

UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 AND
STUDENT ACHIEVEMENT

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF EDUCATION

By

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Norman, Oklahoma

2014

THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 AND
STUDENT ACHIEVEMENT

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

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Dedication

This work is dedicated to the memory of my parents, Johnnie and Nell Pate. They were extraordinary individuals. My mother instilled a love of learning in me and my siblings with weekly trips to our local library. To this day reading is one of the great joys of my life. My father was a modest man who served this great country in World War II, Korea, and Vietnam. As children of the depression my parents grew up quickly and learned to survive the long separations and uncertainty that comes with a military career. Despite those difficulties, my parents managed to raise a family of seven children with patience, integrity, and a strong work ethic. Their belief in the inherent value of education led each of us to obtain college degrees and to choose work that is personally meaningful.

As one of seven children I was fortunate to grow up in a loving household filled with laughter. Being the youngest provided ample opportunities for attention, with plenty of teasing and practical jokes thrown in for good measure. Richard, Tom, Jerry, Steve, Don, and Becky, I love you all dearly and feel so lucky to have had you in my life.

Acknowledgements

My work as a practitioner in education has allowed me to develop a keen curiosity about the nature of learning, and how the use of resources may affect this process. I am very grateful to the many outstanding educators who have been a part of this journey. Many years ago Dr. Chuck Novak, President of Richland Community College in Decatur, Illinois, asked if I might step into the recently vacated position of Controller at the college. Within a few years I was promoted to Vice President of Finance and Administration. His mentoring and encouragement from many years ago remains with me today. This unlikely career choice became a life-changing opportunity that, when combined with my passion for learning, led me to this dissertation. A family move to Oklahoma in 1997 provided an opportunity to work in common education and continue in the role of a public school finance officer. There have been many, many colleagues and friends along the way. I am grateful to all of them for their counsel and friendship. During these busy years with demanding work and a young family I dreamed of one day completing my own education with a doctoral degree.

The doctoral program at OU Tulsa seemed like the perfect fit, and in 2007 I joined a cohort of educational professionals that became a sort of extended family. This group of students quickly became a support network, a trusted group who helped each other through the tough times and celebrated our successes. It has been a journey of learning, growth, and change for all of us. Special thanks to those who

were a part of the 2007 cohort. Your friendship and support through this process has been invaluable.

No doctoral student succeeds without a committed, caring group of faculty guiding them in their program. Dr. Patrick Forsyth, who has served as my committee chairman and advisor, is an exceptional professor. Along with Dr. Curt Adams, they have changed the way I look at education and learning. They challenged my thinking and supported me throughout this process. I have been blessed with a doctoral committee that also includes Dean William Ray, Dr. Jeff Maiden, and Dr. Beverly Edwards. Their time and counsel is greatly appreciated.

My colleagues at Tulsa Public Schools, and my network of CFO's at school districts across Oklahoma, have become good friends and a source of inspiration. My superintendent at Tulsa Public Schools, Dr. Keith Ballard, has been a wonderful mentor and brilliant leader. I have learned from all of these talented professionals.

My work would not have been possible without the love and support from my family. Lee, as my husband and partner of nearly 30 years, we have shared everything in this life together. Your love and support means more to me than words can express. At every step in this process your encouragement made it possible to do this work, and it would have never happened without you. To my daughters Sara and Allison, you are both the light of my life. My wish for you is that you each find your passion in life's work, and that your journey is as enriching as mine has been.

Finally, I am deeply grateful to the George Kaiser Family Foundation for their support of education leadership in the Tulsa Public School district. Through

their matching scholarship, administrators in the district are afforded the opportunity to learn the lessons of urban school leadership at OU Tulsa.

Although my career has not been the work of the classroom teacher, I have been fortunate to know many outstanding educators. Their dedication to the profession and the students they serve every day is an inspiration to all of us whose role is to support the work of classroom teachers and building principals. My hope is that this study will advance the perspective of educators as we work to better understand the relationship between fiscal resources and the academic performance of our students.

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Abstract

The relationship between school spending and student achievement has been studied for years, beginning in earnest with the Coleman Report (Coleman, Campbell, Hobson, McPartland, Mood, Weinfield, York, 1966). The authors concluded that increased levels of spending in public schools were not sufficient to overcome the educational disadvantages faced by students living in poverty. Coincidentally, during this same time Congress launched the largest federal program aimed at providing educational assistance to poor children – Title I of the Elementary and Secondary Education Act (1965). In the years that followed, program evaluations suggested some evidence of improved student performance related to Title I programs. During this same period school finance researchers sought to better understand the relationship between school spending and student achievement. However, early research was limited by unsophisticated data systems and methodologies, combined with ambiguous guidelines (Borman, 2000, Borman & D’Agostino, 1996). Recent improvements to data systems, combined with increasing expectations of taxpayers for accountability, have led to the fields of production function research and cost effectiveness, which provide important analytical tools to answer these lingering questions.

An exceptional opportunity to study school spending and student achievement was provided when Congress passed the American Recovery and Reinvestment Act (2009). Designed to stimulate the economy and preserve jobs, the bill provided an unprecedented influx of funds for the Title I program. Schools

were directed to spend the funds in a manner that would result in improved student achievement, while at the same time saving and creating jobs.

This study addresses whether the additional funds provided through the Title I program under ARRA are associated with improvements in elementary reading scores in an urban school district. A review of the relevant literature results in two research questions. They are:

1. Is there a difference in elementary grade reading test scores before and after Title I ARRA funds were expended?
2. Is there a relationship between specific types of ARRA expenditures and student reading test scores?

It is expected that there is no improvement in student test scores that can be attributed to spending patterns of ARRA Title I funds. However, this study also gives rise to several public policy and school finance questions suitable for additional research.

Introduction

For public schools to provide solid educational opportunities to all children, particular attention must be given to decisions involving the use of resources. Discussions surrounding school resources frequently focus on the various funding mechanisms and how schools spend money.

Outcomes associated with school spending have long been an important part of this discussion, since the rate of spending in schools has increased substantially during the last decade while student achievement has remained relatively flat. Current expenditures per pupil (expressed in constant 2008-09 dollars) in the United States increased from \$8,214 to \$10,441 during the period from 1997-98 to 2007-08, an increase of over 27%. During roughly the same timeframe (1999 through 2008) average NAEP math and reading scores increased slightly for 9-year-old students, but remained nearly flat for 13- and 17-year-olds (Snyder & Dillow, 2011).

Rothstein and Miles (1995) provide a slightly different perspective and take issue with the notion of a “school productivity collapse”. They contend that inflation-adjusted rates of education spending are overstated, and not all school spending is targeted to student achievement. Schools provide a broad range of services to students including programs for special education and English language learners. They propose that expenditures be tied to specific programs, and that program effectiveness be measured based on the goals of individual programs.

For years researchers have sought to clarify the relationship between school spending and student achievement outcomes. Meanwhile, an increasingly frustrated public questions why increases in education spending have not generated similar gains in student achievement. This rhetoric, combined with the current economic downturn that resulted in massive budget cuts across the states has led some critics to make “. . . bold assertions that we now know, with certainty, that money doesn’t matter and that the path to school improvement can be accomplished despite – or even because of – reductions in spending” (Baker, 2012, p.2).

Under the No Child Left Behind Act (2001) schools experienced increased pressure to demonstrate accountability in terms of student achievement. At the same time individual states have implemented their own accountability measures at multiple levels. Combined with the interest of local patrons in the efficient spending of their tax dollars, public schools are expected to demonstrate high levels of both accountability and efficiency, while functioning in a highly political environment. Guthrie and Peng (2010) argue that these political pressures, when combined with fiscal pressures from the current economic downturn and years of increased spending for education will result in a “fiscal tsunami” for the nation’s public schools (p.19). They propose that “. . . a new era of intense public policy concern for education efficiency and productivity is about to begin” (p. 44). They describe a disconcerting future for public education for 2012 and beyond:

Public frustration with four decades of stagnant school achievement, the apparent unproductive increasing labor intensity, the slow pace of infusing instructional technology into classrooms,

the overall decline in educational productivity, frightening financial liabilities associated with current and future retiree pensions and health-care obligations, added political competition from other publicly funded services, increasing centralization of revenue generation, the diminishing number of households with school-age children, and overarching pressures of soaring national debt all warn of a downwardly spiraling funding dynamic that may be more powerful than any partisan electoral forces. Future presidents, governors, mayors, school board members, and superintendents will likely face a perfect storm of fiscal obligations, revenue restrictions, and resource competition not seen for a hundred years (p. 35).

One could argue that this new era began in earnest with passage of the American Recovery and Reinvestment Act of 2009 (ARRA). With over \$100 billion earmarked for education from kindergarten through college, the legislation represented a landmark funding increase for public education. This extraordinary spending increase was larger than the total budget of the U.S. Department of Education at the time of passage. Likewise, the reform goals and accountability measures attached to this funding were ambitious. Under ARRA, the Secretary of Education, governors, and state education agencies acquired the ability to drive education policy and reforms at an unprecedented level.

The subject of money and schools has been a long and complex debate that began in earnest with the report by Coleman et al. (1966), which was called for under the Civil Rights Act of 1964. The researchers concluded that school

resources had a minimal effect on student achievement, and that student performance was largely attributed to student socioeconomics (Coleman et al., 1966). The Coleman report sparked an intense debate on the relationship between school spending and student achievement. Much of this debate took the form of dichotomous arguments – money either mattered or did not. As research in this area progressed the focus shifted to a more subtle understanding of *how* money can matter. This area of study, generally referred to as production function research, evolved conceptually from the field of economics. It includes a body of research that explores the linkage between school spending (inputs) and student achievement (outcomes) (Grubb, 2009).

In the years following the Coleman Report researchers sought to clarify under what circumstances resources were associated with improvements in student achievement. Known as the Effective Schools Movement, during this time research emphasized the qualities of schools that were considered successful in their support of student achievement, with an emphasis on serving poor and underserved children. Characteristics of effective schools include: strong administrative leadership, a climate of expectations, an orderly environment, an emphasis on the importance of acquiring basic skills, the ability to divert energy and resources if necessary, and a means of monitoring student progress (Edmonds, 1979). However, Purkey and Smith (1985) caution that “...lasting change seeking to affect student achievement is more likely to result from policies that encourage bottom-up, school-specific reform efforts” (p.354). They distinguish between school characteristics and policies that can be implemented quickly (democratic decision making, leadership,

etc.) and those that create a climate of academic achievement over time (collegial relationships, sense of community, etc.).

Over the years the debate on school spending and student achievement has continued. Although knowledge in this field has advanced during the last fifty years, states and school districts continue to struggle with allocating limited resources in a manner that best supports student learning. It is likely that this struggle will continue. With the passage of ARRA in early 2009, and the dedication of billions of dollars to categorical programs such as Title I, educators faced an unprecedented challenge of spending funds in the manner prescribed while also spending in a manner to support student achievement.

Funding under the ARRA has come to a conclusion. Final reports have been submitted and school districts across the country have developed plans to deal with the “funding cliff” created by the loss of the funds. An examination of this program, and the effects of this unprecedented funding influx, seems most timely.

This study addresses whether the additional funds provided through the Title I program under ARRA are associated with specific types of expenditures related to improvements in elementary reading scores in an urban school district. A review of the relevant literature produced two related research questions. They are:

1. Is there a difference in elementary grade reading test scores before and after Title I ARRA funds were expended?
2. Is there a relationship between specific types of ARRA expenditures and student reading test scores?

It is expected that there is no relationship between an improvement in reading test scores that is related to spending patterns of ARRA Title I funds. However, this study also gives rise to several public policy and school finance questions suitable for additional research.

This study will examine Title I spending and student performance in Tulsa Public Schools (TPS) in Tulsa, Oklahoma. Located on the banks of the Arkansas River in northeastern Oklahoma, Tulsa is the second largest city in the state with a 2010 population of 391,906. TPS serves a student population of approximately 40,000 students, with a high proportion of students eligible to participate in the federal school lunch program. Most of the schools within the district provide services under the federal Title I program.

Since the focus of this study is student performance and spending patterns within TPS, a brief description of the district is appropriate. TPS is the second largest school district in the state of Oklahoma. The district covers a 173 square mile area serving the city of Tulsa, the county seat, and the surrounding counties of Creek, Osage, and Wagoner counties. Approximately 94 percent of the district is located within the city limits of Tulsa. For much of the twentieth century Tulsa was known as the “Oil Capital of the World” and served as a major hub for the oil and natural gas industries. TPS enrollment remains stable with approximately 40,000 students – a sharp decline from the mid-1960’s when enrollment hovered around 86,000 students. The district employs 2,800 teachers and 3,700 support personnel and administrators.

The state of Oklahoma requires that students in grades 3 through 8 complete the Core Curriculum Test (OCCT) in math and reading. The OCCT is a Criterion Referenced Test. In addition to the math and reading tests, grade 5 tests include science and social studies, grade 7 includes geography, and grade 8 includes science and U.S. history. Performance scores on the tests are categorized as advanced, proficient, limited knowledge and unsatisfactory (Oklahoma State Department of Education, 2013).

In late 2008, as the national economy neared collapse, states began to experience significant revenue shortfalls. Accordingly these losses were passed on to the local school districts over the next several years. Along with the loss in state revenues, schools also faced reduced revenues associated with the decline in property values due to housing foreclosures. During the 2008-09 fiscal year, final state revenue collections were 20.1% below estimate. In the following year, final state collections were 15.1% below estimate. Federal Stimulus funds were first released to school districts in the spring of 2009, with half of the funding allocation for Title I forward funded based on each state's existing approved ESEA consolidated application. Although schools benefitted from this unexpected influx of funds, there was confusion regarding maintenance of effort, supplanting, comparability and carryover rules. Furthermore, given the existing research on the effectiveness of Title I programs since the program's inception in 1965, one may have wondered how schools would budget funds in a manner to reflect the priorities outlined. Not only did the four "spending principles" generate a substantial amount of confusion among educators, schools were expected to ". . . advance ARRA short

term economic goals by investing quickly, and we must support ARRA’s long-term economic goals by investing wisely, using these funds to strengthen education, drive reforms, and improve results for students from early learning through college” (United States Department of Education, 2009).

At the same time, Oklahoma schools faced monthly state funding cuts due to declining state revenues. As part of the ARRA legislation, states also received State Fiscal Stabilization Funds (SFSF) as a means of offsetting losses in state revenues. SFSF funds included \$39.75 billion in the Education Stabilization Fund (ESF), and \$8.85 billion in the Government Services Fund (GSF). States were required to allocate SFSF funds under the state’s funding formula to restore school district funding to either 2008 or 2009 levels, whichever was higher (Mead, Vaishnav, Porter & Rothham, 2010). No spending restrictions were placed on SFSF funds, however states were required to agree to four reform assurances identified in the law. Unfortunately, for many districts SFSF funds were used to “backfill” for declining state funds and as a result nearly two –thirds of school districts in the country experienced an overall decline in funding from non-ARRA sources in 2009-10. As a result, despite the existence of ARRA funds, 45% of school districts were forced to lay off employees in fiscal 2009 (Mead et al., 2010).

The State of Oklahoma maintains a Constitutional “Rainy Day Fund” that is available to offset declared revenue shortfalls or emergencies. In FY 2009, the fund held the maximum balance of \$597 million. By the end of FY 2012, the fund was completely depleted. Federal SFSF funds were used to fill the revenue gap during

this time. The following table illustrates the relationship between state revenues, federal SFSF aid, and Rainy day funds.

Table 1

Oklahoma State Appropriations, FY 2007-08 through FY 2011-12 (\$ millions)

Year	State Revenues	Federal SFSF Aid	Rainy Day Funds	Total
2007-08	7,043	-	-	7,043
2008-09	7,095	30	-	7,125
2009-10	5,897	838	224	6,959
2010-11	5,938	554	273	6,765
2011-12	6,404	99	100	6,603

Note. From “Budget Trends and Outlook – February 2014”, Oklahoma Policy Institute.

During this time, schools faced a great deal of fiscal uncertainty as funding reductions were made during the year due to lagging state revenues. Oklahoma per pupil spending has historically been among the lowest in the nation, ranking 49th in FY 2011 (Cornman, 2013). Reductions in state funding typically triggered significant staffing reductions, through attrition and structured reductions, as well as cuts in discretionary operational spending. The following table summarizes the reductions in state funding, along with the increases in federal funding, for TPS during this period.

Table 2

Tulsa Public Schools General Fund Revenues, FY 2007-08 through FY 2012-13

Year	Local Revenue	County Revenue	State Revenue	Federal Revenue	Total New Revenue
2007-08	82,879,383	9,119,604	168,423,361	39,979,735	300,402,083
2008-09	81,806,629	8,652,672	167,607,844	55,495,320	313,562,465
2009-10	86,697,625	9,315,468	148,745,780	60,527,749	305,286,622
2010-11	88,723,149	9,458,249	146,833,724	57,885,976	302,901,098
2011-12	88,071,943	9,542,459	152,677,425	61,927,845	312,219,672
2012-13	90,960,183	10,114,016	151,095,903	42,047,714	294,217,816

Note. From Oklahoma State Department of Education, School District Revenue Reports

Literature Review

Historical Background

The history of school finance began with the Massachusetts Act of 1642, which required sons and servants in the colonies to receive instruction in reading and religious matters along with other more practical learning experiences. Parents and masters were fined if it was determined they were negligent in seeing to the education of their sons and servants. With the eventual failure of the 1642 law, the Massachusetts legislators passed a second law in 1647 designed to insure religious literacy among all of the towns and settlements in the colony. These laws established the state’s right to tax citizens for the provision of a public education system. This precedent, which established the property tax as the central funding

source for public schools, was eventually adopted throughout the colonies (Cubberley, 1920).

As the nation was becoming established, the Constitution firmly designated public education as the responsibility of the states. Under the tenth amendment powers not expressly granted to the federal government are by default the jurisdiction of the individual states. Although this would seem to be a clear distinction, the federal government has played a role in public education for many years, most notably at the conclusion of World War I and then again after World War II when Congress faced an immediate need to respond to the educational needs of returning veterans. With the success of the Soviet's 1957 Sputnik manned space flight, combined with the burgeoning cold war, Americans began to question whether schools were adequately preparing students for their futures. Passage of the National Defense Education Act in 1958 provided massive funding for science and math instruction, as well as providing a pivotal turning point in federal funding for public education (Brimley, Verstegen, & Garfield, 2012).

In the years that followed, there has been much debate concerning the role of the federal government in public education. The nature of this debate ranges from the constitutionality of increasing federal involvement, given the provisions of the tenth amendment, to the burden of compliance associated with federal aid. In specific reference to Title I, some researchers question whether there is sufficient understanding at the federal level of how poverty affects the educational needs of children, and how state and local factors affect those needs (Thomas & Brady, 2005).

A review of the relevant literature illustrates the theory that has evolved surrounding the understanding of the relationship between school spending and student achievement. Likewise, the limitations of the existing research suggest areas of specific study that are needed in order to provide a more thorough understanding of this relationship.

ESEA and Title I

After passage of the Civil Rights Act in 1964 Congress followed with the Elementary and Secondary Education Act (ESEA) in 1965. President Johnson, relying on the work of a newly-formed commission on education, agreed that federal aid to education should be targeted to specific areas of need. Further, this group also recommended the concept of federal aid “following” the disadvantaged child. The passage of ESEA represented the cornerstone of Johnson’s “War on Poverty” and he prevailed on both houses of Congress to pass the legislation promptly with minimal changes. ESEA provided major categorical funding for five educational programs. Most notably, ESEA established Chapter I (known in later years as Title I) as the largest of these programs to provide supplemental reading and math support for economically disadvantaged students. With the passage of ESEA the trajectory of federal spending in public schools jumped from inconsequential to 8 percent overnight (Guthrie & Peng, 2010). In the years that followed the philosophy of providing categorical relief to aid in the education of children with specific disadvantages became commonplace (Jennings, 2000).

During the 1960’s and into the 1970’s proponents of President Johnson’s War on Poverty argued that the poverty-stricken could move into the middle classes

with the help of government programs. Expectations for Title I as a tool to eliminate the achievement gap and eradicate poverty were high, and the passage of ESEA was a clear indication that Congress and the administration believed directed funding could improve the educational opportunities for poor and disadvantaged children (Jennings, 2000). By emphasizing equity and access the legislation was also designed to provide a voice to individuals historically underrepresented in public policy decisions.

Title I was the first piece of legislation to require annual evaluations of effectiveness. Two essential measures of effectiveness are whether the intervention is properly implemented, and what steps could be taken to improve effectiveness (Borman, 2000).

The much larger issue of how best to spend funds to educate poor children was left to local control. As Jennings (2000) describes:

In adopting Title I, Congress endorsed the idea that additional financial resources could make a difference in the education of poor and educationally disadvantaged children and simultaneously recognized the fact that concentrations of poverty have an adverse impact on the ability of school districts to provide such aid. Much less clear at that time was the matter of which types of educational services should be provided to poor and educationally disadvantaged children and by what means (p.518).

This flexibility, combined with the ambiguity of the law's intent and guidelines, resulted in highly publicized early reports of Title I funds spent on a

wide variety of items that were clearly not related to the educational needs of disadvantaged students (McClure & Martin, 1969). With respect to the effectiveness of implementation discussed earlier, it is clear that in the early years these efforts left much to be desired. Borman (2000) points out that the collective knowledge concerning compensatory programs was extremely limited. Also, states and local school districts lacked systems of compliance necessary for this scale of program. As a result, during these early years, “. . . the Title I program was characterized by regulatory compliance, rather than instructional or curricular guidance, which in turn affected the programmatic dimensions by creating a system of instructional isolation for Title I students” (Wong & Nicotera, 2004, p. 97). This isolation was characterized by “pull out” classes and tutoring for these students, which added to the stigma of poverty and low achievement (Pechman & Fiester, 1996).

The U.S. Office of Education responded in the early 1970’s by establishing specific regulations related to services and programs provided with Title I funds. They also began requiring school districts to meet “comparability” and “maintenance of effort” standards, and adhere to “supplement, not supplant” regulations (Jennings, 2000). Comparability rules require that districts demonstrate that services provided with state and local funds in Title I schools are comparable to the services provided to non-Title I schools. To meet maintenance of effort requirements, school districts must be able to demonstrate that state and local funding remains relatively consistent from one year to the next. The supplement, not supplant rule requires that federal funds be used to supplement (or augment) funds or services that the district would otherwise provide (Cowan & Edwards,

2009). During this time states and local school districts began to develop internal structures to more effectively oversee Title I programs (Borman, 2000).

An important change in the evaluation of Title I programs took place with the 1974 reauthorization with the requirement of program effectiveness evaluations to include comparable state and national data. The intergovernmental Title I Evaluation and Reporting System (TIERS) was the result of this legislation. Under the TIERS system, districts utilized one of three evaluation models: norm-referenced comparisons, control group comparisons, or a regression-discontinuity design. Of course, the selection of the evaluation model may have affected the results, which was a major criticism of the TIERS system (Vinovskis, 1999). The models were based on Title I students' performance on standardized tests, and aggregated at the national level to estimate effectiveness of the Title I program. These evaluations indicated that the Title I program resulted in some increase in reading and math performance for moderately disadvantaged children, but the effects were not sustained over time. Also, the evaluations indicated that the Title I program was lacking in cost effectiveness, meaning that at the time there was no clear relationship between program costs and student achievement (McDill & Natriello, 1998).

Evaluations of the effectiveness of Title I programs have generated mixed results due to the variability in program implementation among districts, and due to variations in evaluation methodology. Early program efforts focused on more basic issues of compliance and insuring the dollars were spent appropriately. With no model for evaluating effectiveness on a national level, the issue of program

evaluation was not an immediate priority. Combine this with the unsophisticated local data systems and methodologies, and it becomes clear why early evaluations indicated inconsistent results. Over time the program matured, but during the early years Title I programs generally functioned separately from the main instructional programs (McDonnell, 2005). Ultimately, Title I functions more as a revenue stream, rather than a specific intervention or set of interventions that could be compared among multiple school buildings or school districts (Debray, McDermott, & Wohlstetter, 2005, Borman & D'Agostino, 1996).

The Sustaining Effects Study, conducted from 1976 to 1979, provided the first nationally representative study of Title I effectiveness, and is considered to have provided the greatest contribution to the understanding of Title I effectiveness. Utilizing data from a representative sample of 300 elementary schools and 120,000 students, the study examined a cohort of students over three years beginning in 1996-97 (Vinovskis, 1999). The results of this study indicate that students who received Title I services performed better than other similarly disadvantaged students who did not receive services, however they did not reach the achievement levels of students who were not similarly disadvantaged. Interestingly, Title I students experienced more improvement in academic performance in the early grades than later grades, and more improvement was seen in math than reading. Some researchers concluded that the Title I program, while resulting in some improvement for underserved children, fell short of the goal of eliminating the achievement gap (Borman & D'Agostino, 1996).

During the early 1990's Congress called for a new study referred to as Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity. The Prospects study included 30,000 students divided among three cohorts in the first, third, and seventh grades who were studied over six years. The results were disappointing. Researchers concluded that Title 1 provided assistance for underserved students, but the program did not close the achievement gap among disadvantaged students. The authors concluded that student academic performance remained largely unchanged relative to their classmates (Vinovskis, 1999).

Using meta-analytical quantitative techniques Borman and D'Agostino (1996) analyzed the results of 17 federal studies from 1966-1993 in order to determine the effects of the Title I program on student achievement. The studies yielded 657 unique effect sizes based on comparisons between grade, subject, testing cycle, and year, however significant mediating factors were also identified. The authors hypothesized that the program has maintained a modest effect on student achievement that has increased slowly over time. Borman and D'Agostino's analysis of effect sizes by grade and subject suggest improved effectiveness over the years the program had been in place. They also acknowledge that as the program has evolved, with more stringent regulations and reporting requirements, local educators have also become more familiar with the educational needs of disadvantaged children.

In 1983 the National Commission on Excellence in Education issued its landmark report, *A Nation at Risk* (NCEE, 1983). During the early 1980's a number of major reports were issued to address the issues of efficiency and standards in

education, reflecting the Reagan administration's education agenda. However, *A Nation at Risk* captured the decline of America's public schools with respect to quality and performance. More importantly, the report ". . . defines the role of the federal government to identify the national interest in education" (Wong & Nicotera, 2004, p. 88). The recommendations within the report influenced policy development for years, including the future reauthorizations of Title I (Wong & Nicotera, 2004).

During the 1980's and 1990's two important pieces of legislation provided emphasis on improving Title I programs. The Hawkins-Stafford Elementary and Secondary School Improvement Amendments, along with the Improving America's Schools Act of 1994 (IASA) gave schools more flexibility in the design and implementation of their programs, but added new accountability requirements for student academic performance. Hawkins-Stafford required annual local and state evaluations of Title I program effectiveness, and called for increased coordination between Title I curriculum and standard school curriculum (Wong & Nicotera, 2004). Under IASA, the concept of "adequate yearly progress" was introduced; however states were given a great deal of autonomy in defining AYP. IASA also provided schools with higher poverty levels the ability to implement school-wide programs. School-wide programs, which became available during the 1996-97 school year, allowed Title I schools with poverty levels greater than 50% the ability to combine Title I funds with other local, state and federal resources to improve the educational programs for all children (Pechman & Fiester, 1996). These changes received mixed reviews. A 1996 study of 35 Title I state-level directors, 35 district-

level directors, and 35 school-level practitioners revealed that more time and support was needed to operationalize the intended reform (Billig, 1997). Although school-wide programs have the potential to reduce the instructional fragmentation that characterized the early years of Title I implementation, these programs also co-exist with other district-level reform efforts. In their analysis of the *Children Achieving* program in Philadelphia, Wong and Sunderman (2000) explored the fragmentation that can exist when a major district-level reform effort is “layered” over existing Title I schoolwide programs. Such difficulties can be exacerbated by competition and conflict between the various policymaking levels. In their study of 21 highly regarded schoolwide programs, Pechman and Fiester (1996) maintain that these programs function more as a management strategy than an intervention model.

In a recent study of the effects of Title I funds on schools and students in a large urban school district in the northeastern United States, researchers were unable to identify any impact on student test scores (Matsudaira, Hosek, & Walsh, 2012). The use of individual student-level data allowed for an analysis by subgroups to identify any improvements within targeted groups of students. This same study also explored whether individual schools attempted to manipulate student poverty data in an attempt to gain additional Title I funds. The regression discontinuity design of data from 869 schools in 2001 and 868 schools in 2002 was used to examine schools immediately above and below the funding cutoff level. Title I funds within school districts are allocated to individual schools based on poverty levels as measured by eligibility for the federal free and reduced lunch program. Schools with a free and reduced percentage above the district average are allocated Title I

funds based on their number of free and reduced students. In this study, individual schools at or near the funding cutoff were found to actively engage in strategies designed to manipulate eligibility levels in an attempt to drive funding resources to their schools.

The literature also suggests another explanation for the lack of impact in Title I schools on student achievement. Gordon (2004) finds that as the availability of Title I funds increases over time, there is frequently an offsetting decrease in the availability of local and state funds. Therefore any effect associated with federal funds is diluted by the loss of other funding. This dynamic was also noted by Matsudaira, Hosek, & Walsh (2012), where Title I schools received an additional \$460 per student which was offset by a reduction in state categorical funds to a net impact of \$360 per student.

In 2002, ESEA was reauthorized under the No Child Left Behind Act (NCLB) which represented a complex reorganization of public education and the relationship between the federal government, states, and local school districts. NCLB extended the standards based reform of IASA, providing more stringent requirements in both accountability and assessments. Although critics would argue that NCLB represented a shift in the federal government's role in public education, McDonnell (2005) characterizes the law as "an evolution of the federal role . . . its development tells us as much about the depth of change in state policy as it does about any alteration in the federal role" (p. 21). She also suggests that some of the motivation behind NCLB was the desire to overcome the perceived shortcomings of

Title I in terms of the funds invested and the program's failure to meet its initial goals. Grubb (2009) contends

. . . it remains unclear whether federal efforts on the whole have narrowed inequalities, despite the commitment of all major federal legislation to equity. This uncertainty continues in No Child Left Behind, particularly since the rhetoric of federal efforts has not been matched by the funding or other resources necessary to enhance school capacity (p. 248).

In addition to the various accountability measures, for the first time NCLB provided students with the opportunity to transfer to another school within the district after the first year that their home school is identified as being in need of improvement. Districts are also required to "set aside" twenty percent of their Title I funds to provide supplemental tutoring services for students in low-performing schools. In the second year of "needs improvement" status, districts are required to offer supplemental educational services to students in the school. After a school has been in "needs improvement" status for two years, corrective action including adoption of a curriculum based on "scientifically based research" is required. Finally, states were required to insure that by the end of 2005-06 all teachers in core academic areas met "highly qualified" standards (DeBray, McDermott, & Wohlstetter, 2005).

From a school finance perspective, Grubb (2009) questions whether the mandate for improved student performance is matched with both the revenues and resources needed to improve school capacity. He maintains that

. . . the equitable intentions of NCLB are not matched by the detail of its requirements, and it has worked in complex and (perhaps) unintended ways. The act has increased the pressure on schools to increase students' performance quickly, and that pressure for immediate results has driven many schools . . . to adopt off-the-shelf programs that are of doubtful value and represent quick fixes in place of the longer-run process of enhancing teacher capacity and restructuring schools (p. 249).

ARRA Legislation and Title I

In February 2009, Congress passed and President Obama signed the groundbreaking American Recovery and Reinvestment Act (ARRA), also referred to as the “stimulus package.” The legislation was designed to aid in the deepening economic recession that began with near-collapse of the financial markets in late 2008, providing over \$800 billion in federal spending and tax cuts. In addition to stimulating the economy, the package was designed to further the administration’s education reform agenda. To summarize, “By attaching education reform requirements to stimulus funds, federal policymakers could accelerate state and local progress on education reform. The ARRA legislation ultimately reflected this strategy of using short-term relief to produce long-term benefits” (Mead, Vaishnav, Porter, & Rotherham, 2010, p. 5).

Funding for Title I programs received a significant increase under the ARRA of 2009. At the time, the normal appropriation for Title I grants to school districts was \$14.49 billion (USDE, 2009). The legislation provided for an additional \$10

billion in Title I grants to school districts and another \$3 billion in School Improvement grants. Funds became available to schools in the spring of 2009 for spending in 2009-10 and 2010-11, with spending to be concluded by September 20, 2011. Under the enabling legislation \$5 billion was distributed through the Title I Targeted Assistance formula, and the remaining \$5 billion would be distributed through the Title I Education Finance Incentive Grant (EFIG) formula. As a result, the distribution of Title I ARRA funds was more concentrated among districts with higher levels of poverty than the normal distribution of Title I funds (Fagan, 2009).

Four reform priorities were identified for the ARRA funds: college- and career-ready based standards for assessments, development of longitudinal data systems for pre-K-20 students, improvements in teacher effectiveness, and turning around low-performing schools. Stimulus funds were to be used in a manner that reflected the four guiding principles of the legislation: spend funds rapidly to create and save jobs, improve student achievement, provide accountability and full transparency, and invest the one-time funds carefully to avoid a funding cliff (Garrett, 2009). The federal guidance document reflected similar ambitious language, “The Title I, Part A funds made available under the ARRA provide an unprecedented opportunity for educators to implement innovative strategies to improve education for academically at-risk students and to close the achievement gap in Title I schools while stimulating the economy” (USDE, 2009, p.8). These statements led some experts to describe the nature of ARRA funds as “schizophrenic” (Jennings, Linn, Wilholt, Rigsby, Kusler, & Simering, 2009, p. 13), since it is highly likely that these principles would be contradictory. Researchers

also questioned the ability of the federal government to drive education reform while simultaneously stimulating the national economy. In 2009 the GAO reported that, in fact, stimulus funds were being used to retain staff and fund existing educational programs (Smarick, 2010). Schools were understandably hesitant to create jobs with short term money. To this point, Jennings asks “. . . how much reform can really be expected from this money if it is short term . . . money? (p.24)”

In the spring of 2010, the Center on Education Policy (CEP) surveyed a representative sample of 233 school districts to provide a partial answer to this question. The results suggest that the general purposes of ARRA (save and create jobs, stabilize budgets, and drive educational reform) were being met, but a high level of uncertainty concerning sustainability was also experienced by local school districts. With respect to actual spending of Title I ARRA funds, survey results indicated that 59% of responding schools would use the money to save or create jobs in Title I schools, and 65% would also be using the funds to purchase instructional equipment and/or supplies (Kober, Scott, Rentner, McMurrer, & Dietz, 2010).

In a survey of 40 urban school districts, the Council of Great City Schools reported that on average 52 percent of Title I ARRA funds would be used to fund district-level initiatives. These initiatives included performance pay programs, supplemental instructional programs, extended learning time, and professional development. Results also reflected the importance of receiving waivers for spending and program requirements, such as carryover limits and the required set-aside for supplemental educational services (Naik, Yorkman & Casserly, 2010).

The unprecedented nature of these funds was also demonstrated in the heightened level of accountability. School districts and states were required not only to provide highly detailed expenditure reports for each school site, but also to make these reports accessible through school district and state level web sites. States were required to report how the funds were distributed and spent, as well as the numbers of jobs created or saved. Districts were required to report per pupil educational expenditures from state and local sources for each school site.

Passage of ARRA was not only unprecedented in terms of the level of funding, but also in terms of re-defining the role of the federal government in public education. Even more surprising is the fact that this major shift in the federal government's role in education took place with very little national debate (Guthrie & Peng, 2011). Researchers and scholars have been provided a unique opportunity to study the outcomes associated with a major funding influx – similar to the original Title I program, but with a major reform agenda attached. However, as Smarick (2010) remarks, “While the use of formula-based programs certainly facilitated the speedy distribution of funds, it also set the stage for conventional spending patterns” (p.18). Despite the tendency to resort to traditional spending patterns Fagan (2009) remarks, “. . . this substantial increase in funds provides an opportunity to measure impact. If the higher level of support is to continue, there must be some data to show it is having an effect on improving the achievement of children in the program” (p. 6).

As the program unfolded, however, researchers summarized a number of themes that emerged from the states and school districts:

- Districts used ARRA funds primarily to maintain spending levels in the face of state and local budget cuts. But some districts also used ARRA fund concurrently to move forward with reforms, particularly in the area of human resources.
- Mixed messages from senior officials at the Department of Education, multiple competing priorities, and delays in receiving official guidance from the Department of Education and states created confusion at the district level about the purpose of ARRA funds and how they should be used to preserve jobs and advance reform.
- In many districts, inertia and existing processes, rather than reform priorities, drove allocation and distribution of ARRA resources.
- In districts that did use ARRA for a more strategic end, local leadership, greater capacity, and idiosyncratic local factors, rather than federal policy decisions were the causes.
- Budget pressures on states and districts are proving to be even greater and longer-lasting than initially expected and are a long-term and systemic problem rather a temporary one. (Mead et al., p. 4)

The storied history of Title I, combined with the staggering \$150 billion financial investment made over the last fifty years, gives rise to a significant public policy issue with respect to ARRA. Billions of dollars have flowed through the Title I program, but as one author states “. . . history suggests that they have not always been engines of innovation and improvement” (Smarick, 2010, p. 4).

Which programs and practices provide the most cost effective means for improving and sustaining student achievement? As Vinovskis (1999) states, “The major problem is not the limited amount of federal money available for assisting disadvantaged students, but *spending the existing monies wisely* (emphasis added). Educators and leaders . . . have not focused on finding out what specific educational compensatory interventions really have a significant and lasting positive impact.” (p.199). It can be argued that the expectations were unrealistic for Title I and ARRA, and the understanding of the challenges of poverty were simply too limited. That being said, it is important to recognize that when the effectiveness of these programs or interventions are not demonstrated “. . . the problem is not just wasted tax dollars, but wasted chances to help those most in need” (Vinovskis, p. 201).

In addition to the question of effective spending, there are those who raise questions surrounding the appropriate role of the federal government in public education. Prior to 1960, school funding was provided primarily through local property taxes and accordingly districts exercised a greater degree of local control. As federal and state sources of funding increased each added additional “layers of influence” with respect to spending decisions. In many cases (as is the case with Title I) federal regulations are layered with state regulations which further restrict how the funds are to be spent (Roza, 2011). The result is a system of funding silos that inhibit districts’ abilities to innovate. Thomas and Brady (2004) argue that as the federal role has increased over the more than forty years that Title I has been in existence, across numerous studies and evaluations, what is most notable is the lack

of understanding with respect to educating disadvantaged children. Cross and Roza (2010) take the discussion one step further by stating

“ . . . education policies have had more to do with federal, state, and local entities responding to each other than with their attempts to address educational problems in schools and districts. The result is that four decades of policy making has structured resource allocation systems that now act as barriers to addressing the very problem that prompted federal involvement in the first place” (p.58).

Given the current public unrest regarding school spending increases and student achievement, the introduction of ARRA provides an even greater opportunity to demonstrate the connection between money and student outcomes, continuing the argument that has existed for decades.

Early Research: Money Does Not Matter

The Civil Rights Act of 1964 also called for research in the area of public education and poverty. The Coleman Report (Coleman et al,1966), formally known as *Equality of Educational Opportunity* is widely considered to be the most significant early study in the field of school finance. The report focused on four research questions in the context of socioeconomic status: the extent of racial segregation in public schools, the existence of equal educational opportunities in schools, performance on standardized tests, and the relationship between student achievement and the school students attended. The report concluded that, “Schools bring little influence to bear on a child’s achievement that is independent of his background and general social context” (Coleman, p. 325). In other words, student

achievement was more a function of genetics and the home environment than the effect of school resources. The report findings were controversial, and in the years that followed the Coleman Report was frequently criticized for methodological flaws.

Despite the criticisms surrounding the Coleman Report, and despite the counter-intuitive nature of the findings, Rothstein (2004) urges educators to reconsider the traditional thinking that surrounds the achievement gap. He writes that “. . .all students learn in school, but schools have demonstrated limited ability to affect differences in the rate at which children from different social classes progress” (p. 15).

The Coleman report launched significant research in the field that supported this argument. One of the strongest proponents of Coleman during this time, Hanushek (1986) argued that there was “no strong or systematic relationship between school expenditures and student performance” (p. 1162), since years of increased expenditures for public education have not resulted in similar improvements to student achievement. Hanushek argued that schools are inherently inefficient due to their use of traditional, centralized decision-making models and failure to use resources in a manner that supports student achievement. He concluded that a system of incentives for teachers, students, and schools is a more effective use of school resources (Hanushek, 1981, 1997).

Coate and VanderHoff (1999) found evidence to support the claim that student achievement is primarily associated with socioeconomic factors. In a study of individual New Jersey high schools, the researchers analyzed data from 1988-89,

1992-93, and 1994-95 school level report cards. They sought to relate student achievement to per pupil expenditures, student characteristics, and community characteristics. Community characteristics included median family income as a measure of poverty. Using regression analysis, the research indicated that between 67 and 83 percent of the variation in achievement was explained by race, ethnicity, mobility and median income. Including per pupil spending did not increase the r-squared value. Thus there was no evidence of expenditure effects on student achievement in urban and non-urban high schools in New Jersey (Coate & VanderHoff, 1999).

In a similar study, the effects of parental involvement, SES, and expenditures for instructional supplies on 4th grade math scores was examined in North Carolina. In this study 42 fourth grade classrooms during the 1995-96 school year were studied. SES was measured using the percentage of students eligible for the federal free and reduced lunch program. Regression results indicated a strong negative correlation ($r = -.773$) between mathematics test scores and free/reduced lunch eligibility (Okpala, Okpala & Smith, 2001).

Finally, the relationship between SES and academic performance is examined thoroughly in Sirin's (2005) meta-analysis. The study covered journal articles published between 1990 and 2000 that addressed the relationship between SES and academic achievement. The sample included 101,157 students from 128 school districts gathered from 74 samples. Sirin points out that the more recent studies operationalize SES with a variety of indicators such as parent education, occupation or family structure. However, when the unit of analysis is a school, SES

is usually measured by the percent of students eligible for the federal government's free- or reduced-lunch program. Sirin reports a mean effect size of $M=.299$, a medium correlation between SES and school achievement. By replicating the analytical technique of an earlier meta-analysis (White, 1982 as cited in Sirin, 2005) of studies prior to 1982 Sirin points out that the mean effect size has decreased slightly over time, from $M=.343$ to $M=.299$. He suggests that the reason for the decline in effect size over time is due to changes in society and public policy that promote access to technology and compensatory education for under-performing students (Sirin, 2005).

Later Research: Money Does Matter

During this same time, economists began to uncover the relationship between school spending and adult earnings in the labor market – a relationship that was consistently demonstrated in several studies (Verstegen & King, 1998, Card & Krueger, 1996). Card and Krueger tracked the results of students from North and South Carolina over more than thirty years, and concluded that higher levels of school spending resulted in higher individual earnings as adults. In their meta-analysis of Hanushek's earlier work Hedges, Laine and Greenwald (1994) concluded that the combined effect of earlier studies supported a more consistent and positive relationship between school spending and student outcomes. From this point researchers began to explore the possibility that perhaps school spending did affect student achievement.

In a more comprehensive meta-analysis of sixty production function studies, Greenwald, Hedges and Laine (1996) concluded that "...a broad range of school

inputs are positively related to student outcomes, and that the magnitude of the effects are sufficiently large to suggest that moderate increases in spending may be associated with significant increases in achievement” (p.362). Using two methods – combined significance testing and estimation of effect magnitude – they identified several inputs that are considered important. Combined significance testing was used to compare *p*-values from the original studies, and effect magnitude analysis was used to estimate the strength of the relationship between inputs and outputs. The seven input variables included per-pupil expenditures, teacher ability, teacher education, teacher experience, teacher salary, teacher/student ratio, and school size. The results of this meta-analysis indicate a clear and systematic relationship between per pupil spending and student performance. Furthermore, variables related to teacher quality (ability, education, and experience) are also strongly related to student achievement.

Grubb (2009) argues that the relationship between money and student outcomes must be examined in a broader arena. He proposes that a more accurate approach is to “. . . identify what kinds of resources matter to outcomes and then to determine how those resources are related to funding – that is, to the question of what money can and cannot buy” (p. 7). Rice (2004) also supports the value of production function research – with the caveat that the true promise of this technique lies in a deeper understanding of educational inputs “. . . it seems that money *can* matter. The key to improving student achievement through specific investments lies in reaching a more refined understanding of the resources themselves” (p. 142).

While earlier works focused on the question of whether money matters, Grubb provides a broader framework for consideration of school resources. This conceptual model, described as a “Black Box” (Grubb, p. 27) summarizes the traditional approach to production function research as one that considers only inputs and outputs, and falls short in addressing the process that lies in between. This process is depicted in the following diagram.

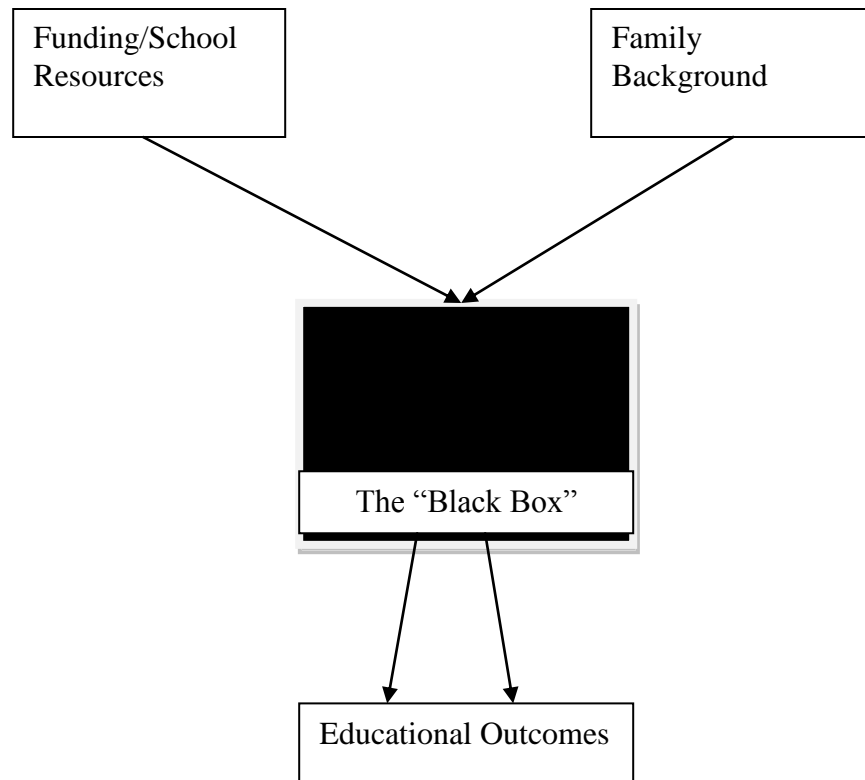


Figure 1: The “Black Box”: Conventional Production Functions, Grubb (2009, p. 28).

The “Black Box” refers to what takes place in the school itself. Grubb maintains that traditional educational production function studies fail to address the “Black Box” or the production process itself to provide a clear conceptual understanding of the learning process. In addition, traditional education production function studies emphasize easily quantifiable variables such as school spending, with educational outcomes typically conceptualized as student performance on standardized test scores. This traditional, industrial-based model does little to explain how different types of resources may affect student learning. Grubb argues that to present a full model it is essential to categorize resources in a fuller sense as simple, compound, complex, or abstract. Simple resources are identified as variables such as class size or teacher salaries and other items that are typical components of per pupil expenditures. Reforms that focus on simple resources alone often fail to result in improved learning. Compound resources are essentially simple resources with additional components such as teacher experience at a specific grade level. These resources tend to reflect a stronger and more consistent effect on student outcomes. Complex resources are typically not resources that can be bought, such as those related to pedagogy. Abstract resources are those that include multiple dimensions, such as school climate or stability. Finally, Grubb argues exogenous effects cannot be ignored. Examples of these effects include school size and school type (such as public, private or religious). Thus, the so-called “black box” is conceptualized to further explain the effects of these various types of resources on student achievement.

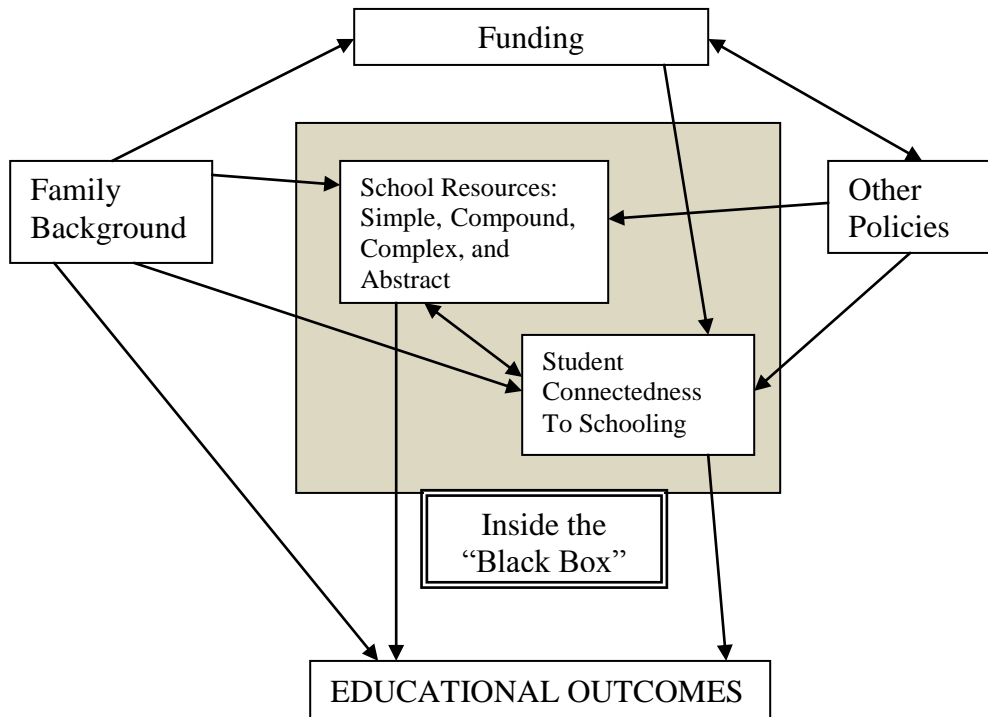


Figure 2: The Black Box Exposed: How Resources Impact Student Achievement, Grubb (2009, p. 47).

Grubb’s analysis of the National Longitudinal Survey of the Class of 1988 (NELS88) data is illustrative of this model. NELS88 is drawn from a random sample of schools, and within those schools a random sample of eighth graders in 1988, with data also drawn from the students during their tenth and twelfth grade years, then two years and six years after completing high school. In addition to a multitude of independent variables the data set also includes multiple outcome measures as dependent variables including test scores, measures of progress, and measures of values and attitudes. By categorizing independent variables as simple, complex, compound, or abstract, the relatively weak influence of simple variables on student test performance becomes clear (Grubb, 2009).

Cost-Effectiveness Research

The early groundbreaking work of Levin (1983) established the framework of cost-effectiveness research, which is described as a systematic, decision-making tool designed to quantify both costs and effects of various inputs and outputs (Levin, 1995). In their later work Levin and McEwan (2001) identify four major types of cost analysis: cost effectiveness, cost-benefit, cost-utility, and cost-feasibility. Cost-effectiveness is used to compare costs to effects, and is most useful when comparing alternatives for a desired outcome. This technique can only be used when the alternatives share a common goal. Cost-benefit analysis is used when inputs and outputs are expressed as monetary values. Cost-benefit can be used with many programs with different objectives, as long as both costs and benefits can be expressed in monetary terms. This may prove problematic in some circumstances. Cost-utility is similar to cost-effectiveness, but incorporates a measure of constituents' perceived satisfaction, which can be effective as a means of consensus-building. Finally, cost-feasibility can be used to determine if a program or initiative is affordable, not if it is the preferable alternative.

There are several essential elements to incorporate in a successful cost-effectiveness analysis. The first is to clearly identify the problem and determine if cost-effectiveness is the appropriate analytical tool. This technique is best suited for comparing various programs or options that are intended to achieve the same effects. Secondly, one must be able to specify the ingredients and their associated costs or values. Third, measures of effectiveness must be defined. Finally the relative relationship between the cost and level of effectiveness (C/E ratio) must be

calculated for each of the various alternatives. This technique is used to choose the best results for a given cost, or the option that minimizes costs based on a desired result. To assess and analyze costs, it is important to have a clear understanding of the cost structure, including who pays what costs, subsidies, net costs, inflation, and the nature of costs that recur over time. Measures of effectiveness must closely reflect desired outcomes and concepts of reliability and validity should also be evaluated. Uncertainty may result from imperfect data, the nature of statistical sampling, or factors that are chosen by the evaluator. Specific techniques such as sensitivity analysis, decision trees, and expected value analysis can be used to account for uncertainty.

Research in this area gave rise to an interest in the overall efficiency of school systems, which when combined with the school reform movement suggested that efficiency measures could be utilized to inform education policy. Also, it is worth noting that significant improvements in technology, more sophisticated databases, and improvements in methodology provided researchers with better analytical tools (Verstegen & King, 1998). Recent studies also underscore the importance of disaggregating data into relevant categories to identify specific areas and types of expenditures that affect student achievement (Archibald, 2006).

It becomes clear that not only do school districts differ in how they spend money, but that the costs associated with improved performance differ among school districts (Reschovsky and Imazeki, 2003). In their study of 803 Texas school districts, a cost function equation was estimated using per-pupil expenditures, student performance, and several other district-level characteristics. The researchers

concluded that there are large cost differences across districts that are necessary to meet required levels of academic performance. Further, they note that even if funds were identified and provided for schools to meet student achievement requirements, there is no guarantee that schools would use the funds in the manner needed to achieve the desired results.

It is interesting to note that these techniques have been used extensively in the health and medical fields. Within this area of research, Hummel-Rossi and Ashdown (2002) identify a methodological protocol appropriate for educational research, summarized in Table 3.

<u>Component</u>	<u>Recommendation</u>
Perspective	Goals of the evaluation that are clearly articulated.
Cost Analysis	Ingredients approach.
Comparators	Existing practice or reasonable alternatives.
Estimate Program Effects	Rigorous experimental or quasi-experimental design with attention to identifying hidden and/or qualitative outcomes, and positive as well as negative outcomes.
Outcome Measures	Standardized achievement measures or effect size, if different achievement tests used. Attempt to measure qualitative residual.
Distributional Consequences	Assign all types of costs and effects to appropriate parties.
Analysis of Time Effects	Annualize costs, take into account inflation, and discount costs over time.
Sensitivity Analysis	Explore variations in significant assumptions/parameters and identify their impact on cost-effectiveness ratio.
Decision Rule	Cost analysis is an important source of information in decision-making, but not sole criterion.
Reporting of Findings	Need for a technical report that includes a reference case that is available upon request. Results also reported in professional journal.

Table3. Recommended Protocol for Educational Cost-Effectiveness Studies. Hummel-Rossi & Ashdown (2002) p. 20.

Although the perspective of analysis may seem self-evident, it is essential that there is consistency with regard to the goals of the analysis. The ingredients approach to cost analysis (Levin, 1983) incorporates hidden as well as explicit costs. Since cost-effectiveness is an analytical tool to compare the effectiveness of one alternative to another, a second program or alternative is also required. Although a traditional experimental design may not be practical in a school setting, the authors urge administrators to incorporate a rigorous design into the analysis. Determination of outcome measures is critical and essential for a valid comparison. Standardized tests are generally considered a valid measure, but other outcomes should also be considered. Distributional consequences refer to the importance of recognizing all costs and assigning them to the appropriate area with consistency. The costs and outcomes must be analyzed over a period of multiple years, assuming the program covers multiple years. The effects of costs over time and inflationary costs must be included in the analysis to insure accuracy. Sensitivity analysis indicates the nature of costs when assumptions about the analysis, such as the school population being served, are altered. Finally, the authors stress that although cost-effectiveness provides valuable information, final decisions should reflect other criteria as well.

Levin (1997) expands on this theme in his later work by suggesting that traditional production function research has not resulted in substantial improvements to school practice and policy. He proposes that an approach based on “x-efficiency” (Liebenstein, 1966 as referenced in Levin, 1997) may be more likely to yield the desired results. The “x-efficiency” is defined as an approach “. . . in

which incentives, motivation, and other organizational dimensions of the firm are viewed as having far greater implications for efficiency of the firm than the allocation of inputs at the margin” (p. 303). Examples of this “x-efficiency” include reorganizing productivity, improving communication flows, and improving incentives for productivity. Levin (1997) identifies five characteristics of x-efficient organizations:

1. A clear objective function with measurable outcomes.
2. Incentives that are linked to success on the objective function.
3. Efficient access to useful information for decisions.
4. Adaptability to meet changing conditions.
5. Use of the most productive technology consistent with cost constraints (p. 304).

These five characteristics are often non-existent in the tradition-bound, compliance-driven environment of public schools. The Accelerated Schools Project, a national reform program that took place during the mid-1990’s, provides a case study of the effects of increasing “x-efficiency” characteristics that results in improved student achievement for underserved and at-risk student groups (Levin, 1997). He concludes that “. . . while allocative efficiency is important also, the potential gains from improved allocative efficiency in education are unlikely to be as large as those from creating schools with greater x-efficiency” (p.308).

Recent Cost-Effectiveness Research

In recent years, much of the research in this area has dealt with specific aspects of the cost-effectiveness issue, utilizing a variety of approaches (Levin & McEwan, 2001, Levin & McEwan, 2002). Researchers acknowledge the importance of re-examining fiscal policy decisions related to education:

This fiscal reality places the issues of education effectiveness, efficiency, and productivity squarely on the school finance agenda.

For the next several decades, school finance policies will need to be intertwined with other strategies that are able to improve the effectiveness, efficiency, and productivity of each education dollar.

This imperative raises a host of new issues around how the education dollar is distributed and used, and likely will require substantial resource reallocation of education funds at all levels of the education system (Odden, 2000, p. 470).

When analyzing the spending patterns of high performing districts one study demonstrated that these districts have consistently higher levels of instructional expenditures as a percent of total expenditures (Pan, Rudo, Schneider, and Smith-Hansen, 2003). As research in this area becomes more focused, scholars have begun to narrow the focus on what types of spending are more likely to influence student achievement (Yeh, 2011, Greenwald et al., 1996). In order to clearly understand the effect of spending on student achievement, expenditures must be disaggregated in order to identify specific areas and their affects, as opposed to utilizing total per pupil expenditures (Archibald, 2006). Due to the variation in

specific spending patterns within school districts this is an area of great potential for future research.

This holds particularly true when considering the debates concerning class size. One recent study performed in Florida attempted to identify what forms of input (i.e. smaller class size, expanding early childhood programs, etc.) had the most significant effect on improving student achievement. The results confirmed that the state's Class Size Reduction initiative, while effective in improving test scores, was not the most efficient method of doing so (Ilon & Normore, 2006). However, in some cases, the class size issue has been shown to illustrate a different effect. New York City schools that participated in the Annenberg Challenge Grant program were found to have higher levels of student achievement and lower per pupil expenditures, even though these schools hired more teachers. The difference is accounted for by the lower experience levels (and therefore salaries) of the teachers who were hired (Iatarola & Fruchter, 2006).

Despite advances made in all areas of educational research, progress in the use of cost-effectiveness techniques has been lackluster (Levin & McEwan, 2002). As Hummel-Rossi and Ashdown (2002) point out, "this is surprising as many new educational initiatives involve significant expenditures and there are increased demands from interested constituencies for evidence of positive student outcomes resulting from the outlay of public funds" (p.2). Reasons cited for the lack of cost-effectiveness techniques include conceptual and measurement difficulties, a lack of understanding among administrators regarding cost-effectiveness, and a lack of incentives or demand for this level of analysis with educational expenditures.

A notable exception is provided in *The Cost-Effectiveness of 22 Approaches for Raising Student Achievement* (Yeh, 2011). Yeh proposes that the achievement gap is most effectively addressed when all students are provided with individualized instruction and assessment that provides challenges for their level of performance and objective evidence of progress. Using this as a basis for his theory of learning he compares the cost-effectiveness of interventions in five major categories: rapid assessment, increased educational spending, vouchers, charter schools, and increased accountability (high-stakes testing). These are divided into specific interventions, including: rapid assessment, comprehensive school reform, tutoring, computer-assisted instruction, a longer school day, teacher education, teacher experience, teacher salary, summer school, rigorous math courses, value-added teacher assessment, class size reduction, increasing spending by 10%, full-day kindergarten, Head Start, exit exams, national board certification, licensure test scores, preschool, an additional school year, vouchers, and charter schools (Yeh, 2011). Utilizing effect-size data from existing studies, instead of the standard cost/effectiveness ratio he analyzed the inverse, effectiveness/cost. This approach allowed the comparison of the various interventions to rapid assessment. Yeh concludes that rapid assessment, which is defined as “. . . systems that provide autonomy in task execution, an accelerating standard of performance, and formative testing feedback to students and teachers regarding student performance in math and reading 2-5 times weekly, while individualizing task difficulty and performance expectations so that students achieve success on a daily basis” (p.11). While the analysis reveals that rapid assessment is in fact a more cost-effective means to

improve student achievement, Yeh is quick to acknowledge that no single intervention is likely to produce sustainable, long-term results, rather a combination of interventions often leads to the desired results.

Conclusion

There is a widely held belief that a positive correlation exists between the availability of resources and student achievement, as measured by standardized test scores (Archibald, 2006, Greenwald et al., 1996). With the pressure on schools to improve student performance and eliminate achievement gaps, there is much more to learn about the effects of specific fiscal inputs on student achievement.

In reviewing the school finance research, it is clear that researchers have largely determined that money matters. While early research was described in dichotomous terms (i.e. money matters/money does not matter), more sophisticated techniques allow researchers to pose more thoughtful, specific questions about the role of money in student achievement. The next phase in furthering the collective understanding is clarifying specifically how it matters, and what resources generate the highest return for our public schools (Rolle, 2004). By analyzing budgeting and spending patterns of high-performing school districts, it is possible to develop a general framework for allocating financial resources (Pan et al., 2003), allowing school districts to maximize the return on their budget dollars. However, allocating the resources to support student learning is only part of the equation. Spending funds in a manner that is aligned with district student achievement goals and individual building needs is of equal importance.

Conceptual Framework

A review of the literature and history of federal funding in education indicates the existence of an underlying theory that targeted federal funding has been provided to schools in hopes that it would lead to improved student performance. Specifically, it was expected that providing programs and services through Title I to support math and reading for children in poverty would diminish the achievement gap (Jennings, 2000, Borman, 2000, Borman & D'Agostino, 1996). Evaluations of program effectiveness have been lackluster (McDonnell, 2005, Borman & D'Agostino, 1996, Matsudaira et al., 2012).

Likewise, the role fiscal resources play in student achievement has been studied. There is evidence to suggest that increased per pupil spending can lead to improvements in student performance (Hedges, Laine, & Greenwald, 1994, Greenwald, Hedges, & Laine, 1996). It remains unclear what types of resources, and what forms of spending, best support student achievement. Finally, the role of school spending in relation to other variables (including school, student, and teacher characteristics) is yet to be fully understood (Greenwald, Hedges, & Laine, 1996). Grubb (2009) suggests that the nature of the resource must be considered to understand the impact. By categorizing resources as simple, compound, complex, or abstract, they are conceptualized in a more complex framework.

With the passage of ARRA in 2009, an unprecedented funding increase of \$10 billion was added to the Title I program. Schools were encouraged to fund innovative reforms to drive student achievement, while avoiding the so-called

“funding cliff”. Experts were quick to question the reform agenda attached to federal stimulus, and the wisdom of this move from a public policy standpoint (Jennings, 2009, Jennings et al., 2009).

Given the climate in which public schools exist, increased demand for accountability and improved outcomes associated with the use of public dollars is to be expected. In light of the recent influx of federal funds provided under the ARRA, with tens of millions of dollars flowing into the nation’s school districts, educators should anticipate that these questions will come sooner rather than later.

Research Method

This study will explore the relationship between specific expenditures of Title I ARRA funds and the associated student outcomes. The unit of analysis will be nested data consisting of individual students in Title I elementary schools within the Tulsa Public School District in order to provide a more robust and thorough examination of specific patterns of growth in student achievement. Specifically, the methodology will address the research questions:

1. Is there a difference in elementary grade reading test scores before and after Title I ARRA funds were expended?
2. Is there a relationship between specific types of ARRA expenditures and student reading test scores?

These questions will be addressed through both quantitative and qualitative data gathered from the Tulsa Public School district in Tulsa, Oklahoma. TPS serves roughly 40,000 students in an urban setting. Tulsa is the second largest city in the state, with a population of 391,906 reported in the 2010 census. The city has

traditionally served as a hub for the oil and natural gas industry. However, over time the economy has diversified to include businesses in the energy, finance, telecommunications and technology sectors.

As with many other urban districts, the student population has declined dramatically since the mid-1980's high of 86,000 students. Along with the shifting demographics, TPS serves an increasingly high-poverty population with challenges common to urban school districts.

The quantitative data for this analysis will be derived from existing district records. The district enrolls approximately 40,000 students at 89 school sites in an urban setting. With a district-level poverty rate (defined by free and reduced lunch students under the Federal School Lunch program) of 78%, 51 of the district's elementary schools qualified for funding under the ARRA Title I "school wide" program. As such, these 51 sites will be the focus of this study. School wide programs are an option available to schools with a 50% or higher poverty level, and provide flexibility by allowing schools to provide programs to all students, with a focus on interventions to assist low achieving students. All of the school sites included in this study featured school wide Title I programs. This study will examine results at elementary school sites since much of the existing program evaluation research on Title I supports academic outcomes at the elementary level.

Student achievement, the dependent variable, is operationalized as performance on state-mandated tests. Test results in reading at the 3rd, 4th, and 5th grade levels, using Oklahoma Core Curriculum Test (OCCT) scores, as measured by the individual raw score at each site will provide the measure of student

achievement . Growth will be captured by use of a three-year growth model using two student cohorts. The independent variable is defined as Title I ARRA spending at the school level measured over the term of the ARRA grant. Expenditure data will be disaggregated by the individual school building and by major object category (tutoring, professional development, materials, equipment, etc.). All data will be derived from existing district records.

As with any research, it is important to acknowledge the limitations and threats to validity inherent in the project. Improvements in student achievement may be attributed to other factors such as school size, teacher experience, or the strength of school leadership. Likewise, it is possible that improvements in student achievement may also be the result of other non-school factors. Since expenditure of these funds took place over a two-year period it is possible that timing of purchases and services would also present a potential source of bias. Finally, as with any project of this nature, the possibility of data entry errors also exists.

In addition to the quantitative analysis, qualitative data will be derived from interviews with district administrators from Title I elementary schools who will provide a practitioner's perspective on the effectiveness of the ARRA Title I program. A clear understanding of the decision-making process related to spending will be explored. Their interviews will also address some of the confusion faced by school officials due to the multiple priorities and guidelines.

Data Collection

Quantitative data was derived from existing Tulsa Public Schools student records. Within the school district, fifty-one elementary schools received funding allocations under the ARRA Title I program.

Students were categorized into two distinct cohorts. The control cohort consists of the following year and grade levels: 2007-08 3rd grade students, 2008-09 4th grade students, and 2009-10 5th grade students. The second group, the test cohort, consists of 2009-10 3rd grade students, 2010-11 4th grade students, and 2011-12 5th grade students.

A number of constraints determined the structure of the groups. The ARRA funds were spent primarily in fiscal years 2009-10 and 2010-11, thus the treatment cohort is identified in this timeframe. Secondly, the District conducted a major restructuring of schools and grade level configurations that took place during the summer of 2011. This restructuring, “Project Schoolhouse”, resulted in the reassignment of approximately 3,000 students. In order to avoid the introduction of bias, and control for student mobility, sample selection in both cohorts required the student have test scores for all three years in the same elementary school.

The identities of individual students were masked by the use of a multiplier applied to student identification numbers. The sample will consist of students in cohorts within each Title I elementary school with complete test scores in reading for all three years. The use of longitudinal models of student progress with individual students as the unit of analysis is supported in the literature (Murnane (1981) as cited in Greenwald et al., 1996).

Demographic data for the sample groups include gender, race, special education designation, English language learner status, and free or reduced lunch status.

Expenditure data for Title I ARRA funds will be compiled for the term of the grant, from May 2008 through September 2011. In keeping with the federal format for budgeting site funds, expenditures will be classified into four broad groups: tutoring salaries and benefits, classroom supplies and materials, parental involvement salaries and benefits, and professional development. School sites were given a budget allocation amount based on the rank order of free and reduced lunch students at the site, and individual sites were allowed to structure their budgets among the four categories outlined above based on the individual needs of the students within the building.

Qualitative data will be gathered through structured interviews with district level Title I administrators and principals. Interview questions (included as Appendix C) focus on how spending decisions were made at the district and school site level, perceived effectiveness of the grant, and evaluation measures of the program effectiveness. Interviews were recorded and transcribed with the use of “TranscribeMe”, a smartphone application that records audio interviews and provides transcription services for a nominal fee.

Findings

The purpose of this research was to determine if there are differences in urban elementary reading scores before and after the availability of Title I ARRA funds. Reading test scores from elementary students in the 3rd, 4th, and 5th grades were utilized to identify two longitudinal cohorts. The first cohort of students was not exposed to the availability of ARRA Title I funds, during 2007-08, 2008-09, and 2009-10. The second cohort consisted of 3rd, 4th, and 5th grade students during and immediately after the funds were spent, in 2009-10, 2010-11, and 2011-12. Timeframes were constrained by a lack of available individual student data prior to 2007, and the District's consolidation of schools that took place in the summer of 2011. Sample selection controlled for mobility by eliminating students without three consecutive test scores from the same school. Accordingly, students who were reassigned to another elementary site by the school consolidation in 2011 were eliminated from the study.

In addition to the quantitative analysis, four TPS building administrators were interviewed regarding their experiences with the Title I ARRA funds. Interview questions addressed how spending decisions were made at their sites, spending strategies, and how the results influenced student achievement at their school site.

This chapter is divided into two sections – the first covers research question 1 and the second section covers question 2. Question number one addresses whether there is a difference in elementary reading scores prior to and immediately

following the expenditure of Title I ARRA funds. Question two inquires if the disaggregated expenditures are related to student achievement in the second cohort.

Question 1 - Descriptive Statistics

Since the two sample cohorts represent individual student test scores nested within each of the TPS Title I elementary schools, multilevel analysis is an appropriate analytical tool. Variables reflect both individual characteristics (gender, race, Special Ed status, ELL status, Free/reduced lunch status) and group characteristics (school assignment, grade level). Student test scores represent a longitudinal measure since state reading tests are administered each year during a specified testing window, which Hox (2010) describes as a “fixed occasion.” Given the nature of the sample (nested) and variables (a combination of individual and group characteristics), the data analysis was conducted using Hierarchical Linear Modeling (HLM).

The variable labeled TEST identifies the nominal value designating the 3rd, 4th, or 5th grade test period. READOCCT statistics reflect characteristics of the dependent variable, student reading scores on 3rd, 4th, and 5th grade OCCT tests. The two cohorts reflect the three year test results on 2,501 individual students (a total of 7,507 records) with 1,372 students in the first cohort and 1,129 students in the second cohort. Test scores range from 400 to 990, with a mean for all students in the study of 724.40 and a standard deviation of 81.86.

Independent variables are also described in Table 4 and include the availability of ARRA funds (ARRA), gender (MALE), eligibility for the federal free and reduced lunch program (FRLUNCH) and the student’s ELL classification

(ELL). As nominal variables, these were assigned a numerical value to facilitate analysis. Of the total student population in the study, 45% of students were included in the cohort that experienced the effects of the ARRA spending. The students were equally divided by gender, with 82% of the population eligible for the free and reduced lunch program. Approximately 24% were classified as English language learners. Current district wide data indicate 78.89% of students are eligible for free and reduced lunches, and 17.81% are English language learners (Tulsa Public Schools, 2013). Since the sample selection was Title I elementary schools, a higher than normal concentration of both English language learners and free and reduced students is expected. Descriptive statistics for the first question are summarized in Table 4.

Table 4

Descriptive Statistics – Question #1

Variable Name	N	Mean	SD	Minimum	Maximum
TEST	7,507	1.00	0.82	0.00	2.00
READOCCT	7,507	724.40	81.86	400.00	990.00
ARRA	2,501	0.45	0.50	0.00	1.00
MALE	2,501	0.50	0.50	0.00	1.00
FRLUNCH	2,501	0.82	0.39	0.00	1.00
ELL	2,501	0.24	0.43	0.00	1.00

Note. TEST = Student grade level, READOCCT = Reading test score on Oklahoma Core Curriculum Test (OCCT), ARRA = Availability of ARRA Title I funds, MALE = Gender, FRLUNCH = Eligibility for federal free and reduced lunch program, ELL = Students classified as English Language Learners.

Question 1 – Findings

The purpose of the initial analysis was to determine if a difference exists between student reading scores during the period of time immediately preceding, and during the availability of, Title I ARRA funds. For this analysis, Hierarchical Linear Modeling, or HLM, was utilized. The two student cohorts, with reading test scores for the 3rd, 4th, and 5th grade provided a longitudinal data set. Model 1 (TEST and READOCCT) was constructed to determine how much of the variance in

reading achievement is determined by individual student characteristics.

Approximately 61% of the variation in all of reading scores is attributable to individual student characteristics. The variability attributed to student characteristics is statistically significant ($\chi^2 = 14,454.70$, $p < .001$)

Model 2 incorporates the remaining variables of ARRA, MALE, FRLUNCH, and ELL. Model 1 was designed to determine if a statistically significant change in test scores takes place from the 3rd to the 5th grade. These results indicate that the average test score is 748.05, with an average decline for all students of 23.6 scale points that is statistically significant ($p < .001$) from the 3rd to the 5th grade. The second model was designed to incorporate the remaining variables of ARRA (availability of ARRA funds), FRLUNCH (eligibility for Free or Reduced Lunch), and ELL (the student's status as an English language learner).

The control cohort had an average third grade reading score of 748.05, while the test group had an average third grade reading score of 712.74 (a difference of 35.31 points). This difference in baseline reading scores between the two groups indicates that the test group was justifiably targeted with the intervention of ARRA funds. However, it is notable that the coefficient associated with the ARRA variable in the test cohort indicates a less steep decline in average reading scores for the three elementary years than the control cohort. These results are significant ($\beta_{11} = 20.77$, $p < .001$). By fifth grade, ARRA students had a slightly higher average reading score than the control group even though students in the control group had a significantly higher average reading achievement at 3rd grade.

Table 5

Reading Achievement – Question #1

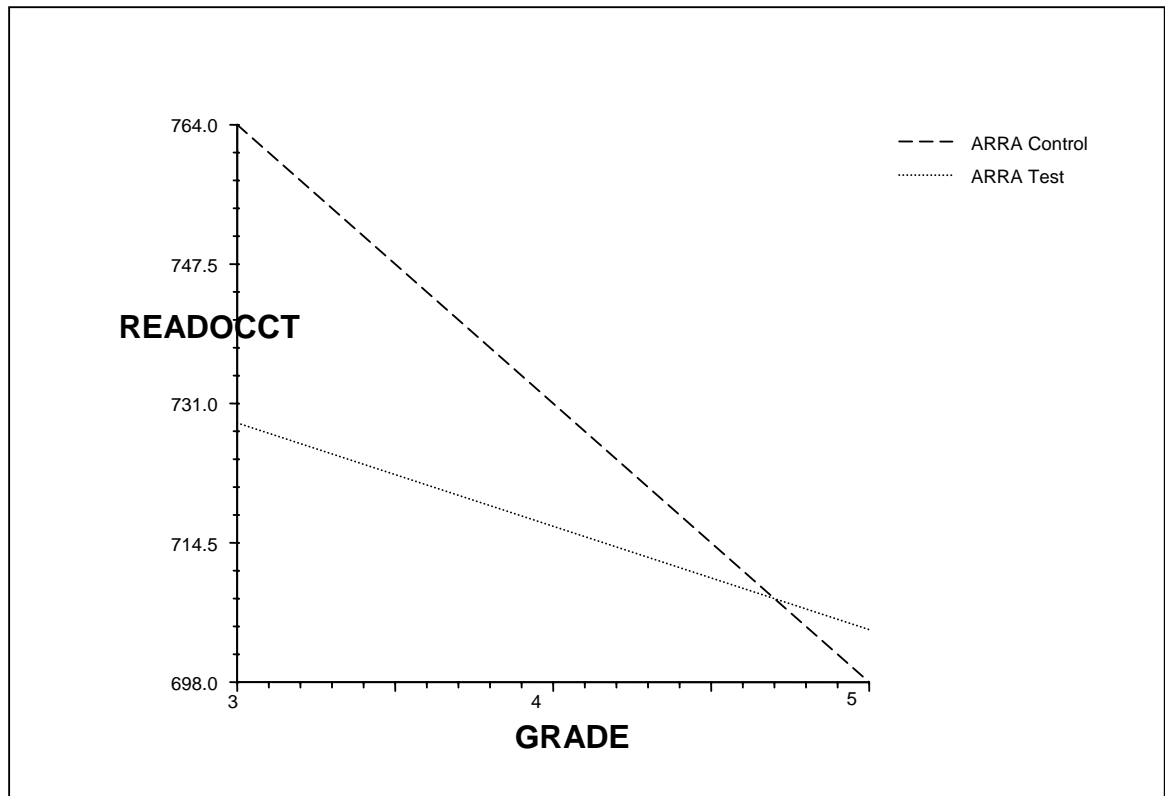
Fixed Effect	Model 1	Model 2
Intercept	748.05 (1.51)**	748.05 (1.38)**
ARRA		-35.31 (2.81)**
FRLUNCH		-42.11 (3.67)**
ELL		-38.73 (3.23)**
TEST Slope	-23.61 (0.67)**	-23.61 (.63)**
ARRA		20.77 (1.29)**
FRLUNCH		-3.84 (1.62)
ELL		4.46 (1.43)
Student level variance in change in reading achievement.	199.51	83.60
Explained student level variance in reading achievement.		53%

** p<.001

The difference in reading scores between the two cohorts is illustrated in the following chart.

Figure 3

Reading Achievement – Control and Test Cohorts in Grades 3, 4, and 5



Question 2 – Descriptive Statistics

The analysis for Question 1 indicated a statistically significant difference in change in average reading scores between the control and test cohorts was found. Although average achievement declined for ARRA students, the drop in the average score was not as large as the average decline of students in the control group. The second research question focuses entirely on the test cohort. These students experienced the resources that resulted from the spending of Title I ARRA funds. This question involves three levels of variables including the dependent variable (READOCCT) measured in the first and third year, student level variables (MALE,

FRLUNCH, and ELL) and school level spending variables (TUTORS, MATERIAL, PARENTIN, and PD). The school level variables reflect the four categories of expenditure at the school level. Schools received a budget allocation based on the number of students eligible for free and reduced lunches, and the site budgets were spent on student tutoring, classroom materials (including computers), parent involvement, or teacher professional development. The remaining student level variables were gender, free and reduced lunch eligibility, and ELL status. The final group of school level variables (N=41) reflect the first year of the District's restructuring program, Project Schoolhouse.¹ Since mobility was controlled through the sample selection process, students affected by the school closures were excluded from the sample. On average, the test schools spent an average of 50.97% of ARRA funds on materials, 28.97% on student tutoring, 13.22% on teacher professional development, and 6.84% on parent involvement.

¹ In May of 2011, the Tulsa Public Schools Board of Education approved Project Schoolhouse, the district's school consolidation plan. Under the plan, the district

shuttered 14 school buildings and reassigned approximately 3,000 students to the remaining schools.

Table 6

Descriptive Statistics – Question #2

Variable Name	N	Mean	SD	Minimum	Maximum
TEST	3,378	1.00	0.82	0.00	2.00
READOCCT	3,378	715.75	81.00	400.00	990.00
TESTREVE	3,378	-1.00	0.82	-2.00	0.00
MALE	1,125	0.50	0.50	0.00	1.00
FRLUNCH	1,125	0.80	0.40	0.00	1.00
ELL	1,125	0.29	0.46	0.00	1.00
TUTORS	41	28.97	25.96	0.00	98.85
MATERIAL	41	50.97	32.29	0.00	99.98
PARENTIN	41	6.84	14.74	0.00	59.21
PD	41	13.22	17.32	0.02	63.02
SIZE	41	444.29	182.95	138.00	1,147.00
FRL	41	94.56	14.03	50.00	113.00

Note. TEST = Student grade level, READOCCT = Reading test score on Oklahoma Core

Curriculum Test (OCCT), TESTREVE = Student test period, ARRA = Availability of ARRA Title I funds, MALE = Gender, FRLUNCH = Eligibility for federal free and reduced lunch program, ELL = Students classified as English Language Learners, TUTORS = expenditures for student tutoring, MATERIAL = expenditures for classroom materials, including books and computers, PARENTIN = expenditures for parent involvement, usually a parent involvement coordinator, PD = expenditures

for teacher professional development. Four records were inadvertently eliminated from the analysis, however this exclusion was deemed immaterial.

Question 2 – Findings

The previous analysis indicated a significant change in average reading scores between the control and test groups, this section includes analysis on how much of the variance in reading achievement of ARRA students exists across time, students, and schools. In the models below, each of the four spending variables is examined to determine their unique effect on reading scores over the three year period in the test schools. In each case the variable had a slight effect that did not rise to the level of statistical significance. The four categories of expenditure did not account for changes in average reading scores during this time. In other words, there is no evidence that spending alone has a unique effect on student performance as measured by reading scores.

Table 7

Reading Achievement – Question #2

Fixed Effect	Model 1	Model 2	Model 3	Model 4
Test Slope	-13.66 (2.49)**	-13.63 (2.47)**	-13.64 (2.50)**	-13.64 (2.48)**
TUTORS	.08 (.10)			
MATERIALS		-.05 (.07)		
PARENTIN			.04 (.11)	
PD				-.004 (.15)
SIZE	.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)
FRL	-.31 (.21)	-0.29 (.19)	-.22 (.16)	-.23 (.17)
Explained	7.25%	7.33%	6.49%	6.40%
School Level				
Variance in				
Change in				
Reading Scores				

Note. **p<.001

Knowing there might be a time lag for the achievement effects of resources, the analysis was performed by setting 5th grade scores as the intercept. This adjustment allowed for an examination of differences in reading achievement at 5th grade attributed to ARRA allocation. Each of the spending categories is considered as a separate independent variable. Only tutoring (TUTORS) had a statistically significant effect on school reading performance ($\gamma = -.37, p < .05$). As shown in Model 1, the tutoring variable (TUTORS) also had the highest explanatory value in

school level reading scores. Schools that spent a greater share of funds on tutoring or professional development, on average, produced slightly lower reading test scores. This negative effect could be attributed to weak implementation, or other factors. None of the remaining ARRA intervention variables tested (MATERIALS, PARENTIN, and PD) had a statistically significant effect on reading test scores by the end of the fifth grade.

Table 8

Reading Achievement – Year 3

Fixed Effect	Model 1	Model 2	Model 3	Model 4
Intercept	701.59 (3.82)**	701.33 (3.91)**	701.48 (4.06)**	701.34 (4.05)**
TUTORS	-.37 (.15)*			
MATERIALS		.26 (.19)		
PARENTIN			.06 (.21)	
PD				-.19 (.18)
SIZE	.003 (.02)	-.004 (.01)	-.002 (.01)	-.004 (.01)
FRL	-1.25 (.20)**	-1.35 (.25)**	-1.59 (.21)**	-1.56 (.21)**
Explained	78.32%	76.78%	72.17%	72.61%
School Level				
Variance in				
Change in				
Reading Scores				

Note. * $p < .05$, ** $p < .001$. The intercept represents average 5th grade reading scores when school and student variables are 0.

In conclusion, although there is a significant difference in school level reading scores before and after the Title I ARRA program, this difference could not be attributed to spending patterns among individual school sites. There is no evidence to suggest that spending, particularly in the form of a short-term influx of funds, drives student achievement. Grubb (2009, p. 210) describes these “natural

experiments” that occur when additional short-term funds are provided to schools as well-intentioned, but ineffective for sustaining improved student performance in high poverty schools.

However, it is important to note that on average reading scores declined at a slower pace for the test cohort than the control cohort. By the time students reached the 5th grade, average reading scores in the test group exceeded those of the control group. This is illustrated in the slope for the control group (-23.61) compared to the slope of the test group (-13.64).

Interviews of building administrators revealed the sensitivity to short-term funding, and the need to invest funds in a manner to support student achievement while avoiding ongoing financial obligations. For this reason, many principals used the Title I ARRA funds to purchase classroom materials, technology, and professional development (K. Ackley, personal interview, September 20, 2013).

Another theme that emerged from administrators was the importance of focus in the planning and budgeting for the funds. One principal of a year-round school remarked, “We became more focused and more discreet, in how we handled funding and our teaching and learning through Title I” (D. Hensley, personal interview, September 24, 2013).

Although the analysis indicates no statistically significant relationship between the intervention variables and reading test scores, in verbal interviews TPS building administrators were quick to note specific anecdotal instances of improvement. For example, one struggling site made AYP (Adequate Yearly Progress) after the Title I ARRA funds were spent. This site invested heavily in

computers and smart boards, along with professional development, that served as a technological “booster shot” that energized both teachers and students (J. Tell, personal interview, September 19, 2013).

At another school site, the principal described the new funding as an opportunity to invest in a proven reading intervention and to “. . . go bigger and deeper with a very specific strategy related to one of our goals” (K. Robinson, personal interview, September 20, 2013). Rather than attempt to use the funds to the benefit of all students in the school, this principal and her leadership team chose a highly focused approach. This intervention was credited with site gains in OCCT reading scores.

Future studies in this area may benefit from improvements to the research design. A larger student population over an extended period of time may provide a richer understanding of the relationship between school spending and student performance. The district’s restructuring of school buildings and reassignment of students and staff may have resulted in an unintended bias, despite the fact that the sample selection controlled for mobility. As part of the Project Schoolhouse implementation in the summer of 2011, approximately 3,000 students and 300 teachers were reassigned to different buildings. Since this research was not conducted in a true experimental environment, it is possible that other factors such as those related to school leadership, environment, or other factors may explain differences in student performance. Further study would be required to identify additional variables that explain the difference in performance.

Discussion

The relationship between school spending and student achievement has been the subject of debate since the Coleman Report (Coleman et al., 1966) was first published. The report is often characterized as discounting the effect of school spending on student achievement, but in fact the authors concluded that increased spending alone is not sufficient to overcome the academic disadvantages associated with poverty. Rothstein (2004) revisits Coleman's thesis and argues that socioeconomic differences generate the racial achievement gap, and these social class differences will not be mediated by education reforms.

As the nation recognizes the 50th anniversary of Title I under ESEA, one could argue that the program has fallen short of its original goals. Reflecting on the anniversary, Eric Hanushek of Stanford University commented “. . . the bad side of this legacy of the War on Poverty is we just re-legislate something similar to what we had before, and ignore the fact that what we've been doing has not been very helpful” (Sparks, 2014, p. 15). Over the years, major evaluations of Title I have indicated lackluster results (Borman, 2000, Jennings, 2000, McDonnell, 2005, Vinovskis, 1999, Borman & D'Agostino, 1996).

During this same timeframe, school finance researchers grappled with the relationship between school spending and student achievement. Production function research provides an analytical framework for exploring this relationship. Levin's (1983, 1997) pioneering work, drawn from the field of economics, explored the relationship between inputs (funding) and outcomes (student achievement).

However, this form of analysis is most appropriate for comparing the costs of various programs or activities to their expected outcomes.

In the years that followed researchers sought to build on this framework by emphasizing the role of effectiveness and productivity within the school finance arena (Odden, 2000). Scholars have focused on types of spending and the relationship to student achievement (Yeh, 2011, Greenwald et al., 1996).

Grubb (2009) conceptualizes this dynamic by categorizing resources as simple, compound, complex, or abstract. He argues that too often policymakers add a simple resource (often in the form of categorical grants) to lower class size, or to increase teacher salaries, with the expectation that such a resource will instantly result in improved student performance. He argues that “The conclusion that money doesn’t matter is not correct . . . But money by itself is not enough to ensure greater effectiveness” (p. 88). By understanding the importance of complex and abstract resources, we can better inform public policies and educational practices.

Against this backdrop it comes as no surprise that the 2009 ARRA Title I legislation falls short of its promise to eliminate the achievement gap among underserved students. As early as 2010, a number of key themes emerged:

- Federal policymakers should not expect federal funds that are not attached to clear reform requirements to generate reform. Policymakers can combine stimulus and reform but must acknowledge the trade-offs, structure the funding accordingly, and communicate their priorities and goals clearly to recipients of funds.

- Federal policies that prevent districts from using stimulus funds for practices known to be ineffective may be more effective than policies that encourage spending those funds on new reform activities.
- Federal policies and spending should be crafted with the goal of helping districts make hard choices to address unsustainable cost structures rather than simply postpone the tough decisions.
- When possible, federal education policies should help districts become more strategic and effective and should not focus narrowly on specific reforms.
- Policymakers at all levels – federal, state, and local – must support strategies that build data, analytic, and research capacity to help districts use resources more strategically, especially in the current fiscal climate. Lack of district capacity is an enormous obstacle to implementing change.
- Advocacy organizations can play a valuable role in providing political cover for districts and states that make tough choices. (Mead, et al., 2010)

An opportunity to study the relationship between Title I funding authorized under the American Recovery and Reinvestment Act and the performance of elementary students in an urban school district contributes to the existing literature. The results of this study revealed a difference in elementary reading scores after the funds were spent, but there was no indication that the spending of Title I ARRA funds had a direct effect on student achievement.

Although the data in this study did not indicate that this particular form of spending had an effect on student achievement, the result does not suggest that spending decisions made in schools and districts are of no consequence to student performance. Rather, it suggests that the conceptual model is more complicated than originally assumed. Grubb (2009) maintains that school spending decisions exist and relate to each other in a more complex manner than originally thought. Further research in this area may incorporate the more complex relationship between resources and outcomes found in Grubb's work.

The scope of this project was limited to elementary reading scores in Title I schools in the Tulsa Public Schools district. The two cohorts were tracked for a three year period. A larger group of students studied for a longer period of time might yield more significant results. Likewise, future studies that incorporate student test results from urban, suburban, and rural school districts as related to how districts spend funds may provide a broader perspective of the relationship between district spending and student performance.

As schools experience continuing pressure to demonstrate a relationship between increased spending and improved student performance, it is essential that school officials and policymakers understand the complex nature of this relationship. With improved data systems and analytical tools, researchers are provided ample opportunities to inform theory in this field. By building on existing theory, researchers can use these sophisticated tools to further our understanding regarding the role of financial resources in student learning.

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Appendix A: IRB Approval



Institutional Review Board for the Protection of Human Subjects Approval of Initial Submission – Expedited Review – AP01

Date: August 28, 2013

IRB#: 2576

Principal

Approval Date: 08/27/2013

Investigator: Patricia Kay Williams

Expiration Date: 07/31/2014

Study Title: Title I of the American Recovery and Reinvestment Act of 2009: A Framework for Program Evaluation Through a Cost-Effectiveness Lens

Expedited Category: 6 & 7

Collection/Use of PHI: No

On behalf of the Institutional Review Board (IRB), I have reviewed and granted expedited approval of the above-referenced research study. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Obtain informed consent and research privacy authorization using the currently approved, stamped forms and retain all original, signed forms, if applicable.
- Request approval from the IRB prior to implementing any/all modifications.
- Promptly report to the IRB any harm experienced by a participant that is both unanticipated and related per IRB policy.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Promptly submit continuing review documents to the IRB upon notification approximately 60 days prior to the expiration date indicated above.
- Submit a final closure report at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

A handwritten signature in black ink, appearing to read 'E. Laurette Taylor'.

E. Laurette Taylor, Ph.D.
Chair, Institutional Review Board

Appendix B: Tulsa Public Schools – Approval to Conduct Research



January 11, 2013

Ms. Trish Williams, Chief Financial Officer
Tulsa Public Schools
3027 S. New Haven
Tulsa, Oklahoma 74114

Dear Ms. Williams,

The Program Management Office (PMO) has received and reviewed your application to conduct research in Tulsa Public Schools. The topic of your research is stated as the following, "This study will explore the relationship between specific expenditures of Title I ARRA funds and the associated student outcomes. The unit of analysis will be individual students in Title I elementary schools within the Tulsa Public School System in order to provide a more robust and thorough examination of specific patterns of growth in student achievement."

You have proposed conducting this research within 51 selected Title I elementary schools within the district. Please be advised that approval from the PMO does not mandated individual school participation as this is at the discretion of each principal being requested to participate.

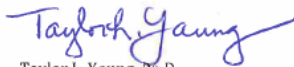
This study will demonstrate a tangible benefit to the District and we would welcome the opportunity to receive a copy of your complete study in a PDF electronic format and a briefing at its conclusion. Your proposal and application does meet the requirements of TPS Board Policy 9102.

Your project is approved as of January 10, 2013 subject to the following conditions.

1. It is the discretion of the principal of each school to participate in this project.
2. This study does not require active or passive participation of students of the school selected to participate.
3. Written individual staff consent must be obtained prior to conducting your structured interviews in which you will be collecting qualitative data.
4. Participation in this study by district staff is purely voluntary.
5. The PMO will provide student achievement data from the existing data base for the 51 selected schools.
6. There are no requirements to access student records or files as a part of this study.
7. The project is approved for on calendar year from today's date.
8. The RRB reserves the right to suspend approval of the project in accordance with the conditions of the established rules.

Please do not hesitate to contact me should you have questions about our approval and support of this valuable project.

Sincerely,



Taylor L. Young, Ph.D.
Director of Portfolio Management
Program Management Office (PMO)
Office of Teaching and Learning
Room 602 Educational Service Center
918-746-6309

Appendix C:
Administrator Interview Protocol

1. General – Volunteers will be selected from TPS administrators who have had substantial involvement in Title I programs at the elementary level. Interviewees will be selected based on recommendations from the District’s Title I Director. All interviews will be recorded and transcribed, and interviews will be de-identified. Subjects will be provided with the interview questions in advance.

2. The interviews will be conducted in a standardized, open ended format. This form of interviewing offers several advantages:
 - a. The instrument is available for inspection as part of the study.
 - b. A single interviewer reduces the variability that is possible when multiple interviewers are utilized.
 - c. Interviews are focused, insuring an efficient use of the subject’s time.
 - d. Analysis is facilitated since responses are easily compared.

3. Oral interview questions for administrators regarding Title I ARRA funds:
 1. How did the staff in your building make decisions for spending Title I ARRA funds? What information, expertise, or data informed these decisions?

 2. In their 2009 ARRA announcement, the federal government identified four guiding principles for determining how stimulus funds should be spent: saving and creating jobs, improving student achievement, providing accountability and transparency, and investing funds in such a manner to avoid a funding cliff. Were these principles incorporated into spending decisions in your school? If so, which ones?

 3. How were your school site goals and priorities reflected in Title I ARRA budget decisions?

4. TPS schools typically used their Title I ARRA funds in four areas: student tutoring, supplies/materials, parental involvement, and professional development. What did you determine would be the best use of the funds for your school site and why?
5. How did your site address sustainability, and have you avoided the “funding cliff”?
6. How would you evaluate the effectiveness of the Title I ARRA program? In your opinion, were there any positive or negative outcomes experienced at your site attributable to these funds?
7. Do you think having these resources in your building influenced student achievement? If so, what evidence can you cite to support your view?
8. The purpose of this study is to determine if Title I ARRA funds had an influence on elementary student reading performance in TPS. Given that, is there anything you would like to add based on your experience with the program?