (2011) the list does differ.

The International Center for Leadership Education was established in 1991. With

financial support from the Bill and Melinda Gates Foundation, Bill Daggett, CEO for the center,

wrote a white paper outlining The Daggett System for Effective Instruction. The system is based

off of the premise that good instruction is at the heart of effective schools. He outlined the studies and research of John Hattie's Visible Learning, Robert Marzano's research for Effective Teaching and What Works in Schools, Charlotte Danielson's Framework for Teaching, Sutton Trust Toolkit for Strategies to Improve Learning, InTASC Model Core Teaching Standards, Focused on Student Success: A Five- Year Research Study of Models, Networks, and Policies to Support and Sustain Rigor and Relevance for ALL Students (Daggett, 2011). However, Daggett insisted that effective school reform and student achievement does not occur from improved instruction alone. Daggett suggested that his system works because it "provides a coherent focus across an entire education system: Organizational Leadership, Instructional Leadership, and Teaching (2011)." Within these three domains almost every strand of focus compares favorably to Lezotte's Effective School's Correlates. Although the names of the strands vary from the same wording as the correlates, they essentially translate to the same ideas such as cultivating high expectations, creating a shared vision/mission, building leadership capacity, using data systems to inform decisions, effective instruction, and building relationships with students (Daggett, 2011)**.**

It appears that in the late 1990's and 2000's there was a shift in school reform to systematic and systemic change reform. The words "transformational leaders" and "transformational change" are prevalent in the research during this time period. The term transformational is typically focused on change. When referring to transformational leadership in the area of education the work of Bass (1985), Bass and Avolio (1994), and Leithwood (1994) have led the way. All of these authors have contributed to the idea that leaders must possess specific skills in order to create change including the four I's: "individual consideration, intellectual stimulation, inspirational motivation, and idealized influence." The Leadership and

Learning Center is one of several educational organizations that promote school transformation

through systematic change (The Leadership and Learning Center Brochure, 2012). This center

specifically focuses on the work of their founder Doug Reeves. His research in the area of

effective schools where 90% of the students are low income, 90% are from minority ethnic or

linguistic backgrounds, and 90% are at grade-level or above, are called 90-90-90 Schools (The

Leadership and Learning Brochure, 2012).   On the Center's website it lists nine areas for school

improvement. Of the nine areas identified, five overlap with the correlates identified by Lezotte.

The five areas that are closely related to Lezotte's work include Vision and Mission, Student

Achievement, Instructional Quality, Leadership, and Parent and Community Engagement

(http://www.leadandlearn.com/services/school-improvement/blueprint). The idea that change

theory is behind the effective schools movement is not new, but change models for schools and

districts to follow in order to implement change are a newer concept within the last decade.

Reeves contends that, "it is not rhetoric that persuades us (to change), but evidence at a personal

level (2012)." As our data collection and assessments have become more sophisticated we have

more evidence at our fingertips. The timing for school reform is ripe, because although we have

had the effective schools characteristics and correlates from Edmonds and Lezotte since the early

1980's, implementing the information has been difficult. Now that data and evidence is easier to

obtain, decipher, and monitor, perhaps change will be more likely to occur.

Research in effective schools not only has spread across the United States, but also

throughout the world. Constantinos Papanastasiou analyzed data (both a student questionnaire

and actual test data) from the Progress in International Reading Literacy Study (PIRLS) in

Cyprus (2008). Although his data is tied to only achievement in the area of literacy, he also

identified six areas that impact student achievement. The factors include: in-class activities

following the reading class lesson, reading outside of the school day, time spent on homework, attitude towards reading, activities during in-class teaching, and school climate (Papanastasiou, 2008). Of the six factors, two of the six occur only outside of the school day. The other four factors occur or are shaped by teachers within the school day. Again this data reinforces the concept that what schools do, does have a significant impact on student achievement.

A meta-analysis in the area of effective schools was also published from a group of authors from Cyprus and the Netherlands in 2010. The authors analyzed and coded 67 studies in the area of effective schools research (Kyriakides, Creemers, Antoniou & Demetriou, 2010). Their work was grounded in searching for answers to what works in schools and what makes it work? Instead of effective school research, they have shifted the terminology to educational effectiveness research (Kyriakides et al., 2010). The authors examined the effect size of the relationship each factor had on school improvement throughout the 67 studies. Areas that had a relatively high impact on student achievement include: Policy on teaching, quality of teaching, student assessment; collaboration, partnership policy, and school climate (Kyriakides et al., 2010). Again, the school and teachers influence these factors. The results of these studies provide additional confirmation that schools matter and teacher practices and instructional strategies have an impact on student achievement. They argue that it is not who is in charge that makes the most impact, but rather what policy and which instructional strategies are being implemented that have the greatest influence on the student achievement data (Kyriakides et al., 2010). Since the authors used the technique of meta-analysis, they were able to employ a wide variety of studies to extract data to analyze. The areas identified as having the greatest impact on student achievement had an effect size of 0.15 or greater when compared to other characteristics of effective schools. The studies listed above confirm that characteristics identified as being

present in effective schools by Edmonds, Lezotte, and other prominent researchers have not only

countered the argument made in the Coleman Report, but have continued to gain importance as

factors that contribute to increase student achievement and highly effective schools.

Interestingly, the recent research by Kyriakides et al., 2010 and Papanastasiou, 2008 was

conducted mainly with studies that occurred outside of the United States and did not factor in the

poverty level of the students within the study. A meta-analysis on effective schools research

using studies from within the United States with a specific focus for strategies that have a

positive impact on student achievement for students of poverty has not been performed. There

are several reasons a study needs to be performed, which includes data from the United States.

Perhaps the most convincing rationale is the socio-political differences that exist between the

United States and other countries. An example of those differences include the history of *de*

facto and *de jure* segregation and discrimination against minorities and various socio-economic

status (both of poverty and wealth) in the American education system. These issues have left a

lasting impact on present day issues. Another reason for studies from American schools include

the difference between school structures. Examples of these structural differences include but

are not limited to the length of the school year and day to the age in which formal schooling is

even required. Teacher preparation and teacher pay are also very different within other

countries. A final rationale for utilizing studies from the United States is to see if the results are

replicated in different populations. If the results in this study are consistent with the results from

Kyriakides et al., 2010 and Papanastasiou, 2008 then the strategies are strengthened and should

give educators more of a reason to be implementing these strategies with our schools. If the

results from this study suggest that other strategies are more effective then it will provide critical

information that is relevant to American children and will give schools across the nation a road

map of the most effective strategies to impact student achievement with students living in poverty.

CONCLUSION

      In summary, the literature in this chapter outlines the historical perspective and response to educating children living in poverty within the United States. While Title I Federal Funding has provided schools with some financial assistance, funding alone is not the answer to dispelling the myth that students living in poverty are unable to achieve academic success. The funding must be targeted to research based strategies, interventions, and resources that have been shown to improve student achievement for students living in poverty. The effective schools movement over the past several decades has provided high impact strategies, which have evolved into the correlates of effective schools. Although the names of various strategies have changed, throughout time it appears that the three most common characteristics of effective schools are: 1) Instructional Leadership, 2) Monitoring student progress, and 3) Collaboration/Professional Learning Communities.

SUMMARY

      The research presented in this literature review and in this dissertation will make a contribution to the field of education. Schools should produce results in the area of student achievement regardless of the special populations of students that attend their school. By analyzing studies that include information about strategies that effective schools have used, critical information will be relayed to educators. Not only will educators learn which strategies lead to effective schools, but will be able to quickly see which strategies were the most effective

by looking at the effect size. This information will allow educators including teachers, administrators, and central office directors to prioritize resources, personnel, and professional development to focus on the strategies that produce results. The research will also be helpful to grant organizations, non-profits that fund educational programming, and departments of education as they determine grant funding for school districts. Ultimately, the research in the area of effective schools will increase student achievement since educators will be able to focus their time and energy in areas that will have the greatest gains. In the next chapter, a complete description of the methodology of meta-analysis will be explained for this study. Details describing the data collection process and analysis as well as limitations of this methodology will be outlined in chapter 3.

CHAPTER III

RESEARCH DESIGN

When reading literature regarding meta-analysis the words research synthesis, review of research, study of studies and many other terms are often used interchangeably. However, according to Harris Cooper and colleagues the word meta-analysis can be defined as the "Statistical analysis of a collection of analysis results from individual studies for the purpose of integrating the findings" (Cooper, Hedges, & Valentine, 2009, p. 578). A meta-analysis is performed by looking at the effect size and the variance for each study and then determining the weighted average of those effect sizes (Borenstein, Hedges, Higgins & Rothstein, 2009).

Although meta-analysis is a rather recent method in the social sciences, it has frequently been used in the behavioral sciences. Literature from Mark W. Lipsey and David B. Wilson (2001) suggests that there are several advantages to using Meta-Analysis as a way of summarizing information. A few of the benefits are: set criteria and protocol that allow for a consistent procedure to be implemented throughout the study, quantitative analysis that shows "statistical significance" that helps determine the effect that the research had on the outcome of the study, and a meta-analysis provides a meaningful way to allow a researcher to review a large number of studies.

Additionally Harris Cooper cites the American Psychological Association's Presidential Task Force on Evidence Based Practice (2006) by stating "the call for use of evidence-based decision making has placed a new emphasis on the importance of understanding how research was conducted, what it found, and what the cumulative evidence suggests is best practice." One example of a recent meta-analysis is the book by John Hattie titled Visible Learning. This book

has helped uncover the research that has been done in effective schools and specifies which instructional strategies and characteristics are most successful in creating effective schools. However, this meta-analysis includes studies throughout the world and is not specific to schools within the United States

PROCEDURES

For this study, Cooper's stages of research synthesis (2010) was utilized:

Step 1: Formulating the Problem

Step 2: Searching the Literature (Data Collection)

Step 3: Gathering Information from Studies (Data Coding)

Step 4: Evaluating the Quality of Studies (Criteria for Inclusion)

Step 5: Analyzing and Integrating the Outcome of Studies

Step 6: Interpreting the Evidence

Step 7: Presenting the Results

PROBLEM FORMULATION

The impetus for conducting research is to solve a problem. Although the problem has been stated throughout chapters 1 & 2, instructional characteristics that have the greatest impact on student achievement with students who receive free or reduced price lunch was the problem that was answered by the research presented in this dissertation. The data from this meta-analysis included evidence for student achievement as measured by an assessment that was able to produce an effect size. The selection of variables included collaboration with a focus on student learning and progress monitoring, as those are two of the three most prominent variables throughout the research in the literature review section.

It is important to note that each of these variables had subsets and other phrases that represented the same idea. One example of this included teachers' working together to focus on learning. Subsets within collaboration included Professional Learning Communities and teachers sharing strategies to improve student learning. It also included maintaining a focus on learning through academics and maximizing school learning time.

The second selected variable was progress monitoring. This variable included the monitoring of progress at the student level, classroom level, and school level. Each of these variables has been listed by the International Handbook of School Effectiveness and Improvement (2007). The handbook actually lists nine different variables; however, this dissertation only investigated two of the nine variables. The two selected appeared to be the most commonly cited characteristics from the effective schools research according to Figure 2.1. after instructional leadership.

SEARCHING THE LITERATURE

The second stage of conducting a meta-analysis included searching the literature (Cooper, 2010). The studies used in this dissertation include peer reviewed and non-peer reviewed data. The electronic database of ERIC was used to gather the data for this meta-analysis. The key words for the database searches are included in appendix A and support the progress monitoring variable in the Problem Formulation section.

Additional criteria for inclusion were both the time period and location of the data. Since other studies have been completed outside of the United States, the data for this meta-analysis only includes data that was collected within the United States and that was after the 1990's

decade. Reasons for this criteria included the idea that accountability changed after 2001 with

the Legislation of No Child Left Behind, and because most of the Effective Schools Research

took place prior to the 1990's time period. The criterion also excludes any data that is

qualitative or in a language other than English. Due to the methodology, it was imperative that

the data have an effect size in order to be measured and weighed accurately compared to other

studies. Therefore, the data included in this study were in the form of English Language Arts

test scores and Mathematics and was from schools across the United States.

GATHERING INFORMATION FROM STUDIES

 After combing through data sets to determine which studies and data sets were included

in this meta-analysis, the next step was to code the information. A codebook is included in

Appendix B. The codebook was created collaboratively with Cameron Rains. It outlines the

effective school correlates and the pertinent information to assist in analyzing the results in

chapter 4. Although we have each only researched two of the correlates, we went ahead and

coded for the other correlates for future research. The coded information was entered into the

Comprehensive Meta-Analysis 2 software. The coding guide was essential to create the

continuity that was needed to determine which moderator variables have the greatest impact on

student achievement.

 The information collected on the coding guide in Appendix B outlines the eight types of

information that Cooper (2010) on page 87 suggests should be included for a meta-analysis:

1. Report (author, year, type of journal, peer reviewed, research funded, type of organization produced report)
2. Predictor or independent variables
3. Setting in which the study took place (where the study took place public, private,

urban, rural)
4. Participant and sample characteristics (type of students: SES level, special education, grade, sex)
5. Dependent or outcome variables (test scores, achievement, subject area)
6. Research design
7. Statistical outcomes and effect sizes
8. Coder and coding process characteristics.

Cooper (2010) suggested that most researchers will utilize double coding in which all pieces of data are coded by at least two coders. The use of double coding does increase the reliability of the data being accurate in the meta-analysis. Cooper (2010) also indicates that double coding reduces the possibility for bias and increases the ability to catch errors occurred by the first coder. For this purpose my colleague Cameron Rains assisted in coding the most complex cases by double coding a few of the studies. Discrepancies in our coding are noted in Appendix C. Mr. Rains and I have taken a course in meta-analysis and have experience with the Comprehensive Meta-Analysis 2 (CMA) Software.

EVALUATING THE QUALITY OF STUDIES

The fourth step in Cooper's stages of performing a meta-analysis is a critical juncture because it determines which studies are included in the meta-analysis. Cooper (2010) suggests that having criteria for judging the degree of trustworthiness of the data is helpful to determine if the study will be used at all in the data computation or to some degree (p.116). The data analyzed in this dissertation was selected due to quality and not the name of the journal that it appeared in, or the author of the data. The studies used in this meta-analysis were also selected because they met the criteria outlined in the codebook. The codebook also included methodological characteristics so studies were compared to ensure consistency in quality and to lower the risk of having data that is considered an outlier. Consistent with the advice given by

Dr. Cooper, data that produced an extreme outlier result was removed from the meta-analysis in order to reduce the risk of skewing the results (2010 p. 144).

ANALYZING AND INTEGRATING THE OUTCOME OF STUDIES

Comprehensive Meta-Analysis software was used to compute this data. The advantage for using the software included the reduced risk for human error. Additionally the effect size of studies was weighted depending on the number of participants or size of the study. According to (Borenstein, Hedges, Higgins & Rothstein, 2009, p. 3) an effect size, "reflects the magnitude of the treatment effect or (more generally) the strength of a relationship between two variables." Therefore, when analyzing data and studies included in this meta-analysis, studies with effect sizes already calculated or accurate information to calculate an effect size were chosen to be included in the study. A random effects model was utilized for this meta-analysis. In the random effects model there was more weight given to a higher number of studies.   Also, in the random effects model, it is understood that the true effect could vary from study to study due to the population analyzed within the study and different weights are assigned according to the size of the sample population. The random effects model was reported for this study because the true effect size was not the same in all of the studies (Borenstein, Hedges, Higgins & Rothstein, 2009).

The confidence interval is presented within the data in Chapters 4 and 5. It explains how much confidence exists in the effect size. Narrower confidence intervals represent studies with more accurate estimates. The precision of a study can be due to the sample size and the study design. Typically larger samples have more precise estimates and study designs (Borenstein, Hedges, Higgins & Rothstein, 2009). The effect size is extremely important in a meta-analysis. Jacob Cohen (1988) is widely respected for his guidance in translating the magnitude of an effect

size. Figure 3.1 outlines the definitions outlined by Cohen and commonly used within the

research community.

Figure 3.1 Jacob Cohen's Effect Size Translations (1988)

_____

_____

Effect Size	Translated Impact of the Effect Size
0.0-0.2	Trivial Impact
0.2-0.5	Small Impact
0.5-.80	Large Impact
.80-1.0	Very Large Impact

LIMITATIONS OF THE STUDY

By utilizing the research method of meta-analysis, the information presented in this

dissertation was reliant on the studies that have already been conducted by other researchers.

Every effort was been made to select authors with trustworthy data and accurate representation

of their research process outlined in the study to meet the criteria for this meta-analysis.

It should also be noted that this meta-analysis was not comprehensive. The items

outlined in the codebook have been controlled for in the meta-analysis software, but it was

limited to the areas that were coded: Monitoring student progress. Attempts have been made to

include studies that met the criteria outlined in this methodology chapter; however, critical

studies could have been accidentally omitted or purposefully omitted due to missing statistical

information.

The precise definitions of the controlled variable could also be a limitation. Although the

term progress monitoring was controlled for in the analysis and was defined earlier in this dissertation, the wording of those characteristics might have been defined differently in the studies used in this dissertation. Definitions and selection of studies that represent progress monitoring have been reviewed through the practice of double coding articles and through utilizing journals and data that has been reviewed.

The terms research review, research synthesis, and systematic review are sometimes used interchangeably; however, for the purpose of this dissertation I used the term limited meta-analysis on effective schools research. At this time, classifications for meta-analysis do not exist according to the What Works Clearinghouse Procedures and Standards Handbook (ies.ed.gov). It is likely in the future there will be guidelines and definitions published by the Institute of Education Science to separate the various types of research reviews.

According to Cooper (2010), the terms research review and systematic review can also be applied to the critical analysis of a single study. As stated throughout the methodology section of this dissertation, this study was comprised of more than one study. The effect size of various studies were analyzed using the methodology of meta-analysis to determine the impact two specific variables of effective schools research had on student achievement. Since more than one study was analyzed, I used the term limited research review. The research review is limited since the criteria has been set to include only studies performed in the United States since 2001, reported an effect size and presented school-wide achievement data or grade level data.

The studies outlined in this dissertation are imperfect. In fact, Hunter and Schmidt outline 11 artifacts that are routinely the cause for a biased meta-analysis study. The 11 influences are found below in table 3.2 and are taken from their book Methods of Meta-Analysis Correcting Error and Bias in Research Findings (p. 41, 2015).

FIGURE 3.2 Artifacts for Correcting Error and Bias
_____
_____

1. Sampling error

2. Error of measurement in the dependent variable

3. Error of measurement in the independent variable

4. Dichotomization of a continuous dependent variable

5. Dichotomization of a continuous independent variable

6. Range variation in the independent variable

7. Attrition artifacts: Range variation in the dependent variable

8. Deviation from perfect construct validity in the independent variable

9. Deviation from perfect construct validity in the dependent variable

10. Reporting or a transcriptional error

11. Variance due to extraneous factors that affect the relationship

Schmidt and Hunter (2015) explain that the process for accounting for these artifacts

and the impact that they have on the existing data is known as the attenuation process.

While no study is perfect, the quantitative data retrieved from the studies is crucial to the

process of correcting for the bias, which is known as disattenuation model (2015).

Appendix E has been dedicated to outlining the artifact of reliability that may have

influenced the data within this dissertation.

In conclusion, the final two chapters of this dissertation share the final two stages of

Cooper's (2010) research synthesis: Step 6: Interpreting the Evidence in Chapter IV as the

Results section of the meta-analysis and Step 7: Presenting the Results in Chapter V which

presents the summary, conclusions, discussion and recommendations for future studies.

CHAPTER IV

INCLUSION AND DESCRIPTION OF STUDIES

        Outlined in Appendix A, are the subject search terms that were used to discover the

studies used in this meta-analysis. Initially, two variables of effective schools research both

Progress Monitoring and Collaboration with a focus on student learning were investigated.

Although 249 studies were listed with the key words and effect size, I reviewed 379 studies and

was unable to find any that met the criteria listed in my codebook. After reviewing the 249 and

not finding any success, I increased my search terms and even looked at references of some of

the articles listed in the 249, and that is how I ended up reviewing 379 studies in the area of

collaboration.   I found many studies that stressed the importance of collaboration among

teachers, but the studies typically did not give an effect size. If an effect size was given, they did

not cite collaboration as the reason for the effect size. Another reason many studies were

rejected was because they did not give school-wide or even grade level wide data. In the area of

Progress Monitoring, 123 articles were listed in Appendix A. However, 333 articles and

abstracts were actually reviewed for inclusion. The reason for the increase of articles in both of

these categories was due to additional search terms since I was not finding studies that met my

criteria. I also discovered additional studies listed in the reference section of a What Works

Clearinghouse article that also lead me to review extra studies. Using the technique of

snowballing or looking at the references cited within the articles that were fitting my criteria, I

discovered a few additional studies to be considered for this meta-analysis.

        This study investigated the outcome of student achievement when progress monitoring

was implemented. The study specifically addresses the variable of progress monitoring and the

impact it has on achievement with students of high poverty and in the area of reading and

mathematics. Ultimately only 11 studies met the criteria established in the method section of this paper. Many studies were unable to be included due to not having a reported effect size. Another reason many studies were excluded was because they did not have frequent assessments, probes, or progress monitoring in addition to a culminating assessment at the end to determine the impact of the progress monitoring along the way. Although it would have been ideal to have more than 11 studies in this meta-analysis, the studies do represent a cross section of research since they come from various publishing backgrounds and span of years from 2002-2013. The 11 studies produced 13 effect sizes that were entered into the Comprehensive Meta-Analysis Software. Each of the studies gave a sample size and effect size.

Of the 11 studies, six used a randomized controlled study as the design. Six of the studies were dissertations; three were discovered through publications on the What Works Clearinghouse website. Creative Research Associates conducted one study in promotion of a particular intervention, two studies were unpublished manuscripts, and the final two studies were published in peer-reviewed journals. The effect sizes included a large range from a negative effect of -.1 to a high effect size of 1.0.

A brief description of each study and the effect size is listed below.

1) *Efficacy of a First-Grade Responsiveness-to-Intervention Prevention Model for Struggling Readers (*Gilbert, J.K., Compton, D.L., Fuchs, D., Fuchs, L.S., Bouton, B., Barquero, L.A. & Cho, E., 2013) ES=0.19. In this randomized controlled trial study struggling first graders were screened and progress monitored. Tier 2 and tier 3 supports were randomly assigned to students based on the initial screener for students.   The difference between the tiers was the intensity in which the students received tutoring. Progress monitoring included three one-minute measures: two WIF (word identification fluency assessments using the Dolch list and a first

grade word list) and a rapid letter-naming screen (RLN) assessment throughout the study and pre- tests and post -tests used in this study are identified in the codebook found in the appendix. A free and reduced-price lunch of 66% was reported for this study.

2) *The Effect of a Continuous Quality Formative-Assessment Program on Middle School Student Mathematics Achievement* (Wilson, R.B., 2009) ES= 1.0. The dissertation delineates between different types of assessment and discusses short-cycle and medium-cycle assessments with continuous quality improvement concepts to improve student achievement in the area of mathematics. The progress monitoring for the middle school students involved weekly quizzes given to all students. A high effect size of 1.0 was reported and improvement was noted in every subgroup area assessed. The New Jersey Assessment of Skills NJASK was ultimately used to measure the impact the continuous assessment had on student achievement. A free and reduced-price lunch status of 33% was reported for this study. No additional interventions besides the continuous quality formative assessments were noted in the study. This study met the criteria because the assessments were considered continuous and resembled the frequency of other progress monitoring studies included in this meta-analysis.

3) *A Randomized Evaluation of a Supplemental Grade-Wide Mathematics Intervention*. (VanDerHeyden, A., McLauglin, T., Algina, J. & Snyder, P., 2012) ES= 0.46 & -0.1. In this randomized control study weekly computation curriculum-based probes of mathematics were administered as the progress-monitoring tool with a state assessment also given at the end of the year. This study included both fourth and fifth graders and that is why two effect sizes were reported in the meta-analysis. The students represented in this study had a 55% free and reduced-price lunch rate. The intervention utilized in this study was a supplemental mathematics intervention that focused on fluency building for computations and procedures.

4) *Early numeracy: technical adequacy of select kindergarten and first grade screening measures.* (Feldmann, G.M., 2012) ES=.698 & .672. This two-year study measured the academic success of 72 kindergarten and 57 first grade students. The free and reduced-price lunch rate was 29%.   There was a moderate to large effect sizes for almost every subtest. No intervention was specified in this dissertation. The emphasis was on using early numeracy curriculum based measures as an ongoing tool to determine student achievement. The progress monitoring probes for kindergarten included number identification, quantity discrimination, closer number and verbal math items. The first grade progress monitoring probes included number identification, quantity discrimination, first grade math computation, closer number, and verbal math items.

IMPORTANT NOTE ABOUT STUDIES 5-9

The information for studies 5-9 was originally found in an article published by the What Works Clearinghouse regarding the Read Naturally intervention. The study breaks down five different studies (studies 5-9) to determine if the Read Naturally intervention has a positive effect on student achievement. Initially, I averaged each of the domains within the study, but realized that by averaging the domains I was counting the same students more than once in the effect size for each of the domains in reading. Therefore, I have separated out the studies since each one uses various assessments (see codebook) and utilizes progress monitoring. These studies met the criteria for this meta-analysis and five different effect sizes (one for each study analyzed) is reported within the meta-analysis. I also was able to retrieve the manuscripts or dissertations of each of these studies in order to ensure correct effect sizes and sample sizes were reported out in the What Works Clearinghouse report. Although the studies used the program of Read Naturally, each study varied in their implementation of various components of Read Naturally.

The studies included in this meta-analysis each implemented the progress-monitoring component. The progress-monitoring component of Read Naturally includes valid and reliable passages where the students and teachers can graph the number of words correct per minute (Read Naturally, 2015). The Reading Fluency Progress Monitoring component can be done weekly or biweekly. Due to the variation of the implementation of Read Naturally within each study, I do not believe that this study is negatively affected by including these studies.

5) *Improving reading fluency and comprehension in elementary students using Read Naturally.* (Arvans, R., 2010) ES= .117. In this randomized controlled trial of second through fourth grade students 62% of the students were eligible for free or reduced-price lunch. The intervention of Read Naturally was randomly assigned to individual students within grades second through fourth. Students in the comparison group received normal classroom instruction. The DIBELS oral reading fluency subtest was also administered to the students as a form of progress monitoring.

6) *Empirical evaluation of Read Naturally effects: A randomized control trial.* Christ, T.J. & Davie, J. (2009) ES= .127. This study included the intervention of Read Naturally, but students were progress monitored throughout the study by oral reading fluency subtests of DIBELS. The study showed moderate to large effects on student achievement for third grade students. Sixty percent of the students qualified for free or reduced-price lunch.

7) *Accelerating reading trajectories: The effects of dynamic research-based instruction.* Hancock, C.M. (2002) ES=.105. This randomized control study was conducted on second-grade students in five classrooms from one school in Arizona. Although this study was found through the What Works Clearinghouse for Read Naturally, the author specifically asked that her study

not be included.   She states that her study was not intended to evaluate Read Naturally, but rather the impact of "ongoing supplemental fluency practice on second grade students learning to read." This is noted because Read Naturally isn't implemented with fidelity in this study (which is not a problem for this study since this meta-analysis is about progress monitoring not about the intervention utilized), but progress monitoring did occur through oral reading fluency portion of the Read Naturally program. Only 11% of the student population qualified for free or reduced-price lunch within this school.

8)*The effects of Read Naturally on grade 3 reading.* Heistad, D., (2008) ES=.32. This study selected students based on teacher recommendation and/or parent recommendation. The third graders who participated in this study had a 50% free and reduced-priced lunch rate. Reading Fluency Progress-Monitoring Assessments were utilized as a progress-monitoring tool throughout the study.

9) *Teaching to Read Naturally: Examination of a fluency-training program for third grade students*. Kemp, S.C. (2006) ES=.01. This study proclaims that 70% of the students who participated in the study were not at-risk students or were above the 50th percentile in fluency. However, significant gains were still made within the study on student achievement. The Read Naturally passages were used for this study as well as the Reading Fluency Progress Monitoring component in addition to the Oral Reading Fluency subtest in DIBELS. I was unable to obtain the free and reduced price lunch percentage for this study. Therefore, it is exempt from the meta-regression analysis on poverty, but not the overall analysis of the effect of progress monitoring on student achievement and the subgroup analysis of reading and mathematics.

10) *The Exploration of Demographics and Computer Adaptive Testing in Predicting Performance on State-Mandated Reading Assessments.* Maziarz, A.L. (2010) ES=.019. This study reflected on the increase reform regarding high stakes testing and the demand for progress monitoring and questioned the reliability of progress monitoring to predict the outcome of students on statewide assessments. In this study the Measures of Academic Progress (MAP) were used in relationship to the South Carolina's Palmetto Assessment of State Standards (PASS) in the area of ELA. The students participating in this study had a free and reduced-price percentage of 17.9%.

11) *Evaluation of the Waterford Early Reading Program in Kindergarten.* Powers, S., Price-Johnson, C. (2006). A comparison-group study using a quasi-experimental design involving a treatment group using Waterford was implemented in 15 Title I schools with high SES levels. Progress monitoring included DIBELS: Initial sound fluency, letter naming fluency, word use fluency, phoneme segmentation fluency, and nonsense word fluency. The WERP software, and the districts Core Curriculum Standard Assessment (CCSA) were also given as pre- and post-test during the school year.

Figure 4.1 Effect Size and Sample Size

Author and Study Name	Effect Size Reported in study	Sample Size
1) Efficacy of a first-grade responsiveness-to-intervention prevention model for struggling readers (Gilbert et al., 2013)	.19	212
2) The effect of continuous quality formative-assessment program on middle school student mathematics achievement (Wilson, 2009)	1.0	588

3) Randomized evaluation of supplemental grade-wide mathematics intervention (VanDerHeyden et al., 2012)	.46 -0.1	188 186
4) Early numeracy technical adequacy of select kindergarten and first grade screening measure (Feldmann, 2012)	.698 .672	72 56
5) Improving reading fluency and comprehension in elementary students using Read Naturally (Arvans, 2010)	.117	82
6) Empirical evaluation of Read Naturally effects: A randomized control trial (Christ & Davie, 2009)	.127	104
7) Accelerating reading trajectories: The effects of dynamic research-based instruction (Hancock, 2002)	.105	94
8) The effects of Read Naturally on grade 3 reading (Heistad, 2008)	.32	44
9) Teaching to Read Naturally: Examination of a fluency training program for third grade students (Kemp, 2006)	.01	158
10) The exploration of demographics and computer adaptive testing in predicting performance on state-mandated reading assessments (Maziarz, 2010)	.019	3,861
11) Evaluation of the Waterford early reading program in kindergarten (Powers & Price-Johnson, 2006)	.306	1,309
11 Studies – 13 effect sizes- Totaling 6,954 Students		

COMBINING MULTIPLE EFFECT SIZES

Several of the studies featured in this meta-analysis reported more than one effect size. In fact, one article had 18 effect sizes listed in the study. Therefore, an average was computed when the data listed the same students over multiple assessments. If the effect sizes were with the same students over multiple years, the most recent effect size was used to show the effect that progress monitoring had on student achievement. This method was utilized since the purpose of this study was to determine if progress monitoring impacted student learning. There were two studies (VanDerDerHeyden, McLauglin, Algina, & Snyder, 2012 and Feldmann, 2012) that tracked the progress of two different grades of students throughout the study. In those studies,

both effect sizes were reported because it involved different groups of students and the students were not over represented within the study since it was a different cohort of students. [4]

For this meta-analysis the standardized mean difference was computed in the Comprehensive Meta-Analysis Software. A standardized mean difference converts all effect sizes within the software into a common metric, which allows different outcome measures within the same synthesis (Borenstein, Hedges, Higgins, & Rothstein, 2009).

EFFECT SIZE RESULTS FOR PROGRESS MONITORING

The effect size results for progress monitoring and the impact it has on student achievement overall was relatively low. A fixed- effect size of .172 was computed, which would be considered a trivial effect size (Cohen, 1988) and a random-effect size of .294, which would be considered small (Cohen, 1988) was determined when analyzing the data from the studies that met the criteria for this meta-analysis. A fixed-effect size assumes what the results of the study would be if all of the studies had been conducted in the exact same way with the same variables influencing the study. The random-effect size model allows differences in the results assuming that not all studies were conducted in the same manner (p. 270, Cooper, Hedges, Valentine, 2009). In Figure 4.2 the meta-analysis shows the results for both fixed and random effects. A difference of .122 exists between the two models. There is a low level of variance between the fixed-effect size model and a much wider variance in the random-effects model. When looking at the diamond shaped figures near the bottom of the forest plot diagram in Figure 4.2 the size between the two is easily seen.

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[4] This process was determined with the assistance and consultation of my colleague Cameron Rains and Dr. Robert Marzano a member of my dissertation committee and founder of Marzano Research Laboratory.

Figure 4.2 Meta-Analysis for Progress Monitoring

Meta-Analysis for Progress Monitoring

Model	Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Hedges's g and 95% CI
	Gilbert et al	0.189	0.142	0.020	-0.089	0.468	1.331	0.183	
	Wilson	0.999	0.087	0.008	0.827	1.170	11.431	0.000	
	VanderHeyden et al	0.458	0.148	0.022	0.168	0.749	3.092	0.002	
	VanderHeyden 2	-0.100	0.148	0.022	-0.389	0.190	-0.674	0.500	
	Feldmann	0.690	0.240	0.058	0.220	1.161	2.875	0.004	
	Feldmann 2	0.663	0.271	0.073	0.132	1.194	2.446	0.014	
	Arvans	0.116	0.219	0.048	-0.313	0.545	0.529	0.597	
	Christ & Davie	0.126	0.195	0.038	-0.256	0.508	0.647	0.518	
	Hancock	0.104	0.205	0.042	-0.297	0.505	0.509	0.611	
	Heistad	0.314	0.298	0.089	-0.270	0.898	1.055	0.292	
	Kemp	0.010	0.158	0.025	-0.300	0.320	0.063	0.950	
	Maziarz	0.019	0.032	0.001	-0.044	0.082	0.590	0.555	
	Powers et al	0.306	0.065	0.004	0.178	0.434	4.692	0.000	
Fixed		0.172	0.025	0.001	0.124	0.221	6.944	0.000	
Random		0.294	0.108	0.012	0.082	0.505	2.720	0.007	

-1.00   -0.50   0.00   0.50   1.00

Meta Analysis

When analyzing Figure 4.2 it is important to note the standard error column and variance column because these numbers tell how much confidence we should have in the effect size. The standard error is really an indication of the precision of the effect size. A small standard of error number represents a more precise effect size. Fortunately, in a meta-analysis the software can weight the studies according to their size. The precision of a meta-analysis is often driven by the sample size with larger sample sizes carrying more weight in the analysis (Borenstein et al., 2009).

Although Figure 4.2 shows both Fixed and Random effect sizes represented within this meta-analysis, for the remainder of this study I will focus on Random effect sizes only. The rationale for this is that all of my studies are not designed the same way with the same variables

that could potentially influence the effect size within each study. Borenstein (2009) shares that while the studies are often similar enough to synthesize the information, "there is generally no reason to assume that they are identical in the sense that the true effect size is exactly the same in all the studies (69)." I am addressing that there are differences among my studies and will therefore, focus on the random effects model throughout the remainder of this study.

The standardized mean difference or effect size (Hedges' g) =.294 and the standard error is .108. This means that progress monitoring has a small impact on student achievement (Cohen, 1988). The Z-value is 2.720 and the P-value is 0.007, which means that the effect size is not likely zero. The 95% confidence intervals ranges between .082- 0.505. There is a fairly wide range in this confidence interval due to the range of studies that had small sample sizes. Precision is driven by sample size, which is given more weight in a meta-analysis (Borenstein, 2009).

CORRECTING FOR ATTENUATION

As mentioned in chapter 3, Schmidt and Hunter (2015) suggest that no study is perfect and there are many factors that can sway the results of a meta-analysis. The process for correcting for the artifact depends on the factor that will be analyzed. For this meta-analysis, I have corrected for one artifact. This means that I have used the formula below to help ensure that the assessments used in this meta-analysis are corrected for reliability. After consultation with my colleague, Cameron Rains and with guidance from Dr. Marzano, dissertation committee member and founder of Marzano Research Laboratory, it was determined the correcting for reliability would be the best artifact to examine for this meta-analysis. Since all of the studies in my meta-analysis utilize an end of the year assessment or standardized assessment, the reliability artifact was an appropriate artifact to examine. The formula used to correct for this study

correlation is from Hunter & Schmidt (2015) $r_C = r_o / A$ (p. 144). Since this meta-analysis used

end of the year assessments or a culminating score to determine the impact that the effective

school variable (Progress Monitoring) had on student achievement, I corrected for the reliability

within those assessments. Appendix E, breaks out each study within the meta-analysis and

shows the effect size used within this study, the reliability of the assessment used to determine

the effect size, and the corrected effect size. If the individual study did not report the reliability

of the study, I searched to find the reliability. If the reliability of the assessment was not given,

or was unable to be obtained, I used .85 as the reliability factor. This decimal was utilized to

correct for reliability since most standardized assessments have an internal consistency of at least

.85 (Wells & Wollack, 2013). The corrected reliability did raise the effect size results of overall

progress monitoring to equal .325 in the random effects model. This is an increase of .031.

QUANTIFYING HOMOGENEITY AND HETEROGENEITY

Homogeneity tests if the assumption that the effect sizes are estimating the same

population mean is a reasonable assumption (Wilson, 1999). The term heterogeneity in the

realm of meta-analysis analyzes the true effect size taking account for random error (Borestein,

2009). The Q statistic and the P-value deliver a test of significance for my meta-analysis

because they take into account the number of studies and help to show the relationship of

progress monitoring and the impact it has on student achievement. The Q value is 132.919 and

the df (degrees of freedom)=12. Because the Q value is greater than the degrees of freedom we

reject the null hypothesis (that all studies share the same effect size). This means that the

variability across all the effect sizes does surpass what would be assumed based on sampling

error. Another important statistic is tau-squared. This represents variance of the true effect sizes

by estimating the observed effects. In this study Q > df which means that τ^2 will be a positive

number. $\tau^2 = 0.121$ which is important because a function of this statistic is to assign weights in a random-effects model. The random effect size weights are listed below and correlate with the sample size, which increases the weight when the studies are larger.

Figure 4.3 Random Effect Size Weights

Study	Random Weight	Sample Size
Gilbert	8.26	212
Wilson	9.07	588
VanderHeyden	8.16	188
VanderHeyden 2	8.17	186
Feldmann	6.53	72
Feldmann 2	6.00	56
Arvans	6.90	82
Christ and Davie	7.34	104
Hancock	7.16	94
Heistad	5.56	44
Kemp	7.99	158
Maziarz	9.56	3,861
Powers	9.32	1,309

Another important statistic to analyze is I^2. This number falls between 0-100% and can be interpreted as a ratio to show the variances between studies, but has the added benefit of not directly being affected by the number of studies in the meta-analysis (Borestein, 2009). The I-

squared for this study is 90.972. This means that I need to employ additional meta-analysis

techniques in order to try and explain the high variance I have within studies. I will be utilizing

the techniques of subgroup analysis and meta-regression to address this issue by examining a few

moderator variables.

MODERATOR VARIABLES

Schmidt and Hunter (2015) discuss moderator variables in the context of study artifacts.

Essentially, every study has imperfections known as "artifacts" and the more information listed

in the studies; the more likely it can be corrected for that variability within the study.

"Variation must be caused by some aspect of the studies that varies from one study to the next,

that is a 'moderator' variable" (Schmidt & Hunter, 2015, p. 40). Although the articles within

this meta-analysis have been coded for various artifacts (see codebook in Appendix B), the two

moderator variables that I will focus on are socioeconomic status or the percentage of free or

reduced-price lunch within the schools participating in the study and the subject area progress

monitored in order to establish if either of these moderator variables have an impact on the

effect size of progress monitoring on student learning.

The first moderator variable is a dichotomous variable. Initially when I coded the

studies I listed the subject areas in the codebook and listed reading, mathematics, social studies,

and science. However, the studies that met the criteria for this meta-analysis only had two

subject areas reported: English/Language Arts, which also encompassed reading, and

Mathematics. Therefore, this moderator variable became a dichotomous variable since only two

different subject areas were reported. While I did not predict this outcome, it is not surprising

since english language arts/reading and mathematics are the two most commonly assessed

subject areas within most high stakes standardized assessment and areas frequently progress

monitored. Of the 13 effect sizes in this meta-analysis, five were coded as mathematics and

eight were coded as reading. This means that 62% (a majority) of the studies that met the

criteria listed in the codebook for assessment and progress monitoring were in reading. This is

also not surprising since the majority of high stakes testing focuses on students being able to

read (Walker, 2014). A subgroup analysis was performed to differentiate the effect size for

each subgroup: reading and mathematics. The purpose of doing a subgroup analysis is to

determine if progress monitoring is more effective for one group over the other group.

The second moderator variable of free and reduced-price lunch is a continuous variable.

The percentage of students receiving free or reduced-price lunch is reported on a scale from one

to one hundred. Utilizing the technique of meta-regression, I was able to conclude if an

increase in poverty affected an increase in student achievement when progress monitoring was

implemented based on the studies included in this meta-analysis.

Of the 13 effect sizes reported in my meta-analysis 12 had information about the free

and reduced-price lunch status. Therefore, only 12 effect sizes are factored in the meta-

regression analysis. In addition to the meta-regression, I was also able to analyze the effects of

poverty by using a subgroup analysis for schools eligible for Title I funding and schools below

40% free and reduced price lunch. Of the 12 effect sizes analyzed in the meta-regression, seven

effect sizes reported poverty above 40% or higher. This is noteworthy because schools that

have more than 40% of their students qualifying for free or reduced-price lunch would be

eligible for Title I funding (U.S. Department of Education, 2015). Five of the effect sizes fell

below 40%, which means the students were not considered to be high poverty for the purposes

of this study. One study did not report the percentage of students who received free or reduced-

price lunch and therefore, was not factored into the meta-regression analysis or the subgroup

poverty analysis.

EFFECT SIZE RESULTS FOR SUBGROUP ANALYSIS

Figure 4.4 Subgroup Analyses for Progress Monitoring in Reading and Math

Meta-Analysis: Subgroup Analysis for Progress Monitoring in Reading and Math

Group by Reading	Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Math	Wilson	0.999	0.087	0.008	0.827	1.170	11.431	0.000
Math	VanderHeyden et al	0.458	0.148	0.022	0.168	0.749	3.092	0.002
Math	VanderHeyden 2	-0.100	0.148	0.022	-0.389	0.190	-0.674	0.500
Math	Feldmann	0.690	0.240	0.058	0.220	1.161	2.875	0.004
Math	Feldmann 2	0.663	0.271	0.073	0.132	1.194	2.446	0.014
Math		0.543	0.135	0.018	0.278	0.808	4.021	0.000
Reading	Gilbert et al	0.189	0.142	0.020	-0.089	0.468	1.331	0.183
Reading	Arvans	0.116	0.219	0.048	-0.313	0.545	0.529	0.597
Reading	Christ & Davie	0.126	0.195	0.038	-0.256	0.508	0.647	0.518
Reading	Hancock	0.104	0.205	0.042	-0.297	0.505	0.509	0.611
Reading	Heistad	0.314	0.298	0.089	-0.270	0.898	1.055	0.292
Reading	Kemp	0.010	0.158	0.025	-0.300	0.320	0.063	0.950
Reading	Maziarz	0.019	0.032	0.001	-0.044	0.082	0.590	0.555
Reading	Powers et al	0.306	0.065	0.004	0.178	0.434	4.692	0.000
Reading		0.142	0.105	0.011	-0.063	0.346	1.354	0.176
Overall		0.333	0.201	0.040	-0.060	0.726	1.661	0.097

Hedges's g and 95% CI

Favours A   Favours B

Meta Analysis

The random effect size for progress monitoring in the area of mathematics was g= .543

with a SE of .135, a variance of 0.018 and a confidence interval of .278 - .808.   The category of

mathematics has a Z-value of 4.021 and a p-value of 0.000. The overall random effect size for

progress monitoring in the area of reading was g=.142 with a standard error of .105, a variance of

0.011, and a range in confidence interval from -0.063 to .346. The Z-value for reading = 1.354

and has a p=value of .176. In this case there is not sufficient evidence to reject the null

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hypothesis of the subgroups of math and reading in progress monitoring having no relationship on student achievement; which means that the alternative hypothesis was accepted. The alternative hypothesis is: There is a difference between progress monitoring in the subgroups of Mathematics and English Language Arts and the impact it has on student achievement.

Additionally, the Q-statistic and degrees of freedom must also be taken into consideration when trying to determine if there really is a relationship between the effect size of progress monitoring in the categories of mathematics and reading on student achievement. The Q* (Q statistic for random effects between studies) =2.776 and the df (degrees of freedom) = 1 and the p-value= .096 means that there is a relationship between the effect size and the subgroup categories. Therefore, there is a large effect size relationship g= 543 to progress monitoring in mathematics, but a trivial impact on progress monitoring in reading g= .141. To describe the impact that the covariate or moderator variable has on the proportion of variance is to determine the R^2, which is defined as the ratio of explained variance to total variance (Borestein, 2009, p. 179). This formula is $R^2 = 1 - (T^2 \text{ within}/T^2 \text{ total})$. This statistic is obtained by taking the T^2 total between studies variance within subgroups and dividing it by the total between studies variances both between subgroups and within subgroups (Borestein, 2009, p. 179) Therefore, the $R^2 = 36\%$. This means that 36% of the relevant variance can be explained by the moderator variable of reading and mathematics.

Figure 4.5 Subgroup Analyses for Progress Monitoring Students of Poverty

Meta-Analysis: Subgroup Analysis for Progress Monitoring for Poverty

| Group by Poverty	Study name	Statistics for each study							Hedges's g and 95% CI
		Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	
N	Wilson	0.999	0.087	0.008	0.827	1.170	11.431	0.000	
N	Feldmann	0.690	0.240	0.058	0.220	1.161	2.875	0.004	
N	Feldmann 2	0.663	0.271	0.073	0.132	1.194	2.446	0.014	
N	Hancock	0.104	0.205	0.042	-0.297	0.505	0.509	0.611	
N	Maziarz	0.019	0.032	0.001	-0.044	0.082	0.590	0.555	
N		0.490	0.279	0.078	-0.057	1.037	1.755	0.079	
Y	Gilbert et al	0.189	0.142	0.020	-0.089	0.468	1.331	0.183	
Y	VanderHeyden et al	0.458	0.148	0.022	0.168	0.749	3.092	0.002	
Y	VanderHeyden 2	-0.100	0.148	0.022	-0.389	0.190	-0.674	0.500	
Y	Arvans	0.116	0.219	0.048	-0.313	0.545	0.529	0.597	
Y	Christ & Davie	0.126	0.195	0.038	-0.256	0.508	0.647	0.518	
Y	Heistad	0.314	0.298	0.089	-0.270	0.898	1.055	0.292	
Y	Powers et al	0.306	0.065	0.004	0.178	0.434	4.692	0.000	
Y		0.217	0.070	0.005	0.079	0.354	3.083	0.002	
Overall		0.233	0.068	0.005	0.099	0.367	3.418	0.001	

-1.00   -0.50   0.00   0.50   1.00

Meta Analysis

In Figure 4.5 students were grouped by poverty into two dichotomous variables. The cut off range was 40% because that is the threshold used for Title I funding. If there is an N that means that the study reported a free and reduced-price lunch status of below 40%. If it is marked Y for poverty that means that the school or schools used in the study had higher than 40% free and reduced-lunch status. The random effect size for students with low poverty (under 40%) is g= .490 with a SE=.279 and a confidence interval of -0.057-1.037. The Z-value =1.755 and the p-value= 0.79. The effect size for the studies that had higher poverty there was a random effect size of g= .217 with a SE of .070 and confidence interval of .079-.354 and a Z-value of 3.083 and p-value of .002. Therefore, we cannot reject the null hypothesis; which means that we cannot conclude that the effect size is not zero or that there is a relationship between poverty and progress monitoring and the impact it has on student achievement.

Meta-regression is a term that is given to a practice of multiple regression analysis using the method of meta-analysis. The purpose is to determine the relationship between various variables and the effect size to ultimately see if the impact of that variable influences the effect size (Cooper, Hedges, & Valentine, 2009). In Figure 4.6 the technique of Meta-Regression is utilized to determine if the socioeconomic status makes a difference on whether progress monitoring has an impact on student achievement.

Figure 4.6 Scatterplot of Impact of SES on the Effect Size of Progress Monitoring
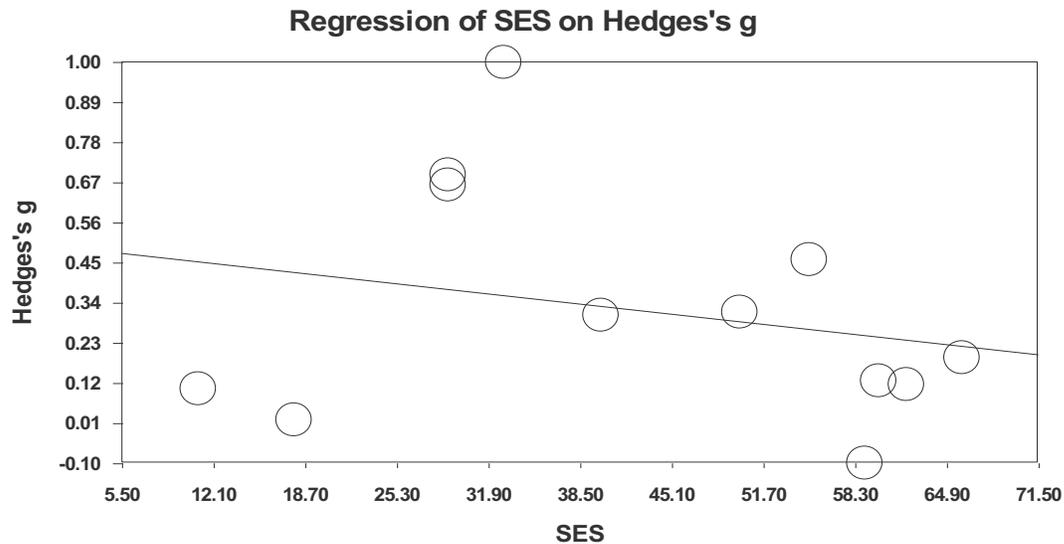
The Scatterplot in Figure 4.6 demonstrates that as the socioeconomic status of the students increases the effect size decreases. There is one outlier at 33% free and reduced-price lunch, which had an effect size of 1.0; however, generally as the poverty increases the effect size decreases with respect to progress monitoring in the studies that fit the criteria for this meta-analysis. Additional data for this scatterplot can be seen in Figure 4.7.

**Figure 4.7 Additional Information from Scatterplot Regression Analysis**

	Point Estimate	Standard Error	Lower Limit	Upper Limit	Z-value	P-value
Slope	-0.00421	.00720	-.01832	0.00990	-.5848	.5586
Intercept	.49814	.33198	-.15253	1.14881	1.50052	.13348
Tau-squared	0.16573					
	Q	Df	p-value			
Model	.34202	1.00000	0.55867			
Residual	5.70120	10.00000	.83971			
Total	6.04322	11.00000	.87046			

The analysis does omit the Kemp study since free or reduced-price lunch percentage was not reported. Therefore only 12 effect sizes were included in this analysis. The information in figure 4.7 is important because a Z-test or Q-test must be used to test the relationship and the impact it has on the effect size. The Z-value is -.548, with a corresponding p-value of <.559 The Q-value is .342 with a corresponding p-value of .559 with 1 degree of freedom. Because the Q-value is higher than the degree of freedom and due to the p-value we can determine that no relationship between free and reduced-price lunch and improvement in student achievement with progress monitoring can be established with the studies represented within this meta-analysis. A negative slope of -0.004 is the mean. $T^2 = .166$ and represents the distribution and helps to explain the dispersion from the prediction line.

FUNNEL PLOT BIAS AND CORRECTION FOR BIAS

        A well-known drawback of the method of meta-analysis is the issue that authors

typically only publish when their studies show statistical significance and produce favorable

effect sizes. The fear is that publication bias may exist in a meta-analysis because the studies

may not really be representative of all studies, but only the studies that were published to show

positive effects sizes on student achievement.   This is not a new phenomena, in fact Robert

Rosenthal, labeled this issue the "file drawer problem", because he believed that many

unpublished studies ended up in a file drawer and worried that data was skewed because of this

issue (1979). One way to address this concern was developed by Richard Light and David

Pillemer who developed a graphical representation of a scatterplot called the funnel plot to show

publication bias (Cooper et al., 2009). The funnel plot of this meta-analysis is represented in

Figure 4.8.

Figure 4.8 Funnel Plot for Publication Bias
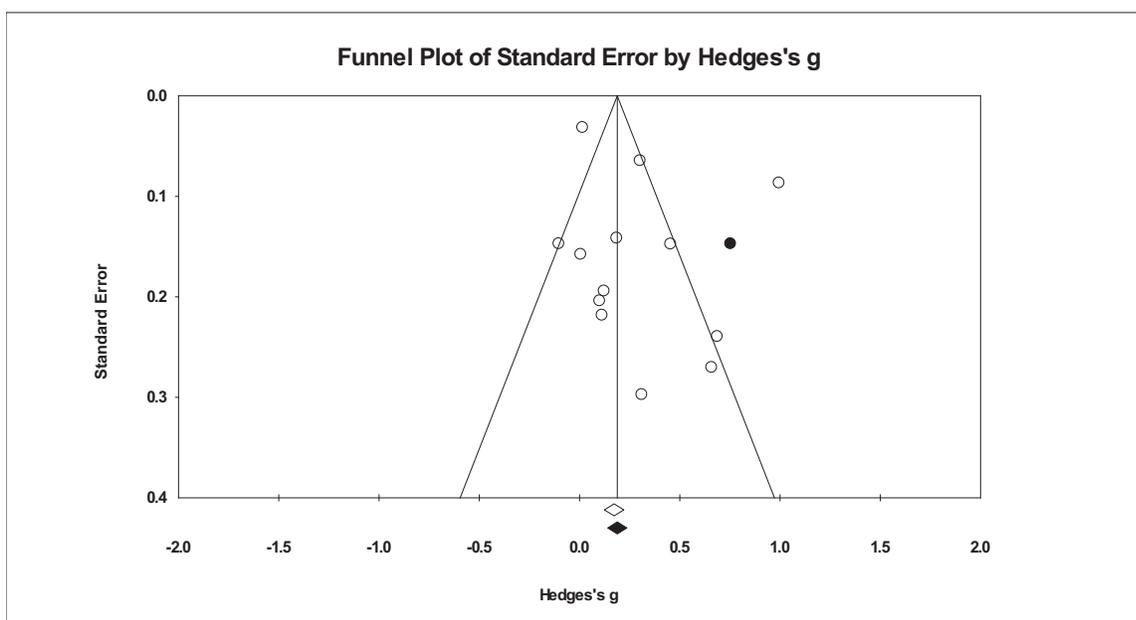
It appears there is some publication bias in this funnel plot because although there is overall general symmetry within the funnel plot, it is skewed to the right.

The data in Figure 4.8 shows the adjusted publication bias by Duval and Tweedie also known as the trim and fill method of adjusting for publication bias. In this analysis, a mean effect size is computed for all studies. Next, the numbers of studies that cause the asymmetry in the funnel plot are trimmed off. In this study, zero studies were trimmed off and then a mean effect size for the remaining studies was computed. Then, they fill in the number of studies that made it asymmetrical to the other side and recomputed it to get an adjusted value. In this meta-analysis, one study was filled in on the right side of the mean and is represented with a black dot. It was a study with a large effect size and a low standard of error. The purpose of filling in this study would be to correct the variance that occurred with the studies selected for this meta-analysis. According to Schmidt and Hunter (2015) in their book Correcting Error and Bias in Research Findings, "An absence of publication bias is indicated if the difference between the untrimmed estimate of the mean and the adjusted estimate is small or zero" (p.538). Therefore, this confirms the funnel plot data to show that there is relatively low publication bias in this study. The point estimate for the observed value based on Duval and Tweedie is 0.172 and the adjusted value is 0.188. The Trim and Fill procedure also serves as a sensitivity analysis for this study.

An additional test to detect publication bias is known as the classic fail-safe N. This approach actually reports how many missing studies would need to be included in order to ensure that the p-value does not become nonsignificant (Borenstein, 2009, p. 284). Therefore, a bigger number is better because it would show that it would take many additional studies to "nullify" (Borenstein, 2009, p. 284) the effect. In this meta-analysis the classic fail-safe N test

reports that it would take 200 nonsignificant studies to overturn the result. The fail-safe N test

can also help ensure that sampling bias is not an issue (Lipsey & Wilson, 2001) because it

determines how many null results are needed to lower the effect. Lipsey and Wilson (2001)

report that studies with null effects are not always published so by including this test in this

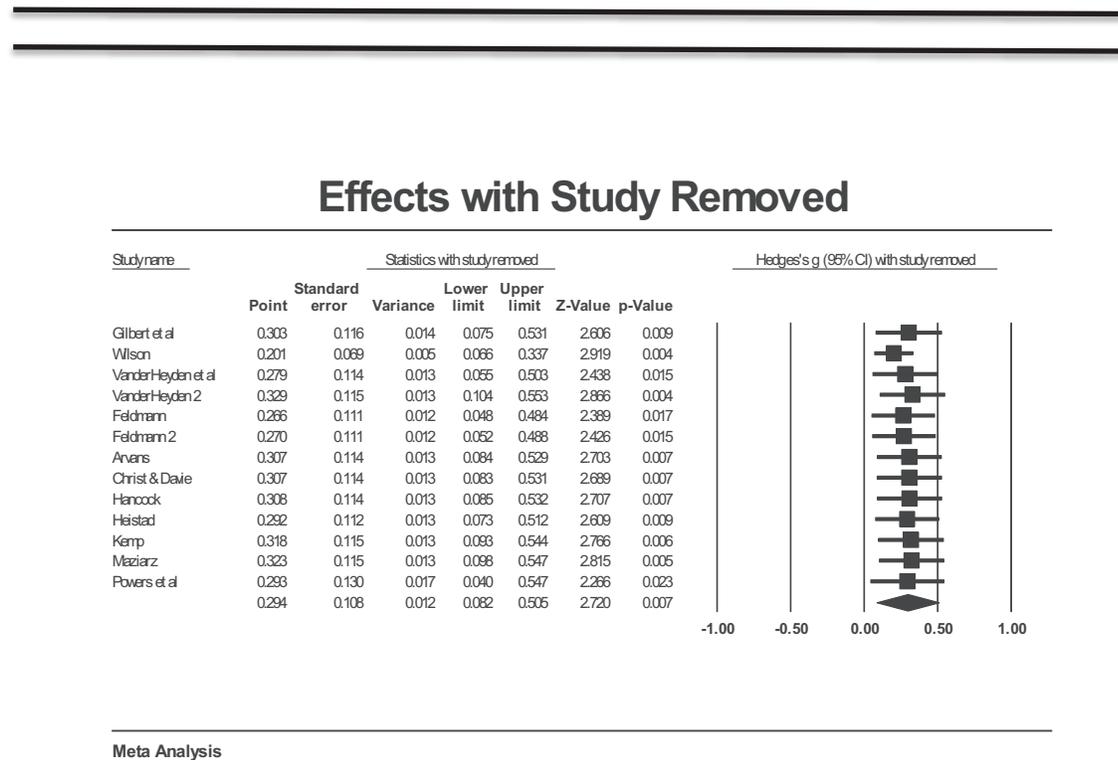study, it helps ensure that there is not a skewed upward bias.

SENSITIVITY ANALYSIS

Sensitivity analysis is important when performing a meta-analysis. The above tests of

publication bias including the funnel plot, fail-safe N test, and Tweedie and Duval's trim and fill

are all ways to pay special attention to areas that could sway the effect size. Other examples of

sensitivity analysis that have been performed throughout this meta-analysis are the combining of

effect sizes. Careful attention was given to not represent the same students more than one time.

Even the use of the random model data throughout this meta-analysis is a way to ensure

sensitivity analysis since it is unlikely that all studies were performed with consistent variables.

Sensitivity analysis is really just a term to mean that decisions were consciously made

throughout this meta-analysis to ensure the most accurate representation of the studies were

intentionally captured in order to present a true picture of the impact that progress monitoring

has on the effect size of student achievement.

The Comprehensive Meta-Analysis software also has a feature that allows the points to

be determined based on the effect size and sample size to see how much the overall effect size

would be altered if studies were removed. This is just one more way to ensure sensitivity to the

effect sizes within the study. In Figure 4.9 each of the studies are given a point value. For

example, the Wilson study had the largest effect size in this study. The point value given to that

study was 0.201. This means that if this study was removed from the meta-analysis the biggest

drop would by .093. This means that instead of the overall random effect size for progress

monitoring being g=.294 it would be .201 which would still place the effect size in the small

impact on student achievement according to Cohen's scale used throughout this meta-analysis

(1988).

FIGURE 4.9 Effects with Study Removed

Effects with Study Removed

Study name	Point	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Hedges's g (95% CI) with study removed
Gilbert et al	0.303	0.116	0.014	0.075	0.531	2.606	0.009	
Wilson	0.201	0.069	0.005	0.066	0.337	2.919	0.004	
VanderHeyden et al	0.279	0.114	0.013	0.055	0.503	2.438	0.015	
VanderHeyden 2	0.329	0.115	0.013	0.104	0.553	2.866	0.004	
Feldmann	0.266	0.111	0.012	0.048	0.484	2.389	0.017	
Feldmann 2	0.270	0.111	0.012	0.052	0.488	2.426	0.015	
Arvans	0.307	0.114	0.013	0.084	0.529	2.703	0.007	
Christ & Davie	0.307	0.114	0.013	0.083	0.531	2.689	0.007	
Hancock	0.308	0.114	0.013	0.085	0.532	2.707	0.007	
Heistad	0.292	0.112	0.013	0.073	0.512	2.609	0.009	
Kemp	0.318	0.115	0.013	0.093	0.544	2.766	0.006	
Maziarz	0.323	0.115	0.013	0.098	0.547	2.815	0.005	
Powers et al	0.293	0.130	0.017	0.040	0.547	2.266	0.023	
	0.294	0.108	0.012	0.082	0.505	2.720	0.007	

-1.00   -0.50   0.00   0.50   1.00

Meta Analysis

RESEARCH QUESTION #1

Does progress monitoring have a positive effect size on student achievement? As stated

earlier in the literature review of the effective schools literature, assessment has been noted as

having a positive impact on student achievement. However, the idea of progress monitoring and

doing quick probes with students to establish if this current intervention and method of instruction is working has been a recent topic in education. While progress monitoring is not a new concept, the formal way it is being done in school has taken on a different shape within the last 10 years. With the assistance of electronic devices and programs such as DIBELS, AIMSWEB, and other intervention programs with built in progress monitoring the ability to track progress has become more available and easy for teachers to track trend lines and data points over time. Therefore, this meta-analysis found studies that were using progress monitoring as an on-going instructional strategy (some studies also listed a specific intervention) and either an end of the year achievement test or some other culminating assessment to determine if the progress monitoring ultimately had an impact on student achievement. The results did show that progress monitoring had a small, but positive effect size on student achievement when looking at the calculated random-effect size of .294. A trivial effect of .172 was determined for a fixed effect size of progress monitoring having an impact on student achievement from the studies that met the criteria for this meta-analysis. However, the statistical power and significance behind the effect size is not strong enough to be able to determine the relationship between the two variables due to the limited number of studies and sample sizes within the studies that met the criteria for this meta-analysis.

RESEARCH QUESTION #2

Did the effect size differ when considering students who receive free and reduced price lunch versus paid meals in the area of progress monitoring? Analyzing the subgroup analysis data, it appears that the effect size was actually greater for students with less than 40% free or reduced-price lunch = .490 than for students who had 40% free or reduced-price lunch or higher = .217.

Furthermore when the meta-regression analysis was performed the slope decreased with the increase in free and reduced-price lunch.

RESEARCH QUESTION #3

What was the effect size gap between progress monitoring and student achievement in the subject area of mathematics and reading? Does one subject area produce higher results than the other subject area? The random effect size for the subgroup of Mathematics was .543, which according to Cohen's scale (1988) translates to a large impact on student achievement. The random effect size for the subgroup of reading was .142, which is a trivial impact according to Cohen's scale (1988). Therefore, there is an effect size gap of .401 when examining the gap between reading and mathematics. The student achievement in mathematics was much higher than in reading when progress monitoring takes place.

Research questions 4-6 are listed below. However, due to the lack of articles that met my criteria within my codebook, I was unable to find any studies that fit the description of collaboration to include in this meta-analysis. Therefore, I was unable to answer the original research questions #4-6 because I was unable to compare the two effective school variables.

4) Of the two characteristics of the effective schools research, collaboration with a focus on learning and progress monitoring, which strategy produces a higher effect size in student achievement for students living in poverty?

5) Did the effect size differ when considering students who receive free and reduced-price lunch versus paid meals in the areas of collaboration with a focus on learning and progress monitoring?

6) What was the effect size gap between the two effective schools research characteristics of collaboration with a focus on student learning and progress monitoring on student achievement for students living in poverty?

SUMMARY

      This study investigated the impact that progress monitoring had on student achievement based on 11 studies and 13 different effect sizes reported within those studies. Each of the studies met the criteria of progress monitoring by reporting the type of progress monitoring evident within the study such as DIBELS, Curriculum Based Measurement Assessments, Computer Adaptive Assessments or some other quick probes administered with high frequency in order to get a "temperature check" of the progress being made by the student. Furthermore, studies included a culminating score either by a state standardized assessment, cognitive achievement assessment, or core curriculum assessment. The studies also all had a reported effect-size on student achievement. The effect sizes were then entered into the comprehensive meta-analysis software along with the sample size of the group being assessed.

      In summary, a large effect size was evident for progress monitoring and the impact it has on student achievement in math. Using the technique of meta-regression and the subgroup analysis it did not appear that progress monitoring had a greater impact on students of higher poverty (40% free and reduced-price lunch or higher) compared to lower poverty (less than 40% free and reduced-price lunch). In fact the slope of the impact on student achievement actually decreased as the poverty increased. There was a substantial difference between progress monitoring in reading and mathematics. Progress monitoring had a much greater impact on student achievement in the academic subject area of mathematics than in reading.

CHAPTER V

IMPLICATIONS & RECOMMENDATIONS

As outlined in chapter 2, the research on effective schools has taken place for decades. However, I would argue that this research is more important now than ever before in United States history. The 2012 PISA (Programme for International Assessment) ratings of American 15 year old students showed that the United States ranked 27th in Math and 17th in Reading when compared to other countries and subsets within various countries (OECD, 2014). Although it can be argued that PISA is just a sample and not representative of the entire country, the overall average scores compared to the mean scores of the highest performing countries was noticeable with a132 point difference in math and a 72 point difference in reading (OECD, 2014). Although this data may misrepresent the United States because we test all of our children and we also do not break out our individual states unlike China and other countries, the data is still concerning. "PISA reported scores in six levels of proficiency, with level 1 being the lowest, showing minimum skills, and level 6 the highest. In Shanghai, 55 percent of students achieved levels 5 or 6 in math, compared with only 9 percent in the United States and 13 percent for the 34 OECD nations (EdSource, 2013)." According to a recent TED paper there hasn't been any economic pressure for the United States to secure complex problem-solving and critical-thinking skills in our students in order to thrive or survive within the last few decades, which is no longer the reality that we live in (Choi, 2014). It is imperative that as educators we utilize techniques and strategies that will ultimately impact student achievement. As the pressure of standardized testing, the common core movement, and multi-step problem solving has increased, educators are left wondering if their existing instructional strategies are improving student achievement. Progress monitoring has become an essential tool to help guide instruction. As noted earlier, the

process of progress monitoring has become more readily available to educators with the increase of technology programs and devices. Progress monitoring has become a more formal way to check for understanding, and to establish if an intervention or strategy is working and ensure that progress has occurred for all students. This study investigated if progress monitoring impacted student achievement. There was a large positive effect size of .543 on the impact of student achievement when progress monitoring was done in the area of mathematics. This study was intended to enhance the current body of research on the qualities of effective schools.

This research does have a significant impact on education because the results indicate that progress monitoring in the academic area of mathematics has a substantially higher impact on student achievement than the progress monitoring of students in the subject area of reading. As mentioned above, our nation is below the average PISA score in the area of math. Progress monitoring along with altered instruction and intervention in the area of mathematics does appear to have an impact on student achievement. This outcome has implications as the expense of progress monitoring can be costly, and the time it takes to progress monitor has also been a controversial issue. For example, in many districts teachers question if the time it takes to progress monitor would be better-spent instructing students. Considering the limited amount of money and time that most school districts have at their disposal, knowing that progress monitoring in the area of mathematics could have a greater impact on student achievement is critical to help educators best utilize their resources. Depending on the type of progress monitoring implemented it can range from $6.00 to $12.00 a student to progress monitor using a formal software program and take anywhere from 1 to 30 minutes depending on the type of probe and number of probes used (Hanover Research, 2013, p.13). Ironically, of the studies that met the criteria for this meta-analysis, more progress monitoring was done in the area of reading

and not mathematics and yet the effect size was substantially greater in mathematics than in reading. The results of this study show that progress monitoring in the area of math impacts student achievement more than in reading.

CONNECTIONS TO PREVIOUS RESEARCH AND THEORIES

In chapter 2, a study was shared by Bangert-Drowns, Kulik and Kulik that contained 35 studies that examined frequent classroom testing and the impact it had on criterion referenced exams. Interestingly, of the 35 studies 29 of them showed positive effects with an overall effect size of 0.23 of an impact on student achievement (Bangert-Drowns et al., 1991). For my study I used the term progress monitoring and included only studies from 2001-2015 and the random effect size was .294. This translates to a .06 difference, which supports the literature, that formative assessments and now progress monitoring have a similar positive effect size on student achievement. It does not appear that the frequency of the probes traditionally utilized in progress monitoring made a measurable difference compared to formative assessments used by teachers to measure student progress and guide instruction. Although formative assessment could be considered a type of progress monitoring, typically progress monitoring involves shorter probes to determine growth and influence instruction (National Center on Response to Intervention, 2015). The data from my study is also comparable to John Hattie's Visible Learning Meta-Analysis in that his reported effect size for frequent effects of testing is .34 (Hattie, 2011). While his effect size seems rather high, when correcting for reliability of the studies in Chapter 4 a random effect size of .325 was calculated.

As more districts across the United States have developed RTI programs over the past decade, the use of formal progress monitoring has been documented. The National Center for

Learning Disabilities has posted on their website information about RTI and includes progress monitoring as an essential component. According to the National Center on Student Progress Monitoring there are many benefits to progress monitoring including:

1) students learn more quickly because they are receiving more appropriate instruction; 2) teachers make more informed instructional decisions; 3) documentation of student progress is available for accountability purposes; 4) communication improves between families and professionals about student progress; 5) teachers have higher expectations for their students; and, in many cases, 6) there is a decrease in special education referrals (2015).

I would add that an additional benefit is an increase on student achievement with a large effect size of .543 when utilized in the area of mathematics.

LIMITATIONS

This meta-analysis is, like most studies, limited in scope. Every effort was been made to select reputable authors with trustworthy data and accurate representation of their research process outlined in the study to meet the criteria for this meta-analysis. Only 11 different studies including 13 effect sizes met the criteria to be included. The sheer number of studies that met the criteria is a limitation. Studies without an effect size or sample size were also omitted from this study. This also substantially limited the number of studies that qualified to be considered for this study. The total number of students included within the studies represented only 6,954 students all of the studies but one were at the elementary level.

Another limitation includes the definition of progress monitoring and the fact that various studies used a variety of progress monitoring tools. Some studies specified which type

of progress monitoring was used such as DIBELS or Curriculum Based Measurements. Other studies included progress monitoring within the intervention such as Read Naturally and Waterford studies included within this meta-analysis. Other studies did not use a formal progress monitoring tool or package, but did specify that quick probes, fluency recordings, and temperature checks were conducted throughout the learning. The purpose of this study was not to determine which type of progress monitoring has the greatest effect on student achievement, just that progress monitoring does impact student achievement.

Educational jargon was also a limitation of this study. As previously mentioned, progress monitoring is a relatively new term in education and although definitions were provided in chapter 2, different authors may have different interpretations of the word and extent of progress monitoring utilized within the 11 different studies included in this meta-analysis.

Another limitation of this study was a problem that I have titled the intervention issue. The intervention issue occurred because when a teacher assesses a student, and the student does not perform at grade level or make enough progress, a teacher implements an intervention. Therefore, although the progress monitoring continues, it is difficult to determine if progress monitoring is impacting the student achievement or if the intervention involved is the reason for the improvement. Progress monitoring is not teaching. It is assessing, but it does and should guide the instruction. Therefore, although the intervention issue exists within this study and should be considered a limitation, progress monitoring is critical to show a teacher that an intervention is needed and to help determine if it is the correct intervention for that child.

The focus of this study was to understand if progress monitoring had an impact on student achievement. Future recommendations would be to attach the intervention to the study and to control for the intervention to see which intervention had the greatest impact on student achievement. The studies included in this meta-analysis included the following interventions: one intervention of tutoring, three studies only suggested that constant monitoring was utilized, five studies included the intervention of Read Naturally, one study focused on the intervention of Waterford Early Reading Program, one study shared that computer adaptive technology was used as an intervention. Due to the variability of these interventions, and limited overall studies within this meta-analysis, a meta-regression on interventions was not completed. There would not have been enough statistical significance to make a difference considering the limited studies and wide diversity of interventions. However, this would be useful information for educators to know if a certain intervention linked with progress monitoring would increase student achievement in a specific subject area. Given wider parameters and criteria for study inclusion this information could be obtained and analyzed.

Another possible area for future research would be to analyze the type of progress monitoring. As more tools are developed for progress monitoring and quick temperature checks of student progress, I believe that more studies will be completed and that this area could help educators to know which type of progress monitoring (DIBELS, AIMSWEB, Curriculum Based Measurements, and teacher created probes) might produce the greatest effect on student achievement.

An additional area for future study should include the age of the students to determine if progress monitoring has a greater impact on student achievement at the primary, intermediate, or

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secondary level.   Although the age of the students was coded for within this study, all but one study focused on students from the elementary level. Therefore, although meta-regression could have been analyzed within this meta-analysis, an accurate representation would not have been achieved. However, given wider parameters for selection of studies perhaps a greater representation of ages might exist within the studies.

A final area for future study should include the other effective school variables listed in FIGURE 2.1 Characteristics and Selected Authors of Effective Schools. The top characteristic was instructional leadership followed closely by assessment/progress monitoring and collaboration with a focus on learning and Professional Learning Communities. Although at the moment there were no studies that met the criteria for this meta-analysis in this area, hopefully in the future more studies will be published on this topic and perhaps wider parameters for inclusion of the studies could also help this area be researched.

SUMMARY

This limited meta-analysis study on the Effective Schools Research topic of progress monitoring included 11 studies with 13 effect sizes. Twelve of the studies focused on students at the elementary level and one focused on middle school, and of the 11 studies, 6 used a randomized controlled study as their methodology. The studies included in this meta-analysis represented an assortment of dissertations, journal articles, and studies published for research organizations. All of the studies gave an effect size and sample size, were published after 2001, and had to include progress monitoring and a culminating assessment in order to be included in the study.

For this meta-analysis study the standardized mean difference was computed in the Comprehensive Meta-Analysis Software. A standardized mean difference converts all effect sizes within the software into a common metric, which allows different outcome measures within the same synthesis (Borenstein, Hedges, Higgins, & Rothstein, 2009). The effect size results for progress monitoring and the impact it has on student achievement was relatively low. A random effect size of .294 was determined when analyzing the data from the studies that met the criteria for this meta-analysis.

Utilizing the technique of subgroup analysis two moderator variables were considered in this study. The dichotomous variable of reading and mathematics showed a substantial difference in relationship to the impact of progress monitoring on student achievement. The subject area of mathematics g=.543 had a much larger effect-size than the subject area of reading g=.142. Unfortunately, when investigating the subgroups of poverty no relationship could be determined from these studies between the amount of poverty and the impact progress monitoring has on student achievement. Additionally, when meta-regression was utilized to look at the continuous variable of free and reduced-price lunch, although there was a negative slope, no correlation between the effects of poverty and progress monitoring could be determined within the studies in this meta-analysis.

Additional research in the area of progress monitoring is still needed and is outlined within this study. The effective schools research has studied the concept of assessment for decades, but the term progress monitoring was utilized for this meta-analysis. As tools and software continue to be developed in the area of progress monitoring this study gives guidance to consider for educators and the impact that it has on student achievement.

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Key Word Searches
The first number represented the number of studies that came up in ERIC on each topic when the key words were typed. The number in parenthesis indicates the number of studies that came up in ERIC when the key words were typed AND the word "effect size" was also typed.

Collaboration with a focus on student learning
- Collaborative teachers- 2,159 (2)
- Teacher Teams- 3,166 (5)
- Professional Learning Communities- 912(1)
- Focus on student learning- 1,952 (7)
- Focus on academics- 2,797 (10)
- Academic Focus- 1,536 (4)
- Focus on Learning- 9,654 (18)
- Teachers sharing strategies- 10 (0)
- Focus on student learning- 1,090 (7)
- Focus on student learning time-12 (97)
- Maximizing student learning time-2 (2)
- Instructional Time-772 (22)
- Engaged Time- 226 (3)
- Learning Time- 2,981(23)
- Time on Task- 2,435 (48)

Total # of studies with effect size for collaboration and focus on learning: 249

Progress monitoring
- Monitoring student progress- 538 (1)
- Monitoring school progress- 84 (18)
- School level monitoring- 27 (22)
- Measuring school progress- 29 (23)
- Monitoring classroom progress- 29 (11)
- Class progress monitoring- 9 (7)
- Student progress monitoring- 524 (1)
- Progress monitoring- 1,469 (6)
- Assessment monitoring- 590 (9)
- Assessment growth- 164 (1)
- Benchmark assessment- 171 (2)
- Frequent assessment- 88 (4)
- Formative assessment- 1227 (18)

Total # of studies with effect size for progress monitoring: 123

APPENDIX B

Coding Guide

Coding Sheet Adapted from page 89,95,96,98,100, 176 and 177 of Harris Cooper's Research Synthesis and Meta-Analysis (2010). Additionally, the moderator variable questions were adapted from the International Handbook of School Effectiveness and Improvement (2007) on page 143. The coding guide was also created jointly with colleague Cameron Rains.

Key For Coding Spreadsheet:

Column 1: Study Identification Number beginning with 1 for the first study entered along with author's last name

Column 2 (Study Type)
1a=Frequent, personal monitoring
2=Developing and maintaining a pervasive focus on learning
2a=Focusing on academics
2b=Maximizing school learning time
3=Producing a positive culture
3a=Creating a shared vision
3b=Creating an orderly environment
3c=Emphasizing positive reinforcement
4=Creating high (and appropriate) expectations for all
4a=For students
4b=For staff
5=Monitoring progress at all level
5a=At the school level
5b=At the classroom level
5c=At the student level
6=The process of effective teaching
6a=Maximizing class time
6b=Successful grouping and organization
6c=Exhibiting best teaching practices
6d=Adapting practice to the particulars of classroom
7=Involving parents in productive and appropriate ways
7a=Buffering negative influences
7b=Encouraging productive interactions with parents
8=Developing staff skills at the school site
8a=Site based PD (type of PD was listed next to all 8a codes: One-shot PD, Multiple Session PD, Multiple Session PD with feedback given, or other-specify)
      8a1= content based PD
      8a2= pedagogy based PD
      8a3= both content and pedagogy based PD
      8a4= leadership PD
      8a5= other- please list what "other" is

8a6= not specified in study
9=Emphasizing student responsibilities and rights
9a=Responsibilities
9b=Rights

Column 3: School type will be listed as: a= elementary, b= middle school, c= High School, and 4= other (will specify)

Column 4: Insert grade levels included in the study (K-12)

Column 5: Subject areas included, a= Reading, b= other Language Arts, c=Mathematics, d=Science, e=Social Studies, f=other (will specify)

Column 6: Free/Reduced Lunch Percentage (0-100)

Column 7: Type of outcome measured a= Standardized Achievement Test (will specify), b= another test measuring achievement (e.g. teacher developed test, textbook test), c=class grades, d=multiple types (will specify), e=can't tell

Column 8: Effect Size

Column 9: Page number where effect size data was found

Column 10: Number of students included in the sample

Column 11: Date when coding was completed

Column 12: Special education 1, General education 2, population not specified 0

Column 13: Private school 1, Public school 2, school type not specified 0

Column 14: Date of Publication of Data

Column 15: Was new money used to implement (yes or no)

Column 16: Type of Study

All studies are assigned an ID number (column 1). The study associated with each ID number can be found in Appendix C.

Prenkert Codebook

COLUMN: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Gilbert, Compton, Fuchs, Fuchs, Bouton, Barquero, & Cho (2013)	5a	a	First Grade	a	66.04%	*	0.19	p149 and p. 150	212 (134 AND 78)	9/4/14	0	0	2013	No	Randomized Controlled Study
*The Test of Phonemic Decoding Efficiency (Torgesen, et al., 1997), The Test of Sight Word Reading Efficiency (Torgenson,Wagner, &Rashotte, 1997), untimed decoding skill-Woodcock Reading Mastery Test, and Woodcock Reading Mastery Test revised untimed word identification skill.															

2 Wilson, Robert (2009)	5a	b	Sixth-eighth	c	33%	*	1.0 very large	p. 102	284	9/5/14	0	2	Sept. 2009	No	Non-randomized, casual-comparative method using quasi-experimental design/ one group pre-test-post-test with a double post-test design
* New Jersey DOE standardized test-NJASK															

3a VenDerHeyden, McLaughlin, Algina, and Snyder (2012)	5a	a	Fourth	c	55%	*	0.46	p. 1259	188	9/21/14	1	0	2012	No	Randomized Controlled Study
*CBMs of mathematicsematics for computation 3 computation probes and Statewide Test Analysis															

3b VenDerHeyden, McLaughlin, Algina, and Snyder (2012)	5a	a	Fifth	c	59%	*	-0.1	p.1259	186	9/21/14	1	0	2012	No	Randomized Controlled Study
*CBMs of mathematicsematics for computation 3 computation probes and Statewide Test Analysis															

4a Feldmann, Gregory (2012)	5a	a	Kindergarten	c	29%	*	0.698	p.113	72	10/22/14	0	0	May 2012	No	Not Randomized Controlled Study

*EN-CBM (Early Numeracy Curriculum Based : NI=Number Identification, QD=Quantity Discrimination, M-Comp=Mathematics Computation, CN=Closer Number, VM=Verbal Mathematics, Teacher Rating, WIAT-2 Wechsler Individual Achievement Test 2nd edition, Report Card, and Iowa Tests of Basic Skills															

4b Feldmann, Gregory (2012)	5a	a	First grade	c	29%	*	0.672	p.114	57	10/22/14	0	0	May 2012	No	Not Randomized Controlled Study
*EN-CBM (Early Numeracy Curriculum Based : NI=Number Identification, QD=Quantity Discrimination, M-Comp=Mathematics Computation, CN=Closer Number, VM=Verbal Mathematics, Teacher Rating, WIAT-2 Wechsler Individual Achievement Test 2nd edition, Report Card, and Iowa Tests of Basic Skills															

5 Arvans (2010)	5a	a	Gr. 2-4	a	62%	*	0.117	P 24-28	82	10/9/14	0	0	2010	No	Randomized Controlled Study
*Reading Fluency: Curriculum-Based Measurement: Test of Reading Fluency TORF, DIBELS: Curriculum Based Measurement of Reading CBM-R passages, DIBELS: Oral Reading Fluency Subtest,Woodcock Johnson III, Passage comprehension subtest, Peabody Picture Voc. Test and the Expressive Vocabulary Test Gray Oral Reading Tests, GORT-4 Accuracy Subtest, and GORT-4 Fluency Subtest															

6 Christ & Davie(2009)	5a	a	Third grade	a	60%	*	0.127	pp. 24-28	104	10/9/14	0	0	2009	No	Randomized Controlled Trial
*Reading Fluency: Curriculum-Based Measurement: Test of Reading Fluency TORF, DIBELS: Curriculum Based Measurement of Reading CBM-R passages, DIBELS: Oral Reading Fluency Subtest, Woodcock Johnson III, Passage comprehension subtest, Peabody Picture Voc. Test and the Expressive Vocabulary Test Gray Oral Reading Tests, GORT-4 Accuracy Subtest, and GORT-4 Fluency Subtest															

7 Hancock (2002)	5a	a	Second grade	a	11%	*	0.105	pp 24-28	94	10/9/14	0	0	2002	No	Randomized Controlled Trial
*PPVT-III, Word Use Fluency WUF test, CBM: Cloze probe, Reading Fluency: Curriculum-Based Measurement: Test of Reading Fluency TORF, DIBELS: Curriculum Based Measurement of Reading CBM-R passages															

8 Heistad (2008)	5a	a-	Third grade	a-	50%	*	.32	Pp 24-28	44	10/9/14	0	0	2008	No	Randomized Controlled Trial
General Reading Achievement Minnesota Comprehensive Assessment MCA Reading Portion, Northwest Achievement Levels Test, Reading fluency monitor assessments and WJ-III Summary Scores.															

9 Kemp (2006)	5a	a-	Third grade	a-	N/A	*	0.01	pp 24-28	158	10/9/14	0	0	2006	No	Randomized Controlled Trial
TOWRE Sight Word Efficiency and Phonetic Decoding Efficiency subtests, DIBELS Oral Reading Fluency subtest, Stanford Diagnostic Reading Test, Vocabulary and Comprehension subtest, Rosner Auditory analysis test, Morphological Relatedness Test Written and Oral/Written subtests, the BSI Word List and Features subtests and the Orthographic Choice Test.															

10 Maziarz, Amy (2010)	5a	a-	Grades 3-8	a	18% qualified for Free and	*	0.019	p.113	3,861	10/31/14	0	0	Spring 2009 MAP and	No	Non randomized controlled trial

				Reduced-Price Lunch							PASS score		

* Computer Adaptive Testing, Item Response Theory, MAP by NWEA, and the South Carolina's Palmetto Assessment of State Standards PASS ELA test

11 Powers, Price-Johnson, (2006)- Creative Research Associates	5a	a	Kindergarten	a	15 Title I schools, but didn't give % of F/R had to be 40%	*	0.306	p. 21	WERP=311, 998 Compariosn	10/31/14	0	2	2005-2006	No	Quasi-experimental design-comparison-group study involving treatment WERP implemented in 15 Title I schools ranked with highest F/R. Comparison with next highest 15 F/R from Tucson Unified School District

*DIBELS Initial Sound Fluency, Letter Naming Fluency, word Use Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency and the districts Core Curriculum Standard Assessment CCSA Reading Teset and the Waterford Early Reading Program-WERP software

Studies included in Double Coding & Coding Discrepancies

Article /Author and Identification #	Coding Discrepancies	Prenkert	Rains	Outcome
VanDerHeyden, A., McLauglin, T., Algina, J. & Snyder, P. (2012).	Over-representing students due to many effect sizes reported within the same article	I initially had fact families, multiplication, addition, subtraction subtests that were over representing the same students	We spoke on the phone and consulted with Dr. Marzano regarding combining effect sizes	Reached agreement about way to combine the effect sizes
Arvans (2010), Christ and Davie (2009), Hancock (2002), and Kemp (2006) What Works Clearinghouse Article	Counted this as one article with subgroups with multiple effect sizes across different domains- over represented students	I initially had all of these in just one study from the What Works Clearinghouse. I then looked up each study and separated them out individually.	We spoke on the phone and consulted with Dr. Marzano regarding combining effect sizes	I looked for individual studies and separated out the studies instead of combining them
Powers, S. & Price-Johnson, C. (2006). Evaluation of the Waterford early reading program in kindergarten. Creative Research Associates: Tucson.	Over-representing students due to many effect sizes reported within the same article	I initially had broken out all of the DIBELS subtest and was reporting effect size gains on each of those, but the same students were represented.	We spoke on the phone and consulted with Dr. Marzano regarding combining effect sizes	Reached agreement about way to combine the effect sizes

APPENDIX D

Studies included in the Meta-Analysis that met the criteria as outlined in the Chapter III or

Methodology Section of this study.

1	Gilbert, J.K., Compton, D.L., Fuchs,D., Fuchs, L.S. Bouton, B., Barquero, L.A. & Cho, E. (2013). Efficacy of a first-grade responsiveness-to-intervention prevention model for struggling readers. *Reading Research Quarterly*, 48 (2) pp. 135-154. Doi:10.1002/rrq.45.
2	Wilson, R.B. (2009). The effect of continuous quality formative-assessment program on middle school student mathematicsematics achievement. (Unpublished doctoral dissertation). Capella University.
3	VanDerHeyden, A., McLauglin, T., Algina, J. & Snyder, P. (2012). Randomized evaluation of supplemental grade-wide mathematicsematics intervention. American Educational Research Journal, 49: 1251. Doi: 10.3102/0002831212462736.
4	Feldmann, G.M. (2012). Early numeracy technical adequacy of select kindergarten and first grade screening measures. (Unpublished doctoral dissertation). University of Iowa. http:/ir.uiowa.edu/edt/2869.
5	Arvans, R. (2010). Improving reading fluency and comprehension in elementary students using Read Naturally. (Unpublished doctoral dissertation) Western Michigan University. U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2013). Beginning Reading intervention report: Read Naturally. Retrieved from http://whatworks.ed.gov.
6	Christ, T.J. & Davie, J. (2009). Empirical evaluation of Read Naturally effects: A randomized control trial (Unpublished journal article). University of Minnesota, Minneapolis. Retrieved from http://www.readnaturally.com U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2013). Beginning Reading intervention report: Read Naturally. Retrieved from http://whatworks.ed.gov.
7	Hancock, C.M. (2002). Accelerating reading trajectories: The effects of dynamic research-based instruction. Dissertation Abstracts International, 63(06), 2139A.
8	Heistad, D. (2008). The effects of Read Naturally on grade 3 reading. (Unpublished manuscript) Retrieved from http://www.readnaturally.com
9	Kemp, S.C. (2006). Teaching to Read Naturally: Examination of a fluency training program for third grade students. (Unpublished doctoral dissertation) University of California, Irvine and University of California, Los Angeles.

| 10 | Maziarz, A.L. (2010). The exploration of demographics and computer adaptive testing in predicting performance on state-mandated reading assessments. (Unpublished doctoral dissertation) Indiana University of Pennsylvania. |
| 11 | Powers, S. & Price-Johnson, C. (2006). Evaluation of the Waterford early reading program in kindergarten. Creative Research Associates: Tucson. |

Author and Study Name	Effect Size Reported in study	Sample Size	Reliability of Assessment in study	Effect Size Corrected for Reliability
1) Efficacy of a first-grade responsiveness-to-intervention prevention model for struggling readers (Gilbert et al., 2013)	.19	212	.85	.223
2) The effect of continuous quality formative-assessment program on middle school student mathematics achievement (Wilson, 2009)	1.0	588	.91	1.09
3) Randomized evaluation of supplemental grade-wide mathematics intervention (VanDerHeyden et al., 2012)	.46 -0.1	188 186	.85	.541 -.117
4) Early numeracy technical adequacy of select kindergarten and first grade screening measure (Feldmann, 2012)	.698 .672	72 56	.89	.784 .755
5) Improving reading fluency and comprehension in elementary students using Read Naturally (Arvans, 2010)	.117	82	.89	.131
6) Empirical evaluation of Read Naturally effects: A randomized control trial (Christ & Davie, 2009)	.127	104	.89	.142
7) Accelerating reading trajectories: The effects	.105	94	.85	.123

of dynamic research-based instruction (Hancock, 2002)				
8) The effects of Read Naturally on grade 3 reading (Heistad, 2008)	.32	44	.85	.376
9) Teaching to Read Naturally: Examination of a fluency training program for third grade students (Kemp, 2006)	.01	158	.85	.011
10) The exploration of demographics and computer adaptive testing in predicting performance on state-mandated reading assessments (Maziarz, 2010)	.019	3,861	.85	.022
11) Evaluation of the Waterford early reading program in kindergarten (Powers & Price-Johnson, 2006)	.306	1,309	.85	.36