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Tennessee Per-pupil Expenditures in Special Education and Academic Achievement

A dissertation
presented to
the faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor of Education in School Leadership

by
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August 2015

Dr. Eric Glover, Committee Chair

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Keywords: Special Education; TCAP; Per-pupil; Expenditures; Achievement; Tennessee; Gap Width; Gap Size; Economically Disadvantaged

ABSTRACT

Tennessee Per-pupil Expenditures in Special Education and Academic Achievement

by

Melanie Combs Davidson

Federal legislation known as the No Child Left Behind act has required states to close achievement gaps. The purpose of this study was to investigate the relationships between special education spending by districts in the state of Tennessee and standardized achievement for students with disabilities.

Secondary data were obtained from the Tennessee Department of Education's website (www.tn.gov/education). Data from each local education association were collected for the years of 2010-2014 in the areas of special education spending, special education population, and TCAP proficiency percentages in reading and math grades 3-8. Data from each local education association were collected for the years of 2011-2014 for gap size percentages between students with and without disabilities for reading and math grades 3-8 and the percentage of economically disadvantaged students.

The researcher performed 6 Pearson correlation coefficient tests for this analysis. The findings showed a positive correlation between spending and performance on standardized assessments in the areas of reading and mathematics for students with disabilities. The analysis indicated that per pupil expenditures in special education has not had a statistically significant impact on reducing the gap size between students with and without disabilities. However, the percentage of economically disadvantaged students in a local education association inversely impacted the gap size. Those local education agencies with a higher population of economically

disadvantaged students were more likely to have smaller gap sizes between students with and without disabilities in reading and mathematics on standardized testing.

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DEDICATION

This study is dedicated to my husband Benjamin Davidson for his patience, love, and support during the last 4 years. Even though you did not always understand my need to accomplish this stage in my life, you accepted the need nonetheless. I love you very much.

This study is also dedicated to my parents who from childhood introduced the idea of higher education as part of my life plan. When the world seemed to press down a little too hard on my shoulders, you were always there to provide support and love me unconditionally. No amount of words can tell you how blessed I am to have you as my parents. I could not have asked the Lord for a better father and mother.

Finally, this study is dedicated to all my colleagues who were so encouraging and patient during this journey including, Dr. Kimberly Prater, Dr. Sandra Earnest, and Dr. Ramona Best. It is a pleasure working with all of you.

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CHAPTER 1

INTRODUCTION

Large-scale student testing has become widespread in the K-12 United States educational system. By 2001 all 50 states had such testing programs in place (Hamilton, Stecher, & Klein, 2002). Measuring student achievement has assisted in determining what is working in schools, how well students are or are not achieving, and potential for additional assistance to those who need help (USDOE, 2004). The basis for test based accountability systems has been that public education can be improved with the strategy of requiring all students to take standardized assessments and attaching a form of rewards and sanctions based on test scores (Hamilton et al., 2002). The No Child Left Behind Act of 2001 embodied this educational reform plan and was aimed at providing parents, educators, administrators, and policy makers with critical information about which schools were succeeding and why as well as what was failing and may need to be addressed (USDOE, 2004).

Standardized student test scores have been viewed as useful for many different purposes. Achievement test scores have been used to improve instructional practices by providing information to teachers. Test scores have assisted states with determining which schools should enter and exit mandatory school improvement programs. Parents have used test scores to justify transferring students from home schools to receive vouchers for the payment of private schools. School districts and states have used test scores to evaluate the effectiveness of reform efforts and provide public evidence of educational quality (Hamilton et al., 2002). Historically performance tests have also been used in an attempt to measure teacher effectiveness (Popham, 1971).

The Commission for No Child Left Behind published a report that claimed the nation's educational system was failing its children due to low reading scores, high numbers of students dropping out, and employer frustrations with workers' lack of skills (Thompson & Barnes, 2007). They concluded that the nation is responsible for closing achievement gaps and ensuring that all students are properly prepared for post high school success. Failure to do so, they said, would threaten the nation's economy and future competitiveness in the world.

Average national per-pupil expenditures have risen significantly since the 1980s. In 2006 dollars, American school systems spent \$6,462 per student in 1980 and \$11,470 in 2004 (Hill, Roza, & Harvey, 2008). Expenditures in education have surpassed economic inflation rates. As an effect of increased spending, the public and policy makers have expected continuously growing achievement rates (Chambers, Parrish, & Harr, 2002). A greater push for accountability has contributed to an increase in national standardized achievement testing.

Policy makers have not appeared satisfied with national academic achievement especially in those areas identified as "special sub-groups" under NCLB. The 2014 Federal Budget Summary noted that some progress has been made in closing achievement gaps but that much more progress is necessary (US Department of Education, 2014). Despite concerns with achievement gaps for students with disabilities, spending in this subgroup has steadily increased. In 2000 national per pupil special education spending averaged \$12,474 as compared to \$6,556 for all other students (Chambers et al., 2002). From 1996 to 2005 an estimated 40% of all new educational spending nationally was allocated to special education (Scull & Winkler, 2011).

America's population of students with disabilities totaled approximately 6.5 million for ages 3 through 21 in 2014 (US DOE, 2014). However, the fiscal climate for education has been changing. The 20th-century pattern of continued rises in educational revenues and spending has

ended. Federal stimulus funds that had blunted the effect of state and district deficiencies have been coming to an end forcing new funding cuts (Odden, 2012).

Research on the impact of educational resources or spending and academic achievement has historically been inconclusive. Little research has existed on the relationship between spending in special education and academic achievement. Continuing to allocate finances to educational subgroups such as students with disabilities without understanding the correlation to academic performance has not allowed policy makers to make educated financial decisions.

Statement of the Problem

This study was an investigation of the relationship between special education spending and academic achievement in the state of Tennessee. Relatively little research has existed related to this relationship nationally or in individual states. Available research relating to general education academic performance and educational spending or resources has largely been contradictory (i.e. Greenwald, Hedges, & Laine, 1996a, 1996b; Hanushek, 1989, 1997). Post NCLB research has suggested limited academic achievement is correlative in nature to increased spending (Dee, Jacob, & Schwartz, 2013).

The variables in this study included yearly district per pupil special education expenditures in Tennessee, the percentage of students with disabilities (SWD) meeting proficiency standards in reading and math grades 3 through 8 on TCAP testing, district gap size percentages for reading and math grades 3 through 8, and the yearly percentage of economically disadvantaged students in each district. The selected variables focused the study on special education spending and academic achievement for SWD.

The purpose of the study was to determine if there was a significant relationship between special education expenditures and achievement on TCAP scores for SWD in grades 3 through 8. The study of the possible relationship between special education expenditures and achievement may be valuable to the discussion of resource allocation for the subgroup of special education.

Research Questions

This was a quantitative study of the relationship between special education per pupil expenditures and achievement in Tennessee public school districts. The measure of academic achievement was the standardized Tennessee Comprehensive Assessment Program (TCAP). Research questions 1 and 2 examined data for the years of 2010 through 2013 and grades 3 through 8. Research questions 3-6 examined the academic years of 2011 through 2013. The following research questions were investigated:

1. Is there a significant relationship between the calculated Per Pupil Expenditure (PPE) for students with disabilities (SWD) and the percentage of SWD meeting proficiency standards in reading?
2. Is there a significant relationship between the calculated PPE for SWD and the percentage of SWD meeting proficiency standards in mathematics?
3. Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in reading?
4. Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in mathematics?

5. Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in reading?
6. Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in mathematics?

Limitations and Delimitations

All data for this research study were collected from the Tennessee Department of Education's (TDOE, 2014) website. Each school district submitted yearly financial, achievement, and demographic data that were compiled into statewide documents titled Annual Statistical Reports and accountability files. This study was limited to data obtained directly from the TDOE website that were *ex post facto* in nature and included only non confidential information. The number of local education agencies (LEA) who reported data during the years of 2010 to 2014 was 137. Of the potentially 822 district reports available for the 5 years, 28 pieces of data were not included in the study (3.4%). For each research question, only LEAs with reported data for all years and all variables were included for analysis. This study analyzed 794 district reports. As the achievement data were associated with the Tennessee Comprehensive Assessment Program (TCAP), the results of this study may not be generalized to other states.

This study was delimited to the state of Tennessee. Therefore, the findings may not applicable to other states with similar components.

Definitions of Terms

The following educational terms were used in this study and are defined as follows:

1. *Accountability*: This is the actual use of holding states, districts, and schools accountable for making adequate yearly progress for all students on standardized assessments. Accountability is based on academic achievement scores and includes the use of sanctions and rewards for making progress (US DOE, 2002). Progress is measured by the amount of improvements states and districts make toward meeting state and district annual goals. (US DOE, 2003).
2. *Achievement gap width*: Gap widths are numerical values indicating the difference in achievement performance on standardized testing between two NCLB identified subgroups (SWD, economically disadvantaged, Black/Hispanic/Native American) existing within a school or district (US DOE, 2014b).
3. *Adequate yearly progress (AYP)*: This is a calculated measure of academic achievement at the district or individual school level based on standardized yearly academic assessment. AYP includes an emphasis on accountability for schools receiving Title 1 funds and a measurement of the amount of improvement students make each year (US DOE, 2009). Two main factors are included: a minimum of 95% of all students are assessed and demonstration of progress over time (US DOE, 2002).
4. *High Quality Instruction*: The characteristics of high quality instruction include student engagement with the content, a classroom culture conducive to learning, equal access to the content for all students, use of effective questioning to help students make connections between content and real world applications, and teacher assistance in making sense of the content (Weiss & Pasley, 2004).

5. *Individuals with Disabilities Act (IDEA)*: This is a federal law ensuring services to children with disabilities across the nation ages 3 through 21 (IDEA, 2004).
6. *Local Education Agency (LEA)*: An LEA is any public board of education or other legal public authority who maintains administrative control or direction of public elementary and/or secondary schools residing in the United States (US DOE, 2014b).
7. *No Child Left Behind (NCLB)*: This act reauthorized and amended the Elementary and Secondary Education Act (ESEA) and includes increased emphasis on accountability, achievement, and assessment (NCLB, 2001).
8. *Per-pupil Expenditure (PPE)*: This is the aggregate amount of expenditures for a fiscal year divided by the aggregate number of children to whom received a portion of the expenditures (NCLB, 2001).
9. *Students with Disabilities (SWD)*: Local education agencies are responsible for identifying students who have disabilities that impact their learning. A student becomes a student with a disability following an eligibility determination based on a variety of assessment and/or medical information. SWD receive support services according to their Individualized Education Programs (IEP) (TDOE, 2008).
10. *Tennessee Comprehensive Assessment Program (TCAP)*: This is a state-wide assessment program given to students in grades 3 through 8 to measure progress in the academic areas of math, reading, science, and social studies. The assessments are delivered yearly in a multiple choice format. Student scores are reported numerically as well as categorized as Below Basic, Basic, Proficient, and Advanced based on state determined cut-off scores. Scores from the TCAP assessment are used to determine AYP for schools and districts (TDOE, 2014).

Overview of the Study

Chapter 1 includes an introduction to the study as well as a statement of the problem, significance of the study, research questions, limitations, and definitions. Chapter 2 is a review of the literature related to the study. This includes historical legal and educational finance backgrounds as well as research findings related to the relationship between expenditures and resources and achievement in both regular and special education. Chapter 3 contains the research methodology including data collection, analysis, research questions and null hypotheses, and a summary of the methodology. Chapter 4 presents an analysis and summary of the data. Chapter 5 consists of a summary of the research findings, implications, and recommendations for future research.

CHAPTER 2

REVIEW OF LITERATURE

Complicated funding formulas in education accompanied by the difficulties inherent in evaluating student learning create complex problems for policy makers and educators (Parrish, 2010). The complicated funding formulas have been constructed according to complicated educational policies. The policies have been based on numerous factors such as increasing standards, testing, and procedures. In response to failing test scores, states have designed policies to increase the amount of testing conducted. A cycle has developed of increased accountability, testing, and regulations based on perceived failing test scores. The complexity of problems surrounding accountability, testing, and ultimately funding have existed as the technological and social structures of American society have outpaced changes made by the educational system (Glover, 2013).

States have reported concerns with inadequate funding in special education especially as the federal government's financial support has fallen short of target (Parrish, 2010). A better understanding between school outcomes and spending could allow educational decision makers to predict outcomes related to resource allocation (Hanushek, 1989). However, research related to regular education expenditures and achievement post No Child Left Behind has been controversial. Research related to special education spending and achievement has been limited in breadth and convoluted by testing accommodations and alternate assessments (Vang & Thurlow, 2013).

Pressure from the business community to raise student achievement has impacted educational reform laws (Toch, 2000). Business leaders have often supported the management of

educational systems similar to private sector business: high standards and hard work encouraged through the risks and rewards of competition. Competition thus rewards performance and encourages educators to work collaboratively. The use of tests has been to measure and promote student capacity to interpret and apply information clearly and persuasively (Toch, 2000). The No Child Left Behind Act of 2001 was based on four basic principles: stronger accountability for school results, emphasis on teaching practices that have been proven effective, more options for parents, and increased flexibility and local control (Hamilton et al., 2002). These four basic principles were similar to the completion-based incentives supported by the business community: high and publically supported academic standards, widespread disclosure of performance, and significant consequences for successes and failures (Toch, 2000). Public education reformers have been applying business, finance, and managerial principles to educational policies in an effort to improve schools (Ravitch, 2010).

Policy makers and society have developed a perception that America's schools are failing based on global test scores and fear that America will lose its position as the most prosperous and advanced nation in the world. Following the release of *A Nation at Risk*, American policy makers pushed for common standards and curriculums as well as high-stakes standardized testing (Ravitch, 2010). Glover (2013) and Zhao (2014) have argued that these policies are sacrificing the creativity and innovation children need for success. Zhao (2014) stated that the American education system has attempted to instill the same knowledge and skills into every child that is deemed valuable by the government. Accountability through the form of high-stakes testing potentially undermines education (Ravitch, 2010). Not only have standardized tests been fallible, but the information has been misused. Historically data from test scores have been

used to determine the futures of teachers, schools, and principles. Testing has become not just a measure of knowledge but an end in itself.

History and Legislation

The development and education of children with special needs has traversed from isolation to integration. Social attitudes concerning the care of exceptional people have been indicators of social progress throughout history (Winzer, 1993). Prior to the 18th century, “abnormal persons” were severely limited by social beliefs and superstitions. Prejudice and callous treatment often led to people with disabilities being ignored, exorcised, exiled, and exploited. Beginning in the mid-18th century, Britain and Europe began educating people with disabilities. Crucial to their acceptance was France’s prevalent philosophy of Enlightenment in the 1740s. Humans were considered to have natural goodness and society sought to protect everyone’s rights. By the close of the 18th century special education was an accepted branch of education.

Historically the purpose of special education has changed as it transitioned from a private to public venture. In the era of isolation and institutionalism, special education was often a charitable system where exceptional learners were expected to learn self-care in an effort to provide assistance to the facilities in which they lived (Winzer, 1993). In the current era of special education, cultural attitudes have changed and society has come to feel obligated to provide equal educational opportunities to all children, including those with disabilities. For more severely impaired children the goal of special education has been to make each child’s world more worthwhile. For more mildly impaired children the goal of special education has been to provide the supports and services necessary for students to benefit from being educated

in the least restrictive environment, which has often been the general education setting (Osgood, 2008; Winzer, 1993). According to the Individuals with Disabilities Act (2004) the purpose for special education has been “to ensure that all children with disabilities have available to them a free appropriate public education that emphasizes special education and related services designed to meet their unique needs and prepare them for further education, employment and independent living” (sec. 601, Findings, d Purposes 1-A).

The first half of the 19th century in North America was a time of social reforms and rapidly expanding educational programs. Special schooling for individuals who were deaf, blind, or mentally impaired began to emerge in the form of separate institutions (Winzer, 1993). By the second half of the 19th century urbanization rural migration, and immigration brought an influx of people from outside the United States into larger cities (Osgood, 2008; Webb, 2006). Farming, apprenticeships, and working in the home were replaced with industrial work. The Progressive Era (1880-1920) included a push for efficiency in government, attention to public welfare, and government intervention into private lives in an effort to benefit the public. With time, governments had significantly expanded their roles by enacting policies to ensure social progress (Osgood, 2008).

By 1909 the first state compulsory school laws for exceptional children were enacted in the United States. Institutions for exceptional children were often not affordable as many potential students were from low to middle income families (Winzer, 1993). Due to the limited availability of schools for exceptional children many were overcrowded (Osgood, 2008; Winzer, 1993). As free schooling became the norm for typically developing students, policy makers began to question the need to duplicate educational privileges for students with special needs (Winzer, 1993). By 1920 most large cities had public school systems with dedicated

programming and classes for children with a variety of special disabilities (Osgood, 2008). In addition, the 1920s saw an added major theme developing in education, the scientific movement (Winzer, 1993). This movement included increased emphasis on reading, writing, and arithmetic as well as the use of intelligence measures in education. By the 1930s many students in special education programs were receiving weakened versions of regular education curricula with an emphasis on drill and increased expectations (Wizner, 1993).

The Progressivism Era continued until the 1930s when the Great Depression impacted the available resources for school districts (Osgood, 2008). The impact of overall limited resources was a widening gap between regular education and special education programming (Osgood, 2008). Equality for students with disabilities in public schools was given support following the school desegregation decision in *Brown v. Board of Education of Topeka* (1954). The court decision rejected a previous court case supporting the constitutionality of separate facilities for black and white students. The Civil Rights Act of 1964 and the Elementary and Secondary Education Act of 1965 were federal efforts to ensure equality in the schooling of young people (Webb, 2006). With the support of President John F. Kennedy, the 1960s was a period of increased federal and state assistance in the expansion of special education programs in America. Public Law 88-164 was passed in 1963 and expanded the target population for special education programs (Wizner, 1993).

Prior to the 1970s special education programs were primarily segregated from regular education programs (Winzer, 1993). After years of lobbying for equality in special education Congress passed the Rehabilitation Act of 1973. Section 504 of this act mirrored the Civil Rights Act of 1964 by ensuring that handicapped individuals were not excluded from participation in or denied equal benefits based on disability. In 1975 Public Law 94-142, the

Education for All Handicapped Children Act, was signed into law by President Gerald R. Ford. This law supported desegregation of children with disabilities by legislating free and public educations in the least restrictive environments. Following the passage of P.L. 94-142 school districts saw significant increases in students receiving special education and related services (Winzer, 1993).

Modern education reforms have been tied to a pivotal report released in 1983 titled *A Nation at Risk* (Webb, 2006). A response to radical education reforms of the late 1960s and 1970s, *A Nation at Risk* was an educational report prepared by the National Commission on Excellence in Education (National Commission on Excellence in Education, 1983; Ravitch, 2010). The report stated, "...the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our future as a Nation and a people" (National Commission Excellence in Education, 1983). Accountability and school choice have become the leading reform notions of the twenty-first century. These reforms were at the heart of a major program titled No Child Left Behind (NCLB) that altered public education across the nation by measuring school quality with standardized test scores (Ravitch, 2010).

In 2001 Congress reauthorized the Elementary and Secondary Education Act by passing legislation known as the NCLB (NCLB, 2001; Webb, 2006). Title 1 of its purpose statement proposed that all children should receive fair, equal, and significant access to high-quality education and meet proficiency standards on challenging state academic achievement assessments. Students with disabilities (SWD) have been an identified subgroup within NCLB. Schools and districts have been responsible for submitting accountability results on SWD to state departments of education. A provision of the act indicated that states would not be required to

provide funding for the provisions of this act (NCLB, 2001). However, many states and school districts have challenged NCLB as an unfunded mandate (Dee et al., 2013).

Although state-level accountability systems have been present since the 1990s NCLB brought test-based accountability to a significantly larger scale as it required both annual student testing as well as school-level reporting (Dee et al., 2013). The theory behind measurable student performance standards has been that consequences for schools not meeting standards will motivate improvement in educational outcomes (Lee & Reeves, 2012). School success or failure has been measured by student performance on standardized tests to achieve adequate yearly progress (AYP) goals. The objective of this policy was all students will achieve 100% proficiency in all subjects by 2014 (Dee et al., 2013; Lee & Reeves, 2012).

Globally students have been assessed with standardized testing such as the Program for International Student Assessment (PISA). The PISA has been administered every 3 years to 15-year old students and has measured reading, math, and science literacy. In 2009 the global PISA results were reported indicating Chinese students had outperformed American students. Considered a wake-up call for American politicians, these results lead President Barack Obama to support continued reform efforts including high-stakes standardized assessments (Zhao, 2014). The President's mission became to out-educate China in an effort to out-compete it. Continued support for the application of business, management, and financial principles to the field of education backed the desire for well documented data-collection systems and incentives in the workforce (Ravitch, 2010).

Research since the implementation of NCLB has been conducted to determine school resource changes and practices (Dee et al., 2013; Lee & Reeves, 2012; Sunderman, Tracey, Kim, & Orfield, 2004). Educational spending nationally has increased by \$570 per student (2009

dollar amount) with \$430 being spent for instructional use. Teacher compensation in higher poverty areas has increased by an average of \$5,000 per year with an increased number of teachers obtaining masters' degrees. Although no consistent changes in class size or pupil-teacher ratio have been reported, schools have been devoting increased instructional time to reading and math with corresponding decreases found in science and social studies (Dee et al., 2013).

A primary objective of NCLB was to reduce inequities in student performance for special populations associated with race, socioeconomic status, and disability (NCLB, 2001). However, expenditures and revenues have increased across the board nationally and have not been directly associated with any targeted population. Despite federal reports that state and local governments would not be required to spend additional monies for implementation of NCLB, federal revenues have increased by less than 20%. Thus local and state revenues accounted for \$448 of the per pupil increased expenditures following federal legislation equating to approximately 76% of the average per pupil increase (Dee et al., 2013).

Learning and Assessment

What students should learn, how much students should achieve, and how learning should be measured have been at the apex of public and political controversy (Ravitch, 2010). The nature of learning has been viewed in several ways. Goel (2011) discussed the diversity of views regarding the nature of learning. Neuroscientists have defined learning as the brain's ability to make structural changes. Behaviorists have viewed learning in the context of the external environment and as changes in behavior due to experiences. Cognitive psychologists have described learning as mental associations occurring with experiences to give humans insight and

perception. Social psychologists have viewed learning in terms of social experiences between the learner and his or her environment. Humanists have described learning as the development of the whole person with an emphasis on affective changes. Finally, constructivists have viewed learning as context bound and with reality being constructed internally with experiences.

Educators have had three primary learning targets for students: knowledge, skills, and affect (Popham, 2010). Knowledge and skills have referred to the vast amount of information students are expected to recall such as facts, procedures, and principles. Students have also been expected to be able to use knowledge and skills to solve real-world problems. Popham (2010) described affect as student interests, attitudes, and values about learning. Some theories of learning such as constructivism have emphasized knowledge and skill attainment, while other theories have highlighted life-long learning and the social rewards of knowledge (Ozman & Craver, 2008).

The philosophy of contemporary realism appears to have been a dominant American educational movement of the 20th century. Ozman and Craver (2008) have described the basic thesis of realism as the human mind existing independently of reality, knowledge, and value. Children have been perceived to need the basic factual knowledge of reading, writing, and arithmetic. Realists typically have supported accountability and performance-based teaching as these methods include measurable components. The importance of scientific research and development have been emphasized in realism, which has led to the extensive use of IQ tests, standardized achievement tests, and competency tests. In the classroom realism has been reflected in the use of serialized and standardized text books and homogenous grouping of students based on performance levels.

Another hallmark philosophy of contemporary educational systems has been positivism. This scientifically based philosophy has emphasized objective measures such as logic, science, and math as an authoritative means of truth (Peca, 2000). Some educational theorists have ascribed positivism as the machine-like, technical arrogance that places limitations on human knowledge and how children learn (Glover, 2013). Reform efforts such as curriculum standards have limited learning opportunities by assuming that quality education is provided when all students receive the same education. Uniform standards lead to uniform assessments. Positivism has also supported standardized testing, typically in the core areas of reading and math (Glover, 2013). Zhao (2014) wrote, “Even if cognitive skills in math, science, and reading were the most important skills in the universe, they would not- could not- be the only skills an educational system should cultivate” (p.173). Zhao further wrote that learning has become homogenized that has suppressed creativity and innovation. Learning has been reduced to students’ abilities to perform well on achievement measures and has not taken into account the complexity of human motivation and varying intelligences (Glover, 2013).

In the field of special education neurodiversity has been explored as a theory of learning. Different ways of thinking and learning have occurred because children have different kinds of brains. Researchers supporting the theory of neurodiversity have recognized the complexity of the human brain and thus human nature (Armstrong, 2012). Another theory sharing similarities to neurodiversity has been the theory of multiple intelligences by Howard Gardner. The theory of multiple intelligences has recognized eight distinct intelligences that humans possess in varying degrees to form intellectual capacity (Gardner, 2011). Students with special needs have been considered to possess less traditional forms of intellect. Western education systems have tended to teach to logical-mathematical and linguistic intelligences. Educators of students with

disabilities have been employing creative and innovative teaching strategies to capitalize on other intellects such as bodily and kinesthetic or visual and spatial (Armstrong, 2012). However, homogenized educational curriculums and methods have potentially restricted the use of varying teaching strategies.

Some researchers and educators have posited that the rising tide in American education has been authoritarianism or obedience to authority (Zhao, 2014). Educational critics such as Zhao described authoritarianism as a ghost that sees education as a means of instilling knowledge and skills deemed necessary by authorities. It is from this rule of authoritarianism that increased accountability and high-stakes testing have been founded. Accompanying these standardized tests have been disrespect for teachers as professional colleagues and prevention of professional autonomy in the classroom. Zhao claimed state and local governments in America have willingly surrendered their control to federal authority. The emphasis on standardized tests and test scores has indicated the values of American educational systems at the expense of creativity, innovations, and diversity.

When standardized tests have been valid and reliable, the information obtained has been extremely valuable (Ravitch, 2010). A fundamental assumption of test-based accountability has been that the information and incentives from standardized tests is necessary for school personnel to commit to the goal of improving student achievement. A lack of incentives has the potential to distract school staff from the central goal of student learning and improvement (Hamilton et al., 2002). Test scores have had the potential to indicate what students have learned, what students have not learned, and where students could improve. Testing information has assisted teachers and administrators in determining which students needed additional support or different instructional methods. Educational leaders and policy makers have used testing data to

monitor district, state, and national progress. For researchers testing data has had the potential to indicate which programs or methods were most or least effective (Hamilton et al., 2002; Ravitch, 2010).

Ravitch (2010) argued that points of contention in modern educational reforms have been the use of unreliable and invalid standardized test scores and misuse of testing scores for accountability purposes. Ravitch explained that standardized tests are not infallible and precise instruments. Human mistakes, purposeful tampering, and technical issues have jeopardized testing reliability and validity. Margins of error have existed within tests. Students have scored higher or lower if a test was taken on different days. Tests have been used for purposes for which they were not intended. For instance, classroom performance on a standardized test has been used to measure an educator's skill. School-based scores have been compared despite varying demographics such as English language learners, students with disabilities, or economically disadvantaged. Standardized testing has typically occurred once a year thus increasing the possibility of random variation. To eliminate random variation, students would have needed to be tested at the beginning of a school year and again at the end. Some teachers have devised various ways to improve test scores through means such as cheating, teaching to the test, or directly teaching test taking strategies. Even states have improved test scores by altering the number of low-performing students who take the test or reducing the expectation level for proficiency in a subject. All of these issues related to standardized testing have indicated the potential for significant decision making to be based on a fallible system of assessment.

Data-driven decision making has been a current dominant feature of American education in an era of accountability and data. The purposes of conducting large scale assessments have been three fold: (1) provide information for accountability, evaluation, and comparative

purposes, (2) focus attention to educational concerns, and (3) change educational practices through curriculum and/or instructional changes and educator motivation (Haertel, 2005). For these purposes to have been fulfilled, standardized testing must have accurately assessed student knowledge.

Special Education Funding

Special education has been financed through a multifaceted combination of federal, state, and local monies based on an assortment of formulas (Parrish, 2010). Individual states have used a wide range of procedures to allocate monies in education contributing to inequity in spending for both regular education and special education students. Federal special education funding has been based on a census formula that "...assumes a fixed cost differential for the average special education student and fixed proportions of students with disabilities across all districts" (Parrish, 2010, p. 5). Federal legislation known as the Individuals with Disabilities Act (IDEA) has governed special education services for students with disabilities by public agencies.

Amendments to IDEA in 1997 and 2004 allocated IDEA funds based on the formula of 85% according to total school-aged population and 15% according to states' degrees of poverty (IDEA, 1997; Parrish, 2010). IDEA 2004 has allowed states to use half of their annual increase in federal money in place of state and local funds and up to 15% for early intervening services and response to intervention programs (Parrish, 2010).

Spending for SWD has risen substantially in the last 40 years along with an increase in special education enrollment numbers. The Special Education Expenditures Project found expenditures for special education students have increased at a comparable ratio to total spending for general education students at a rate of two to one (Chambers, Perez, Socias, Shkolnik, &

Esra, 2004). A survey by the American Institutes for Research, Center for Special Education Finance identified four major themes as issues for states: inadequate funding overall, inadequate funding for students with high-cost needs, failure of the federal government to achieve 40% funding, and difficulty providing services to an increasing number of SWD (Parrish et al., 2004).

Special education spending has risen quickly over the last few decades. Between 1996 and 2005 it is estimated that 40% of all new spending in education went to special education services (Scull & Winkler, 2011). Federal appropriations for special education rose from \$252 million in 1977-1978 to \$7.5 billion in 2002-2003. For general education students the federal average per pupil expenditure (PPE) increased from \$1,430 in 1977-1978 to \$7,499 in 2002-2003. For special education students the federal share of allocated monies increased from \$72 per child to \$1,159 for those same years (Chambers et al., 2004; Parrish et al., 2004). By 2005 special education appropriations consumed 21% of all national educational spending as compared to 18% in 1996 (Scull & Winkler, 2011). At the state level all 50 states and the District of Columbia spent approximately \$50 billion on special education services in 1999-2000. The total national cost of regular and special education funding to educate SWD amounted to \$77.3 billion in 1999-2000. The total average expenditure for a regular education student in 1999-2000 was \$6,556, while the total average expenditure for a SWD was \$12,639 or \$6,083 above regular education student spending (Chambers et al., 2004; Parrish et al., 2004). The additional operating expenditure for a student with disabilities was 108% of that for regular education students in 1999-2000 (Chambers et al., 2004).

According to the 2014 Federal Budget Summary President Barack Obama's administration requested \$71.2 billion in discretionary appropriations for the Department of Education, an increase of \$3.1 billion or 4.5% from 2012. The federal contribution to meet the

excess cost of special education was approximately 15% of the national average per pupil expenditure with an average cost of \$1,767 for the approximately 6.5 million children with disabilities ages 3 through 21 (US DOE, 2014a).

Finance in Tennessee

State special education funding formulas have typically operated with one of five formulas:

1. Pupil-weighted: funding allocated based on specified criteria such as category of disability and location and/or location of primary placement
2. Census-based: fixed cost differential and fixed proportions across school districts
3. Resource: funding based on amount of resources in districts such as pupil-to-teacher ratio
4. Percentage reimbursement: funding based on reimbursing districts for actual spending on special education
5. No separate special education funding: funding to support special education included in overall funding levels for districts (Ahearn, 2010; Parrish, 2010)

The state of Tennessee has used a resource-based funding formula where “funding [is] based on payment for a certain number of special education resources (e.g. teachers or classroom units), usually determined by prescribed staff/student ratios that may vary by disability, type of placement or student need” (Ahearn, 2010, p.3) . In addition, Tennessee has been one of seven states to place limitations on funding based on the population of identified students with disabilities. However, allocated funds have been used for the purposes of special education, response to intervention, assessment, gifted, and consultants. The flexibility in Tennessee fiscal

policy for special education funds has been greater than a majority of other states (Ahearn, 2010).

Each year the Tennessee Department of Education has publicly reported educational spending as a state and per LEA. According to statistics from the State of Tennessee Annual Statistical Report (TN DOE, 2013a), Tennessee's total educational operating expenditures totaled \$8.45 billion in 2013. Spending for special education instruction amounted to approximately \$782 million and special education support services were nearly \$101 million. Instructional services included special education teacher salaries, contract services, and materials purchases. The state had 127,407 identified students with disabilities in 2013 ages 3 through 21. Expenditures per American with Disabilities Act (ADA) amounted to an average of \$9,307 per student (regular and special education students combined). The ADA average per pupil expenditure (PPE) discrepancy between school districts varied from \$7,034 (Gibson County Special School District) to \$12,075 (Oak Ridge) (TN DOE, 2013a).

Educational finance systems have primarily operated by funding enrollment and adjusting funding to target particular needs. Spending has been accounted by fund, function, and object. Budgets have been made incrementally (Hill et al., 2008) based on expected revenue. In 2013 Tennessee received \$3.16 billion from local revenues such as property taxes, local taxes, and appropriations from city funds. Federal funds received through the state amounted to a total of \$1.13 billion with an additional \$1.18 billion received by school districts directly from the federal government (TN DOE, 2013a).

Overall, Tennessee funding for education has been comparatively low when compared to other states across the country. Tennessee's public school revenue per student in 2010-2011 was 47th in the nation with \$8,768. The 2010-2011 national range in revenues per student was

\$20,572 (Vermont) to \$7,582 (Nevada). Per capita expenditures by state governments on education in the same years varied from \$3,675 (Vermont) to \$1,226 (Florida) with Tennessee ranked 47th at \$1,414. The average per pupil expenditure for Tennessee public K-12 schools was \$8,213 in 2011 placing Tennessee 46th nationally. Per pupil expenditures varied from \$17,750 (New York) to \$6,448 (Arizona) nationally (National Education Association, 2012).

In 2012 the National Education Association released data related to individual states and national rankings. The range of average national teacher salaries varied from \$73,938 (New York) to \$38,804 (South Dakota). The average Tennessee public school teacher salary ranked 40th on the list with \$47,082. From 2001-2002 to 2011-2012, Tennessee public school teacher average salaries have decreased by 4.2% (National Education Association, 2012).

Educational Production Functions

In 1966 an investigation into the effects of school resources was conducted by U.S. Office of Education per a congressional mandate. This study titled *Equality of Educational Opportunity* has been more commonly known as the “Coleman Report”. It was a response to the Civil Rights Act of 1964 and explored the extent of inequality in America’s public schools (Coleman, 1966). Surveys and testing were conducted on approximately 570,000 students and sixty thousand teachers in nearly three thousand schools across the country at a cost of roughly \$1.5 million (Viadero, 2006). Although it was not the first study of its type, it was much larger and more influential than previous studies (Hanushek, 1989).

The fundamental contribution of the Coleman Report was its focus on student performance (Hanushek, 1989). The results indicated that black children began school lagging behind their white counterparts and essentially never closed the academic performance gap even

when resources in their schools were equal to more predominantly white schools (Coleman, 1966; Viadero, 2006). These results have fostered discussions and further research into the concept of educational input in the form of school resources and output such as achievement measures. The conclusions of the study were that schools have not been very important in determining student achievement but families and peers have determined variations in performance (Hanushek, 1989).

Five decades later researchers have continued to study equal educational opportunities, school resources, and achievement. The Coleman Report motivated educational leaders to investigate school effectiveness and ultimately led to the effective schools movement. This movement was interested in reversing the conclusion of the Coleman Report that equalizing student achievement for all races and socioeconomic statuses was not achievable through an adjustment of school inputs. The effective schools movement challenged schools and teachers to make a difference in the lives of poorer children (Wimpleberg, Teddlie, & Stringfield, 1987).

The relationship between school outcomes and measurable inputs of financial dollars has been known to economists as the *production-function* or *input-output* approach. Educational inputs have typically included factors such as school, teacher, and curricular characteristics and family demographics. Output factors have included standardized assessment performance, graduation rates, college continuation, student attitudes, and attendance rates. The concept has received increased attention since the release of the Coleman Report as it found school resources had a small effect on achievement (Hanushek, 1989). Although a consistent model for educational production-function has not existed, researchers have attempted to predict school outcomes if input resources such as spending were increased or decreased (Hanushek, 1997).

Adequacy and Equity

Adequacy-based funding has typically begun with the base cost of education and then adjusted for: particular student characteristics such as low-income, English Language Learners, and special education, district size and character, and geographic cost differences (Odden, Archibald, & Fermanich, 2003). Once the educational strategies and staffing positions required to meet achievement standards have been defined, then dollar figures have been assigned to those components. Recent changes to school finance litigation have also caused policy makers to focus on the distribution of educational resources. The benchmark of standards-based reform has been whether per pupil revenues and expenditures have been adequate to employ educational strategies to yield high performance standards. Adequacy in education has been the level of dollars needed to produce the desired level of student achievement (Odden et al., 2003).

School funding has typically topped the list of concerns for many policymakers. Support for education has been widespread throughout communities (Sims, 2004). However, according to Sims (2004) educational funding has been neither adequate nor equitable based on a review of school finance cases ruling state funding systems as unconstitutional. Historically school finance dispersal has been focused on equity of resources but the substantive demands of standards-based reforms have shifted the focus to adequacy. Recent changes to school finance litigation have also caused policy makers to focus on distribution of educational resources (Odden et al., 2003).

Four funding models identified by Odden and Augenblick (2000) and Odden et al. (2003) are:

1. Typical high performing districts (Successful School District Approach): identify districts demonstrating desired student performance and use these districts as models for determining adequate per pupil spending
2. School reform programs (Cost-Function Approach): identify strategies and components which will increase student performance and determine costs for implementation of new or altered programming
3. Professional judgment (Professional Consensus Approach): a panel of educational professionals identifies elements needed to educate students and costs associated with these elements
4. Cost-function analysis (State-Of-The-Art Approach): district data and statistical analysis identifies where dollars need to be targeted to improve student performance

This final approach to determining expenditure levels has involved identifying research-based educational strategies and their associated costs. Selected strategies have been aggregated to identify school, district, and state expenditures required. The cost-function analysis approach has been more likely to guide schools in how to use educational dollars in the most effective ways (Odden et al., 2003).

School systems have been encouraged to reallocate current resources to more effectively used existing dollars. Odden et al. (2003) suggested that financial decision making should be made at the individual school level rather than at the state or district level. Decentralized decision making or site-based management has allowed school leaders to identify ineffective strategies and participate in implementing new strategies that meet individual school needs (Odden & Augenblick, 2000; Odden et al., 2003). By making these decisions at the school level school leaders have been responsible for identifying ineffective strategies and replacing them with new

strategies that best meet the needs of the individual students of the school (Odden et al., 2003). Districts that act as assistance providers rather than decision makers and enforcers have allowed individual schools to serve as the primary sources of information, ideas, and strategies for effective use of resources, organizational development, and implementation of professional development (Odden & Augenblick, 2000). School level decisions have the potential to garner greater faculty and administration commitment (James et al., 2011).

Academic Achievement and School Resources

General Education

As America has attempted to improve public education, there have been debates focusing on whether governments should spend more money. New educational programs have frequently required federal and state policy makers to allocate more resources to improving student outcomes (Lips, Watkins, & Fleming, 2008). Federal spending alone for elementary and secondary education has increased dramatically. From 1985 to 2008 federal spending increased by more than 130%. The question posed by policy makers has been whether government spending increases have led to improved student achievement. In an era where more than half the nation's states have faced budget shortfalls, the policy makers argue that simply increasing government spending on education in an effort to improve academic achievement may not be a viable option (Lips et al., 2008).

Literature reviews related to the effects of school resources on student performance have been inconsistent. Hanushek (1989) examined 187 studies to determine the impact of differential expenditures on school performance. Seventy percent of the studies examined included some type of standardized test data. School expenditures and achievement were analyzed from the

relationship of the education production-function model. Hanushek concluded that if schools were effective at allocating money, expenditures could be used as an index of school quality. This index could then be used to judge equity between districts and ultimately guide state level decision making about systems and schools. Input variables included in Hanushek's review were characteristics of schools, teachers, and curricula, socio-demographic information of families, and the learning capabilities of students. Variables included as outputs were standardized test performance, graduation and drop-out rates, college continuation rates, student attitudes about school, and attendance rates.

Hanushek (1989) concluded that, "The results are startlingly consistent in finding no strong evidence that teacher-student ratios, teacher education, or teacher experience have the expected positive effects on student achievement" (p. 47). In addition, Hanushek concluded, "...expenditures per student provide no definite indication of their importance in determining achievement... There is no strong or systematic relationship between school expenditures and student performance" (p. 47).

In rejoinder articles Greenwald et al. (1996a, 1996b) commented on Hanushek's misinterpretation of the meta-analytic results as well as research methodology. Greenwald et al. (1996a, 1996b) reviewed Hanushek's articles and in a separate study limited inclusion to those of "quality" and increased the time period of included research to the years of 1966 to 1993. Greenwald et al. (1996b) found positive coefficients associated with resource input and student achievement for all variables: teacher education, teacher experience, and school size. The calculated effect size for increased spending by 500 dollars per student was a positive achievement score gain by one sixth of a standard deviation. However, this calculated effect size was only observed with large samples of both longitudinal and quasi-longitudinal studies and not

with longitudinal only studies. In addition, teacher education and experience had a strong relationship to school achievement.

In an updated study Hanushek (1997) conducted a literature review of approximately 400 studies occurring between 1961 and 1991. Of those articles studied 27% showed statistically significant results for increased per-pupil expenditures while 7% suggested that adding resources harmed students. He concluded, “There is no strong or consistent relationship between school resources and student performance. In other words, there is little reason to be confident that simply adding more resources to schools as currently constituted will yield performance gains among students” (p. 148).

A more localized study of student achievement and resource allocations patterns was conducted in Georgia (James et al., 2011). Seven variables were examined as predictors for student achievement on the 8th and 11th grade state assessments in reading and language arts and mathematics. “Two years of data revealed that financial expenditures had a statistically significant, though small, effect on measures of student achievement” (p. 4). Improvement of instructional services was the strongest predictor with a significant negative effect. The only predictor variable with a significant positive effect on student achievement was that of teacher salaries and benefits.

Per pupil expenditures have been found to account for 11% of the variation in ranks of student achievement on college entrance examinations such as the ACT and 19% for the SAT (Womack, 2000). A study of per pupil expenditures and relationships to ACT scores in Arkansas in 1996 indicated that little cost-benefit exists for school districts with lower spending. If these districts were to have been given additional funding, the increased expenditures would likely not have improved achievement. The money would likely be diverted to survival categories such as

heating, electricity, buses, and teacher salaries rather than instruction. However, districts with greater expenditures at a certain “turning point” were found to have a positive linear relationship with higher ACT scores. “The ACT scores did not rise above average for those districts who did not spend much above average” (p. 14).

Cantrell (2013) examined the relationship between per pupil expenditures and Tennessee standardized testing (TCAP). Tennessee received \$501,000,000 in federal Race to the Top grant monies in 2011. The dispersion of this money to public schools was a reform initiative known as First to the Top Act of 2010. Half of the stimulus money was retained by the Tennessee Department of Education (TDOE) and the other half was awarded to Local Education Agencies (LEA) according to a predetermined Title 1 formula and district grant requests. Reform initiatives included transitioning to the Common Core State Standards, changes in standardized testing, changes in tenure, and initiatives for low-performing school districts. The mean PPE rose each year from 2010 to 2012 with an average overall gain of \$325.08 per pupil. Spending differences between LEAs continued to exist with the highest LEAs spending approximately \$12,000 per pupil and the lowest LEAs spending under \$7,000 per pupil (Cantrell, 2013).

Cantrell (2013) found no significant relationships between changes in PPE and changes in TCAP scores. Math scores from 2010 to 2012 were significant based on a paired-samples *t* test, however statistical analysis with the Pearson correlation coefficient technique suggested no significant relationship between spending and changes in math scores. No significant relationships with reading scores were found using either statistical analysis. Cantrell concluded,

No reform should be evaluated after only a year or 2, but it is important for educational stakeholders and practitioners to apply the same standard to teachers, schools, and LEAs. The current climate of high stakes accountability has the tendency to communicate success or failure with 1 year of scores for teacher evaluations and school and district report cards. (p. 87)

Recent research by Bibb and McNeal (2012) in the state of Tennessee found per pupil expenditures to have no significant relationship to ACT scores or TCAP writing scores for high school students in all three demographic areas of the state (east, middle, west). The findings of this study revealed that some districts spent above the average state PPE level but did not reach above average levels on achievement testing. The results of this study supported theories that giving more money to schools in an effort to boost test performance was not necessarily an effective means of improvement. The research indicated that the overwhelming indicator of achievement was the demographic of the percentage of economically disadvantaged students in a district. A direct, significant negative relationship was found between achievements and economically disadvantaged.

Odden et al. (2003) summarized educational strategies that have been more likely to produce desired levels of student achievement. High quality preschools, particularly for students from lower income backgrounds, have impacted future student achievement as well as social and community outcomes. Full-day kindergartens have been found to have positive effects on student learning in the elementary grades. The optimum sizes for elementary schools should be restricted to 300 to 600 students and secondary schools to 600 to 900 students. Lower class sizes for lower income students have been found to improve student achievement with less impact for students after third grade.

School districts and individual schools that have demonstrated doubled student achievement performance and reductions in achievement gap have followed similar steps to meet their goals. These schools:

1. Set high goals: aimed for 90 to 95 percent proficiency for all students

2. Analyzed student data: gained a deeper understanding of student performance status through analysis of standardized state and formative assessments
3. Reviewed evidence: removed former curriculums and replaced with rigorous, evidence-based curriculums
4. Invested heavily in teacher training: this included 1 to 2 week summer teacher in-services, longer teacher work days, and instructional coaches within schools
5. Provided extra help for struggling students: assistance provided in the forms of small group instruction, extended day academic instruction, summer school, and English Language Learner resources
6. Created smaller classes in elementary school years: lowered class sizes to 15 students
7. Used time more productively: examples included increased time allocations to core subjects, protected instructional time from interruptions, and offered double class periods for subjects in which students struggled
8. Created professional school communities: teachers worked collaboratively on instructional design and analysis of formative assessment
9. Used curriculums, strategies, and resource levels that could be funded with the national average per pupil expenditure amount: resources allocated to work within existing budgets (Odden, 2007).

Special Education Measurement

The Center on Education Policy (2009) reported that measuring achievement across states has been difficult due to differences in standardized testing. Measuring achievement in special education has been convoluted due to the possibility of alternate assessments for student

with disabilities. In addition, the use of accommodations for standardized assessments has altered research results.

The state of Tennessee has been assessing students with the Tennessee Comprehensive Assessment Program (TCAP) for the subjects of reading, math, science, and social studies. Students with identified disabilities have been allowed testing accommodations based on their Individualized Educational Plans (IEP). Accommodations have included having the test content and/or directions read aloud, extended testing time, and use of a scribe. Tennessee has also offered a modified version of the TCAP titled TCAP-MAAS that has included fewer test items and answer choices. For students with severe disabilities, the TCAP-Alternate assessment has been available for individuals requiring a portfolio assessment (TN DOE, 2014a).

In contrast, the state of California offers the California Assessment of Student Performance and Progress (CAASPP) as a means of standardized assessment for all students capable of taking a standardized test. Examples of accommodations for students with disabilities include read aloud for the Reading/Language Arts subtest only, math tools, and a thesaurus. Students with disabilities may be assessed with the California Alternate Performance Assessment (CAPA) that has included a leveled system of test administration for severely disabled students (California Department of Education, 2014).

Martha Thurlow (2004), Director of the National Center on Educational Outcomes to the Communities on Education and the Workforce, House of Representatives, has supported the inclusion of students with disabilities in assessments and accountability systems. Thurlow stated that special education eligibility entitles students to receive services and supports so they may achieve proficiency. Being in special education should not be an excuse to expect little from children and in turn provide little education. A pervasive problem in special education has been

that of low expectations, especially for students with identified below average intelligence quotients (IQ scores). Thurlow stated, “We know how to educate all children, including those with disabilities, if we have the will to do so” (para. 2).

Special Education Resources

Levenson (2012) examined the conclusion that special education funding may be one of the most under examined facets of American education. Special education has been complicated by the diversity of the students served, the moral dilemmas associated with children with special needs, and the numerous legal mandates surrounding students with disabilities. According to Levenson, “... general education faces a major budget crunch and push for productivity enhancers, while special education has largely been insulated from considerations of cost and cost-effectiveness” (p. 2). Policy makers have appeared reluctant to discuss funding for children with disabilities potentially for the fear of looking callous or uncaring. The complexity of special education and students with disabilities may have scared off reformers and analysts looking to examine cost-effectiveness and accountability.

Whether due to political fears of retribution or convoluted assessment systems, research on special education achievement and spending has been sparse. Most available research has originated from private organizations such as the Thomas Fordham Institute (Levenson, 2012) or federal grants such as the Center for Special Education Finance (Parrish et al., 2004). However, as special education population trends have indicated rising numbers over the last few decades, the cost and success of educating these students has become more of a research topic and consideration. How local education agencies have spent money for special education services and what has been achieved with that spending may be important for determining the future of

educational services for the more than six million students with disabilities. Greater spending may not result in greater academic achievement (Scull & Winkler, 2011).

The Center on Education Policy (2009) detailed national progress in raising achievement scores for the NCLB subgroup of students with disabilities. Trends were examined for the years of 2006 through 2008. For students in grade 4, SWD made national progress in all three achievement levels (basic, proficient, and advanced) for both reading and math. However, the overall proportions of gains were roughly similar to the proportions for all students and for students in two other NCLB subgroups: racial-ethnic and low-income. In addition, scores for SWD in reading and math indicated very large differences in proficiency with as much as 30 to 40 percentage points.

A more recent examination of achievement for SWD indicated that overall proficiency in reading and math for the SWD subgroup has improved. However, great variability between states has existed. Proficiency rates in reading for SWD in grade 8 varied from 15% to 78.1% for the years of 2010 to 2011. Proficiency rates in math varied from 2% to 45.7% for the same years with an average national proficiency of 22%. The data presented in this report also indicated great variability in the participation rates for SWD on different achievement tests. In addition to alternate assessment options, variability has existed in each state's proficiency cut score (Vang & Thurlow, 2013). The author of the report noted, "It is also apparent from this snapshot of the participation and performance of students with disabilities that examining their performance levels is more complicated than it is for students not receiving special education services" (para. 3).

Other reports since 2000 have indicated similar results. Annual yearly progress (AYP) targets for SWD were not met for a majority of states in a 2010 report by the National Center for

Educational Outcomes. States that did not meet AYP targets tended to set higher targets for proficiency than states who met AYP (Altman, Rogers, Bremer, & Thurlow, 2010).

The relationship between expenditures and student achievement has been researched but a lack of research exists examining this same relationship as it pertains to students with disabilities (Ziswiler, De Luca, & Stedrak, 2013). Levenson's 2012 report on Boosting the Quality and Efficiency of Special Education described the lack of research as a reluctance to look at cost-effectiveness. Policy makers have had a tendency to add to rather than replace programming and staff.

Ziswiler et al. (2013) examined special education expenditures by category and academic performance for the state of Ohio. The following variables were studied: PPE on special education transportation, catastrophic, speech, and instruction. In addition, the variable of percentage of students in poverty was included as "poverty represents a factor that complicates the analysis of relationships between expenditures and student achievement" (p. 18). Using binary logistic regression, the research indicated the only statistically significant independent variables to predict the probability of special education students meeting AYP criteria for reading were catastrophic spending and percentage of students in poverty. For mathematics the only statistically significant independent variable was percentage of students in poverty. In conclusion the authors noted that the results indicated a potential misrepresentation of the model and the use of alternate assessments and their exclusion in accountability measures as limitations to the study.

Chapter Summary

Analyzing educational expenditures and student achievement through a cost-benefit function approach has historically yielded inconclusive results. More spending in education since No Child Left Behind has not consistently yielded improved achievement scores for regular or special education students. For the NCLB subgroup of students with disabilities, analyzing spending and achievement has been convoluted due to the presence of alternate assessments and varying proficiency scores. Historically deficits in achievement have been addressed with additional spending. As the number of students identified as disabled has increased in public schools, so too have national, state, and local educational spending. Research related to spending and performance outcomes for SWD has been limited both nationally and at the state level.

CHAPTER 3

RESEARCH METHODOLOGY

This study was an investigation of the relationships between special education spending by districts in the state of Tennessee, TCAP mathematics and reading achievement accountability for SWD in grades 3 through 8, TCAP achievement gaps sizes between students with and without disabilities, and the social demographic of economically disadvantaged. Achievement gap has referred to the academic performance disparity between different groups of students (Hidden Curriculum, 2014). In this study the achievement gap measured was the gap size percentage between students with disabilities and nondisabled peers on standardized testing. The collected measurements were the differences in the percentages of students in each group meeting proficiency or advanced accountability status.

Examination of the overall relationship between spending and achievement has had the potential to be vital for educational practitioners and policy makers to make informed budget decisions. The purpose of this study was to determine if a significant relationship existed between TN special education spending and TCAP achievement scores and gap size percentages for the years of 2010 to 2014.

This nonexperimental study was a bivariate correlational design using *ex post facto*, secondary data obtained from the TN Department of Education's (TDOE) website. Each year the TDOE has collected information from local education agencies (LEA) regarding spending and achievement and made these data available as a public record. As the data were readily available to the public, they could not be identified with an individual student or teacher.

From 2010 to 2014 approximately 135 school districts in Tennessee reported data to the TDOE related to special education spending and achievement for subgroups (TN DOE, 2014b, 2014c). In this study each school district was considered independently for each of the four years. For each isolated research question, any omission of data for an LEA from public record resulted in omission of the LEA's data for this study. The following data were acquired per LEA for the years of 2010-2014: the percentage of SWD in grades 3-8 who met proficiency or advanced standards for reading and mathematics and average PPE in special education. Additionally, the following data were acquired per LEA for the years of 2011-2014: the percentage of students on free and reduced lunch for grades 3 through 8, and gap size percentages between SWD and non-SWD for grades 3 through 8 in reading and mathematics. The average PPE for SWD was calculated by dividing the total reported expenditures in special education instruction per LEA by the total number of children ages 3 through 21 with IDEA disabilities receiving special education services for each year in each district.

Research Questions and Null Hypotheses

The following six research questions and related null hypotheses (H_0) were investigated in the current study. Each research question addressed LEAs in Tennessee and TCAP achievement testing in grades 3-8. Research questions 1 and 2 examined the academic years of 2010 through 2014. Research questions 3 through 6 examined the academic years of 2011 through 2014 for gap sizes and the percentage of students on free and reduced lunches as well as the years of 2010 through 2014 for PPE in special education.

1. Is there a significant relationship between the calculated Per Pupil Expenditure (PPE) for students with disabilities (SWD) and the percentage of SWD meeting minimum proficiency standards in reading?

H_{o1} There is no significant relationship between the calculated Per Pupil Expenditure (PPE) for students with disabilities (SWD) and the percentage of SWD meeting minimum proficiency standards in reading.

2. Is there a significant relationship between the calculated PPE for SWD and the percentage of SWD meeting minimum proficiency standards in mathematics?

H_{o2} There is no significant relationship between the calculated PPE for SWD and the percentage of SWD meeting minimum proficiency standards in mathematics.

3. Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in reading?

H_{o3} There is no significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in reading.

4. Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in mathematics?

H_{o4} There is no significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in mathematics.

5. Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in reading?

H_{o5} There is no significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in reading.

6. Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in mathematics?

H_{o6} There is no significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in mathematics.

Population

The population of this study included all local education agencies (LEAs) in the state of Tennessee that reported sufficient data for each studied variable for each examined academic school year. For each isolated research question any omission of data for an LEA from public record resulted in omission of the LEA for this study. The number of LEAs varied each year due to districts merging or dividing. The state of Tennessee had three designations of LEAs: county, city, and Special School Districts (SSD). For research question 1, 132 LEAs reported data for the two variables for all 5 years. Four sets of data from LEAs were omitted due to school district merging (Memphis City) or lack of reported data (Achievement School District, Richard City, Gibson County). For research question 2, 130 LEAs reported data for the two variables for all 5 years. Seven data sets from LEAs were omitted due to district merging (Memphis City) or lack of reported data (Achievement School District, Gibson County, Rogersville, Lewis County, Richard City, and Pickett County). For research questions 3 through 6, 135 LEAs reported data

for all years for all studied variables. No individual school or student data were included in this study.

Instrumentation

All data for this study were readily available on the Tennessee Department of Education's website, <http://www.tn.gov/education/>. Four main tab divisions existed: Students and Families, Educators, Community, and Districts. Data for this study were located under the division of Educators and further found under the subsection Data. The subsection Data included the following tabs: State Report Card, TCAP Results at a Glance, Accountability, NAEP Results, Research and Policy Briefs, Department Reports, TVAAS, Data Downloads, and Request Data. The purpose of these public reports has been to fulfill NCLB's requirement that state and district report cards be made public to parents and communities about school and district progress (NCLB, 2001). In addition, the Tennessee Department of Education has been releasing data to the public for the purposes of research (TN DOE, 2014b).

According to Tenn. Code Ann. § 49-1-201 (2014), one duty of the commissioner of the state Department of Education has been to collect and publish statistics and other information relative to public school systems. Each year school districts and LEAs have collected financial and student statistics and submitted reports to the TN DOE. The commissioner of education's office has compiled these reports into Annual Statistical and Financial Reports. These reports have been available for public review on the TN DOE's website for the years of 1999 through 2013 (TN DOE, 2014c). For this study, Annual Statistical Reports were available for 2010 through 2014 under the tab Department Reports. A single year's Annual Statistical Report included expenditure values as well as special education population numbers for all school

districts and LEAs. District related expenditures in Tennessee education were subdivided into support services and operations of non instructional services. The category of support services was further subdivided into the following areas: instructional staff, general administration, school administration, business administration, operation and maintenance of plant, student transportation, and other support services. For this study expenditures related to special education instruction were obtained under the division of Support Services-Instructional Staff-Special Education in each year's Annual Statistical Report. Spending under the special education instruction division included teacher salaries, career ladder program payments, other salaries, fixed charges, contract services, materials, supplies, and equipment, textbooks, and miscellaneous (TN DOE, 2014c).

Special education services have been provided for children ages 3 through 21 who have met eligibility requirements for one or more the following disability standards: Autism, Deaf-Blindness, Deafness, Developmental Delay, Emotional Disturbance, Functional Delay, Hearing Impairment, Intellectual Disability, Intellectual Gifted, Multiple Disabilities, Orthopedic Impairment, Other Health Impaired, Speech or Language Impairment, Traumatic Brain Disorder, or Visual Impairment (TN DOE, 2014f). Special education populations per district have been made available in two tab locations on the Tennessee Department of Education's website: Data Downloads and Department Reports. Under the tab of Data Downloads- Profile Data Files, the total special education populations for each district as well as the number of economically disadvantaged students and racial diversity have been reported (TN DOE, 2014b). Under the tab of Department Reports- Annual Statistical Reports, the total special education populations per district have been reported as well as populations per disability area (TN DOE, 2014c). For the

purposes of this study only the total special education populations per school district or LEA were collected.

Students in grades 3 through 8 in Tennessee have been assessed once yearly with a comprehensive timed, multiple choice test titled the Tennessee Comprehensive Assessment Program (TCAP). Four areas have been assessed yearly: reading/language arts, math, science, and social studies. Tennessee has been an English-only state and thus all means of assessment including the TCAP have been in English only (TN DOE, 2015d). According to the TN DOE, these assessments have been measures of students' skills and academic progress (2014g). The TCAP assessment has been a criterion-referenced assessment measuring a student's performance against specific content standards or criteria. Student expectations have been defined as curriculum standards. Performance indicators have been defined as the written descriptions of how student expectations would be measured. Each question on the TCAP has been linked to a performance indicator and clusters of performance indicators have been combined as reporting categories (TN DOE-Office of Assessment Logistics, 2013).

Four versions of the TCAP have been administered in the spring semester of the years 2011, 2012, 2013, and 2014. The TCAP-Achievement (TCAP-ACH) has been the general assessment for grades 3 through 8. The TCAP-Modified Academic Achievement Standards (TCAP-MAAS) has been administered to some students with disabilities. An IEP team decision has been required to administer the TCAP-MAAS version. As some students in special education have disabilities that prevent them from attaining grade-level proficiency, the TCAP-MAAS has offered shorter tests, three answer choices, simplified language, simplified print styles, and fewer passages and questions on each page. For students who have been eligible to receive English as a Second Language services, an alternate version of the TCAP, English as a Second Language

Assessment (ELSA), has been available. The ELSA has included reduced wordiness, common and simplified verbs, avoidance of multiple meaning words, and simplified sentence structures (TN DOE-Office of Assessment Logistics, 2013). A fourth version titled the TCAP Alternate (TCAP-ALT) has been available for students with the most severe disabilities (TN DOE, 2014a). Student performance on all four versions of the TCAP has been included in district accountability measures (TN DOE, 2013b).

Annual Measurable Objectives (AMOs) have been quantifiable goals based on state assessment performance and achievement gaps among historically disadvantaged groups: economically disadvantaged, English language learners, students with disabilities, and Black/Hispanic/Native Americans. Achievement AMOs have been set at the state, district, and school levels and publically reported as part of the state's report card (TN DOE, 2013b). Beginning in the 2002-2003 school year and continuing until the 2008-2009 school year, AMOs were determined by the percentage of students meeting proficient or advanced standards on the TCAP. Yearly annual yearly progress (AYP) goals were based on performance data from 2003. However, changes in state standards, achievement levels, and assessments required a resetting of student performance expectations as well as AMOs based on 2010 data. Achievement AMOs have been re-set for the subjects of math, reading, and graduation rates and calculated using the following formula:

$$\text{Growth Goal} = (100 - \% \text{Proficient/Advanced in Previous Year}) \div 16$$

$$\text{Achievement Target for Current Year} = \% \text{Proficient/Advanced Previous Year} + \text{Growth Goal}$$

(TN DOE, 2013b).

Gap closure AMOs have been set to reduce gaps between subgroups and comparison groups. Gap closure AMOs have been calculated using the formula:

Growth Goal = $(100 - \% \text{Proficient/Advanced in Previous Year}) \div 16$

Achievement Target for Current Year = $\% \text{Proficient/Advanced Previous Year} + \text{Growth Goal}$
(TN DOE, 2013b).

In this research study gap size percentages were collected from accountability and AMO reports for the tested years of 2011-2014. Gap size percentages for each district and LEA were publically available as part of corresponding yearly Report Cards. Gap size percentages have been calculated by subtracting the percentage of SWD meeting proficiency or advanced standards on the TCAP from the percentage of nondisabled students meeting proficiency or advanced standards for reading and mathematics (TN DOE, 2014e). Data for each LEA were collected under the subsection State Report Cards for the years of 2011 through 2014. The data were in the form of interactive tabs with the Accountability tab containing gap size percentages.

Data Collection

For this study *ex post facto* data were collected by the researcher at the LEA levels. The data were collected by the researcher from the Tennessee Department of Education's website, <http://www.tn.gov/education/>, an online public domain. All data were located under the tab Data. The information for total spending in special education for each year and each LEA was found under the tab Department Reports. Within this tab existed Annual Statistical Reports that included total special education spending by year. In an Excel spreadsheet data from each yearly report in the areas of Instruction-Special Education and Support Services-Instructional Staff-Special Education were calculated yearly. An average for the 5 years of 2010 through 2014 was calculated for each LEA using the averaging Excel function. The numbers of identified students with disabilities for each LEA were also collected from the Annual Statistical Reports (TN DOE,

2014c). To obtain the average PPE for SWD within a district, the total average spending for each LEA was divided by the average number of SWD using an Excel formula function. PPE amounts were rounded to the nearest dollar amount. Two independent readers checked the accuracy of the three data points by comparing the spreadsheet data to the online, public data as well as the formula function used to compute the PPE.

TCAP achievement accountability data for each year was found under the tab State Report Card. Data collected included the percentage of students in grades 3 through 8 meeting minimum proficiency standards (proficient and/or advanced) in reading and mathematics individually for the years of 2010 through 2014. The State Report Card tab included multiple pieces of information related to individual LEAs. For data related to accountability, the tab Accountability was selected. The researcher manually manipulated drop down boxes to individually select each LEA as well as the required year and then recorded the numerical accountability results into a separate Excel spreadsheet. Once all data for all 5 years were transferred to an Excel spreadsheet, an average accountability percentage was calculated by using an Excel averaging function for reading and math individually. Two independent readers checked the accuracy of the three data points by comparing the spreadsheet data to the online, public data as well as the formula function used to compute average accountability results.

The percentages of students meeting qualifications for economically disadvantaged per school district and LEA each year were collected under the Data Downloads tab. The tab of Profile Data Files-District Level was further selected and the isolated years of 2011 through 2014 selected. Data for the percentage of students meeting free and/or reduced lunch qualifications by LEA were downloaded as Microsoft Excel spreadsheets for access and manipulation. Average percentages of economically disadvantaged students for each LEA were calculated using the

Excel Average function option. Two independent readers assessed the accuracy of the downloaded data by comparing the online information to the Excel spreadsheet information.

Gap size percentage data for the years of 2011 through 2014 were collected under the tab State Report Card (TN DOE, 2014e). Data for the years of 2013 and 2014 were collected through an interactive display at the bottom of the website. Data for the years of 2011 and 2012 were archived. Selecting these years directed the researcher to an interactive report card website. For each year, LEAs were selected from dropdown boxes. The tab of Accountability was also selected at the top of the screen. Gap size data percentages were collected for each year and LEA and manually inputted into a Microsoft Excel spreadsheet for manipulation and access. An Excel averaging function was used to find the average of all 4 years for each LEA. Two independent readers assessed the accuracy of the inputted data by comparing the online information to the Excel spreadsheet information.

No data were identifiable in terms of single student or school. All collected data contained information at the LEA level only. Investigation could be made from the website to determine the particular LEA. However, specific schools could not be determined based on the information obtained for this study. Upon review by the dissertation committee, the study was submitted for review by the Institutional Review Board (IRB). The IRB has been responsible for approving and monitoring research involving humans. A risk-benefit analysis was conducted to determine whether a research study should be conducted (East Tennessee State University, 2014). In this study all data were *ex post facto* and not identifiable with any specific student or school. An exemption status was obtained from IRB. Following notification, all data required for this study were downloaded in PDF and Excel spreadsheets.

Data Analysis

Data were organized into spreadsheets related to each research question: achievement and PPE for SWD, gap size percentages and PPE for SWD, and gap size percentages and percentage of disadvantaged students. The data were analyzed using the Statistical Process for the Social Sciences (SPSS) software. All research questions were analyzed using a series of Pearson correlations (Pearson r). All data were analyzed at the .05 level of significance.

Chapter Summary

The relationship between spending in special education and achievement results indicated to what degree input from expenditures impacted academic achievement output for SWD as measured by TCAP. Per pupil expenditures for SWD were calculated by dividing the total special education expenditures by the number of SWD ages 3 through 21 for each district. Academic achievement was analyzed with TCAP performance data in reading and math as well as gap size percentages between SWD and non-SWD. To determine the impact of socioeconomic status on achievement for SWD, the percentage of economically disadvantaged students was compared to gap size percentages for SWD and non-SWD. All *ex post facto* data were collected from public records on the Tennessee Department of Education's website. All data were downloaded or inputted into Microsoft Excel spreadsheets and analyzed using the SPSS program. The statistical technique of the Pearson r correlation was employed for each of the six research questions. Chapter 3 provided the research methodology for the analysis of the data in Chapter 4.

CHAPTER 4

DATA ANALYSIS

The purpose of this study was to determine if there were significant relationships between PPE in special education and reading and math achievement scores and gaps sizes. In addition, this study determined if there was a significant relationship between the subgroup economically disadvantaged and gap sizes for SWD. Secondary *ex post facto* data were gathered from the TN Department of Education's website, which was a public online domain www.tn.gov/education. Data for the years of 2010-2014 were included for research questions addressing PPE and achievement. For research questions pertaining to PPE, gap sizes, and economically disadvantaged percentages, data for the years of 2010-2014 were used for PPE and the years of 2011-2014 for data related to gap sizes and students on free or reduced lunch. The data were first organized and averaged in an Excel spreadsheet and then transferred for statistical analyses using the program SPSS.

Research Question 1

Is there a significant relationship between the calculated Per Pupil Expenditure (PPE) for student with disabilities (SWD) and the percentage of SWD meeting minimum proficiency standards in reading?

H_0 1. There is no significant relationship between the calculated Per Pupil Expenditure (PPE) for students with disabilities (SWD) and the percentage of SWD meeting minimum proficiency standards in reading.

A Pearson correlation coefficient was computed to test the relationship between PPE for SWD and the percentage of SWD meeting proficiency standards on the Tennessee Comprehensive Assessment Program (TCAP) for reading during the years 2010-2014. The results of the analysis revealed a strong positive relationship between PPE for SWD ($M = 6,119.32$, $SD = 1,540.64$) and SWD meeting minimum proficiency standards in reading ($M = 27.67$, $SD = 6.50$) and a statistically significant correlation [$r(130) = .425$, $p < .001$]. As a result of the analysis the null hypothesis was rejected. Figure 1 shows the scatterplot for PPE and reading proficiency achievement for SWD. In general the results suggest that increased spending for SWD by LEAs in 2010-2014 corresponded with positive TCAP minimum achievement proficiency scores in reading for SWD for the same time period.

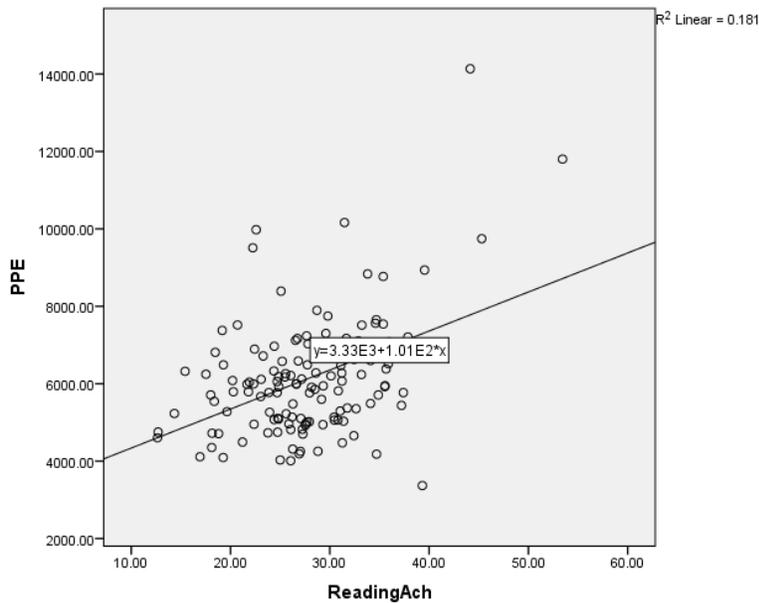


Figure 1. PPE and the Percentage of SWD Meeting Proficiency Standards in Reading

Research Question 2

Is there a significant relationship between the calculated PPE for SWD and the percentage of SWD meeting minimum proficiency standards in mathematics?

H_{o2} There is no significant relationship between the calculated PPE for SWD and the percentage of SWD meeting minimum proficiency standards in mathematics.

A Pearson correlation coefficient was computed to test the relationship between PPE for SWD and the percentage of SWD meeting proficiency standards on the TCAP mathematics assessment for the years 2010-2014. The results of the analysis revealed a strong positive relationship between PPE for SWD ($M = 6,128.29$, $SD = 1,547.73$) and SWD meeting minimum proficiency standards in mathematics ($M = 25.77$, $SD = 6.51$) and a statistically significant correlation [$r(128) = .266$, $p = .002$]. As a result of the analysis the null hypothesis was rejected. Figure 2 shows the scatterplot for PPE and SWD meeting proficiency standards in mathematics. In general the results suggest that increased spending for SWD by LEAs in 2010-2014 corresponded with positive TCAP achievement minimum proficiency scores in mathematics for SWD for the same time period.

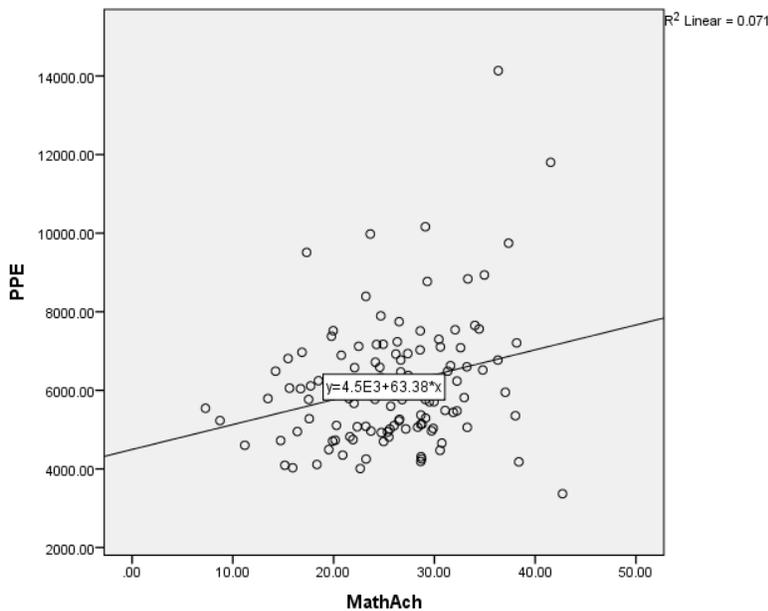


Figure 2. PPE and the Percentage of SWD Meeting Proficiency Standards in Mathematics

Research Question 3

Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in reading?

H_o3 There is no significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in reading.

A Pearson correlation coefficient was computed to test the relationship between PPE for SWD and gap sizes for students with and without disabilities in reading on the TCAP assessment for the years of 2011-2014. The results of the analysis revealed a weak negative relationship between PPE for SWD ($M = 6,146.23$, $SD = 1,565.87$) and gap size in reading for students with and without disabilities ($M = 25.20$, $SD = 7.80$) and a statistically insignificant correlation [$r(131) = -.062$, $p = .481$]. As a result of the analysis the null hypothesis was retained. Figure 3 shows the scatterplot for PPE and gap sizes in reading as it pertains to students with and without disabilities. In general, the results suggest that as spending in special education increases the performance gap on standardized testing in reading between students with and without disabilities decreases.

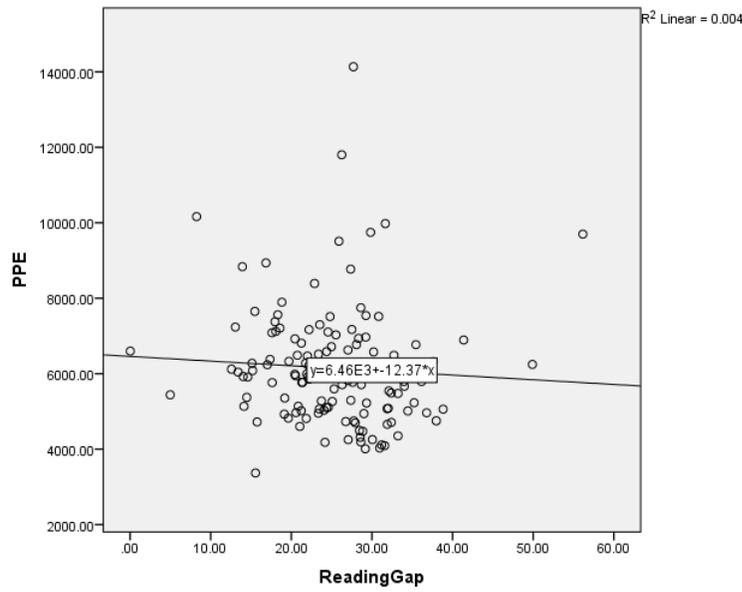


Figure 3. PPE and Gap Sizes in Reading for Student With and Without Disabilities

Research Question 4

Is there a significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in mathematics?

H₀4 There is no significant relationship between the calculated PPE for SWD and the gap size percentage as it pertains to students with and without disabilities in mathematics.

A Pearson correlation coefficient was computed to test the relationship between PPE for SWD and gap sizes for students with and without disabilities in mathematics on the TCAP assessment. The results of the analysis revealed a weak negative relationship between PPE for SWD ($M = 6,146.23$, $SD = 1,565.87$) and gap size in mathematics for students with and without disabilities ($M = 24.30$, $SD = 7.91$) and a statistically insignificant correlation [$r(131) = -.057$, $p = .518$]. As a result of the analysis the null hypothesis was retained. Figure 4 shows the scatterplot for PPE and gap sizes in mathematics as it pertains to students with and without disabilities. In general the results suggest that as spending in special education increases the

performance gap between students with and without disabilities on standardized testing in mathematics decreases.

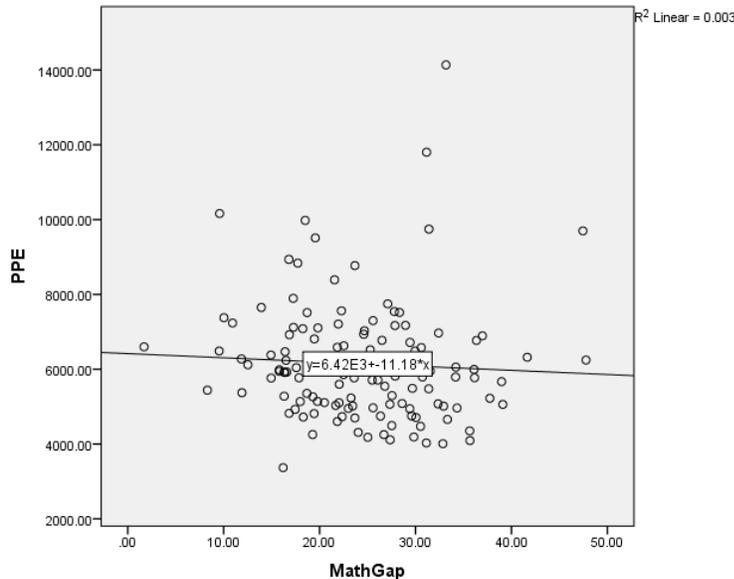


Figure 4. PPE and Gap Sizes in Mathematics for Students With and Without Disabilities

Research Question 5

Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in reading?

H_{o5} There is no significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in reading.

A Pearson correlation coefficient was computed to test the relationship between the percentage of students on free or reduced lunch (economically disadvantaged) and the gap size in reading for students with and without disabilities. The results of the analysis revealed a strong negative relationship between economically disadvantaged percentages ($M = 62.09$, $SD = 10.28$)

and gap size in reading for students with and without disabilities ($M = 25.20$, $SD = 7.80$) and a statistically significant correlation [$r(131) = -.390$, $p < .001$]. As a result of the analysis the null hypothesis was rejected. Figure 5 shows the scatterplot for the percentage of students on free and reduced lunch (economically disadvantaged) and gap sizes in reading as pertaining to students with and without disabilities. In general the results suggest an inverse relationship between the percentage of economically disadvantaged students in a school district and gap widths in reading between disabled and nondisabled students. There appears to be an association between the number of students on free and reduced lunch in a school district and gap widths in reading between SWD and students without disabilities.

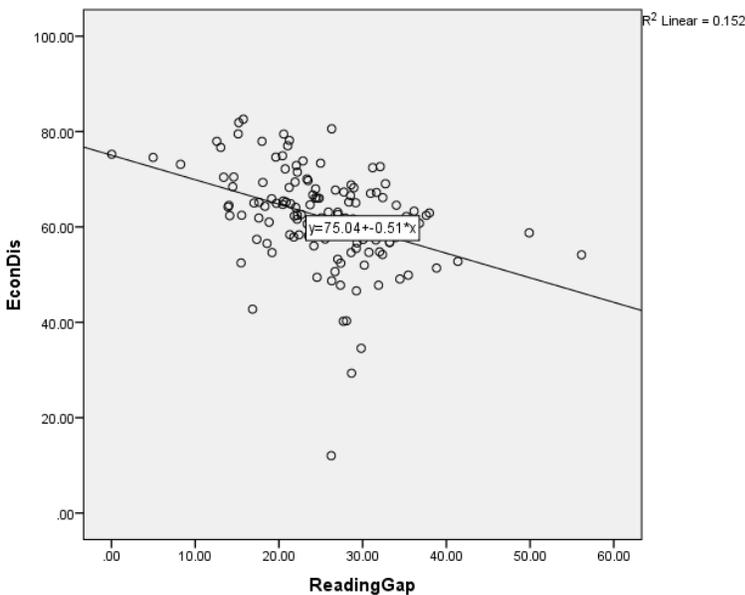


Figure 5. Percentage of Students on Free/Reduced Lunch (Economically Disadvantaged) and Gap Size in Reading for Students With and Without Disabilities

Research Question 6

Is there a significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in mathematics?

H₀₆ There is no significant relationship between the percentage of students on free or reduced lunch and the gap size percentage as it pertains to students with and without disabilities in mathematics.

A Pearson correlation coefficient was computed to test the relationship between the percentage of students on free or reduced lunch (economically disadvantaged) and the gap size in mathematics for students with and without disabilities. The results of the analysis revealed a strong negative relationship between economically disadvantaged percentages ($M = 62.09$, $SD = 10.28$) and gap size in mathematics for students with and without disabilities ($M = 24.30$, $SD = 7.91$) and a statistically significant correlation [$r(131) = -.394$, $p < .001$]. As a result of the analysis the null hypothesis was rejected. Figure 6 shows the scatterplot for the percentage of students on free and reduced lunch (economically disadvantaged) and gap sizes in mathematics as it pertains to students with and without disabilities. In general the results suggest an inverse relationship between the percentage of economically disadvantaged students in a school district and gap widths in reading between disabled and nondisabled students. There appears to be an association between the percentage of students on free and reduced lunch in a school district and gap widths in mathematics between SWD and students without disabilities.

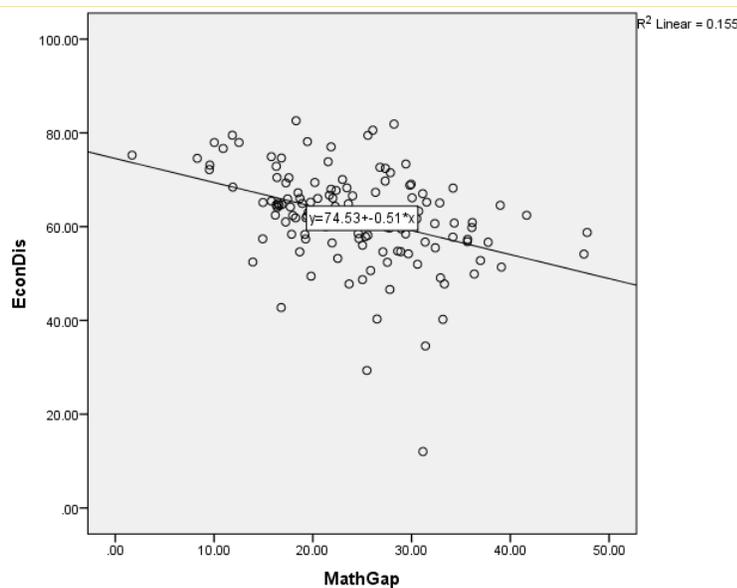


Figure 6. Percentage of Students on Free/Reduced Lunch (Economically Disadvantaged) and Gap Size in Mathematics for Students With and Without Disabilities

Chapter Summary

In chapter 4 the first four research questions had hypotheses related to the relationships between per pupil expenditures in special education and reading and mathematics achievement. The last two research questions had hypotheses related to the percentage of students who were economically disadvantaged in local education agencies and achievement gaps for students with and without disabilities. Data were analyzed with SPSS based on annual statistical reports, state report cards of achievement results, and district level data files obtained *ex post facto* from the TN department of education's website. The results indicated a significant positive relationship for research questions 1 and 2. In general the results suggest that increased spending in special education was associated with positive TCAP minimum proficiency scores for reading as well as mathematics. In addition the results indicated a significant negative relationship for questions 5 and 6. The results suggest that the percentages of economically disadvantaged students in LEAs

were associated with smaller gap widths between students with and without disabilities for reading as well as mathematics. The results indicated a negative statistically insignificant relationship for questions 3 and 4. In general the results suggest a lack of association between spending in special education and achievement gap widths between students with and without disabilities in both reading and mathematics.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, AND IMPLICATIONS

The purpose of this study was to investigate the relationships between special education spending by local education agencies (LEA) in Tennessee and TCAP mathematics and reading achievement accountability assessments for SWD in grades 3-8. In addition, this researcher also investigated special education spending and gap sizes in reading and mathematics between students with and without disabilities and the percentage of students meeting criteria for economically disadvantaged status and gap sizes. The population consisted of LEAs in the state of Tennessee with reported data for all studied years for each research question. For research questions pertaining to per pupil expenditures (PPE) and achievement, the 5 years of 2010 through 2014 were examined. The data consisted of 132 LEAs for research question 1 and 130 LEAs for research question 2. For research questions 3 through 6, data for the years of 2010 through 2014 were used for PPE and 2011 through 2014 for gap sizes and the percentage of students on free or reduced lunch. The data consisted of 133 LEAs for research questions 3 through 6. Pearson correlation coefficients were calculated for all research questions to determine if significant correlative relationships existed. This chapter contains a summary of findings, implications for practice, and recommendations for further research.

Summary of Findings

The analyses focused on six research questions. The independent variables included average PPE for special education for each LEA in 2010-2014, the average percentage of SWD meeting minimum proficiency standards for reading in 2010-2014 for each LEA in grades 3-8,

the average percentage of SWD meeting minimum proficiency standards for mathematics in 2010-2014 for each LEA in grades 3-8, the average gap size in reading between students with and without disabilities in 2011-2014 for each LEA in grades 3-8, the average gap size in mathematics between students with and without disabilities in 2011-2014 for each LEA in grades 3-8, and the average percentage of students on free and reduced lunch (economically disadvantaged) for each LEA for all grades in 2011-2014. The following includes a summary of the findings of each research question.

The results of the analysis indicate that spending in special education by LEAs was significantly associated with the percentage of SWD meeting minimum proficiency standards for reading on the Tennessee Comprehensive Achievement Program (TCAP) for the years of 2010-2014. The strong positive correlation indicates that increased spending in special education had a positive impact on the performance of SWD on standardized testing in reading. A reasonable assumption can be made that when LEAs allocate more money to educating SWD performance on standardized testing improves for this same subgroup in reading.

Regarding spending in special education by LEAs and achievement in mathematics, the results of the analysis indicate that spending was significantly associated with the percentage of SWD meeting minimum proficiency standards for mathematics on the TCAP for the years of 2010-2014. The strong positive correlation indicates that increased spending in special education is positively associated with performance of SWD on standardized testing in mathematics. A reasonable assumption can be made that when LEAs allocate more money to educating SWD performance on standardized testing improves for this same subgroup in mathematics.

The results of the analysis indicate that there was no significant relationship between spending in special education by LEAs and the gap size percentages between students with and

without disabilities in reading. In addition, there was no significant relationship between spending in special education by LEAs and the gap size percentages between students with and without disabilities in mathematics. A reasonable assumption is that increasing special education funding may not provide an effective method for reducing gap sizes. In addition, reducing achievement gaps between identified groups of students may involve factors other than funding.

The results of the analysis indicated a significant relationship between the percentage of students on free or reduced lunch (economically disadvantaged students) and the gap size in reading between students with and without disabilities. As the percentage of economically disadvantaged students in a school district increased during the years of 2011-2014, the gap size between students with and without disabilities decreased. The negative relationship between these two variables was strong. Economically disadvantaged students may have produced scores more commensurate with SWD rather than all nondisabled students and thus gap sizes between students with and without disabilities within LEAs was smaller.

Regarding the analysis of the percentage students on free and reduced lunch per LEA and the gap sizes in mathematics between students with and without disabilities, the results indicated a significant relationship. As the percentage of economically disadvantaged students in a school district increasing during the years of 2011-2014, the gap size between students with and without disabilities increased. The negative relationship was strong. Economically disadvantaged students may have produced scores more commensurate with SWD rather than all nondisabled students and thus gap sizes between students with and without disabilities within LEAs was smaller.

Recommendations for Future Research

Historically research related to resources and achievement in both regular and special education has been inconsistent. To predict outcomes related to resource allocation, an understanding of how school outcomes and spending have been related has been needed. The relationship between school outcomes and measurable inputs of financial dollars has been known as the *production-functional approach* (Hanushek, 1989). Adequacy in education has been described as the level of dollars needed to produce the desired level of student achievement (Odden, et al., 2003). The findings of this study suggest that the question of adequate funding in special education in an effort to close the achievement gap between students with and without disabilities require additional examination. Some implications for further research include:

1. Further investigate the relationships between special education allocations by category and achievement. Variables such as instructional staff expenditures, teacher salaries, and materials may be individually related to achievement for SWD.
2. Further investigate the relationships between the special education disability populations by certification area and achievement for SWD. A higher percentage of low-incidence disabilities within an LEA such as autism, intellectual disability, and traumatic brain injury may be related to achievement.
3. Further investigate the areas in which LEAs allocate special education funding and how spending for students with disabilities compares across LEAs within the state of Tennessee.
4. Replicate this study excluding student data for SWD participating in the TCAP-ALT and TCAP-MAAS achievement tests. The TCAP-ALT has not included grade level content assessments and is conducted as a portfolio review rather than a standardized multiple

choice assessment. The TCAP-MAAS has varied from the traditional TCAP assessment by offering fewer questions per content area and a reduction in the number of multiple choice options for each question. For some questions the reading level has been modified. Modifications to the TCAP-MAAS and TCAP-ALT may impact achievement scores.

5. Replicate this study for years other than 2010 through 2014 to determine if similar findings are found.
6. Replicate this study with another state that has similar reporting of expenditures and achievement and compare the results to those of this study.
7. Replicate this study with data for grades 9 through 12 and/or graduation rates for SWD. Reading and mathematics district data have been compiled from assessment reports related to grades 3 through 8. Students in grades 9 through 12 have been assessed with End of Course exams (EOC). Achievement data for SWD for grades 9 through 12 have been calculated for the following courses: Algebra I and English II (TNDOE, 2014c).
8. Further investigate the impact of Title I funding and spending on gap sizes between students with and without disabilities. Title I has been a federally funded program targeted at improving teaching and learning for students in high-poverty schools. Funds have been provided to improve programming at schools so they may meet state content and performance standards. The addition of Title I funds may impact the performance of SWD as the funds are to be used for whole school improvement (TNDOE, 2014h).
9. Further investigate the impact of the Response to Intervention (RTI) program used in the state of Tennessee to qualify students for the disability certification of Specific Learning Disability and special education expenditures and achievement. The RTI program has included core structural components; however, LEAs and schools have had some

discretion on the full implementation and daily operations of this model. Students who have made little to no progress with high-quality instruction may be referred for special education evaluation, identification, and placement (ReadTennessee, 2015). The variability in the implementation and thus the referral for students to special education may impact special education funding as well as the number of students with identified disabilities.

10. Further investigate if a threshold exists in special education spending where the addition of resources no longer significantly improves achievement for SWD. A previous study of PPE and student achievement for regular education students indicated that a threshold level may exist where additional funding above average school district spending no longer improves student achievement (Womack, 2000).
11. Further investigate if assessment data from tests such as the TCAP provide educators with information regarding individual student strengths and weaknesses. In addition, further investigation may be conducted into how districts, schools, and individual classroom teachers use data to improve outcomes for subgroups such as SWD and economically disadvantaged.
12. Further investigate specific educational and intervention programs for students with identified disabilities in regards to cost effectiveness and impacts on student achievement.

Implications for Practice

This researcher examined spending in Tennessee for special education students and achievement levels in reading and mathematics. The results of this study suggest that increased special education spending does positively impact the performance of students with disabilities

on state standardized testing in the areas of reading and mathematics. However, this study also suggests that additional factors other than PPE in special education play a role in the achievement of students with disabilities when examining the gap size between the subgroup of students with disabilities (SWD) and nondisabled peers. In addition, this study suggests that the percentage of students in an LEA who meet criteria for economically disadvantaged plays a significant factor in achievement for both the subgroup of students with and without disabilities.

The following are implications for practice:

1. Policy makers at the state level should examine the variability between LEA expenditures for special education to determine adequacy of state and local funding models.
2. Policy makers should make special education spending and achievement data more useful for consumers. While this information is available online, it is located in multiple formats and not intuitive for the average consumer to locate and compile.
3. Policy makers at the local education association level should examine local special education spending and achievement. Increased spending in the sector of special education may be warranted to improve achievement scores in reading and mathematics for districts and schools with low performing scores.
4. Policy makers should consider that increased spending may not target subgroups with weak achievement results if spent inefficiently. Additional funding would need to be examined in relationship to allocation in order to impact subgroup improvement. Financial allocations to teacher training, intervention programs, smaller class sizes, and professional learning communities may provide targeted resources to improve subgroup performance.

5. Policy makers at the federal, state, and local levels should examine if additional spending for specific subgroup areas such as SWD or economically disadvantaged in an attempt to enhance student achievement is an appropriate effort for all students and appropriate use of taxpayer dollars.

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