

AN EXAMINATION OF THE RELATIONSHIP BETWEEN TEACHER  
CHARACTERISTICS, SOCIOECONOMIC FACTORS AND  
STATEWIDE TEST PERFORMANCE OF STUDENTS WITH INDIVIDUAL  
EDUCATION PLANS

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Doctor of Education

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by

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STATEWIDE TEST PERFORMANCE OF STUDENTS WITH INDIVIDUAL  
EDUCATION PLANS

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## ABSTRACT

Testing results from 2004 indicated that two of Missouri's 96 middle schools with a reportable number of students with IEPs met the math proficiency goal for adequate yearly progress. The purpose of this study was to examine the relationship between the performance of students with and without IEPs on the MAP mathematics examinations, socioeconomic factors, and teacher characteristics.

Findings indicated that teachers' average years of experience and mean household income failed to demonstrate a significant correlation to student achievement. Correlations demonstrated a significantly negative correlation between achievement for students with IEPs and per pupil expenditures for students with and without IEPs. There was a significantly negative correlation between the percent of student receiving free or reduced-price lunch and achievement for students both with and without IEPs. Findings indicated a significantly positive relationship between the percent of teachers with advanced degrees and achievement for students both with and without IEPs.

## CHAPTER ONE

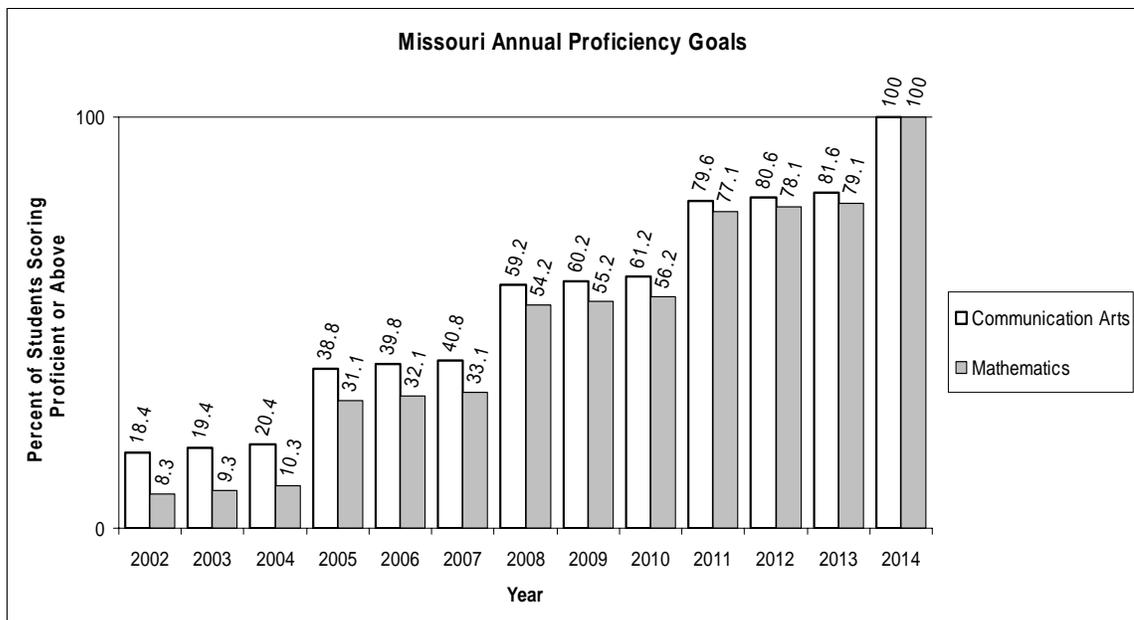
### INTRODUCTION TO THE STUDY

One of the earliest records of the use of testing as a tool for education reform in the United States dates to 1845 in Boston (Abrams & Madaus, 2003). While serving as Secretary of Massachusetts State Board of Education, Horace Mann replaced the traditional oral exam with a standardized written essay test. Sloane and Kelly (2003) believed the present emphasis on high-stakes testing emerged during an era of American education known as learning through standards and accountability. The authors stated that what makes this era different is a political climate at the national level that views the apparently poor academic performance of American students as a national problem appropriate for federal intervention. Mandates established when President George W. Bush signed No Child Left Behind (NCLB) into law in January 2002 required a shift in the paradigm of determining the adequacy of public education. Basic principles of NCLB included greater accountability for student performance, the use of scientifically based practices by highly qualified teachers, increased local control and flexibility related to funding, and expanded options for parents of students attending low performing schools.

In a letter to chief state school officers, dated July 23, 2002, Secretary of Education Rod Paige outlined principles for the NCLB accountability systems for each state. The law required the development of a statewide accountability system that included all public school students. Under NCLB, states determined the level of achievement of all public schools on an annual basis. Student

achievement that was both continuous and substantial formed the basis for determining Adequate Yearly Progress (AYP) with all students demonstrating proficiency in reading and mathematics by the 2013-2014 school year (Beck, 2003). Figure 1 identifies the percentage of students that must score at the proficient level or above on communication arts and mathematics examinations established by the state of Missouri.

*Figure 1. Missouri Annual Proficiency Goals*



While the law established expectations for all students, NCLB also required specific subgroups to meet adequate yearly progress goals. Disaggregated test results indicated the performance of students by ethnic background, including Asian, Black, Hispanic, Indian, and White. In addition, disaggregated test results identified the performance for students receiving free or reduced-price lunch, students with an individual education program (IEP), and students with limited English proficiency (LEP). Students with IEPs included

students identified with a disabling condition as defined by the Individuals with Disabilities Education Act. Areas of disability identified by the Missouri Department of Elementary and Secondary Education Compliance Plan included autism, deaf/blind, emotionally disturbed, hearing impaired/deafness, mental retardation, multiple disabilities, orthopedic impairments, other health impairments, specific learning disability, speech and language impairments, traumatic brain injury, and vision impairment. In an effort to ensure confidentiality and maintain privacy rights, NCLB guidelines allowed states to determine the number of students needed for reporting disaggregated data. Other AYP accountability measures determined by each state included data such as graduation rates for high schools and attendance rates for middle schools. The law included provisions that required each state to develop an accountability system that is statistically valid and reliable.

The Missouri Department of Elementary and Secondary Education (DESE) elected to utilize the Missouri Assessment Program (MAP) examinations given to third, seventh, and eleventh grade students in the area of communication arts and to fourth, eighth, and tenth grade students in mathematics to meet the assessment requirements of NCLB. Five levels defined student performance on the examinations, including Step 1, Progressing, Nearing Proficient, Proficient, and Advanced. A MAP Index Score is also calculated by first multiplying the percent of students scoring at each achievement level for each subject and each year by the following values: Advanced by 3, Proficient by 2.5, Nearing Proficient by 2, Progressing by 1.5,

and Step 1 by 1. The sum of the products produces the MAP Index Score, which could range from 100 to 300.

### Statement of the Problem

As reported in the *Kansas City Star*, 1,033 of the 2,055 or 50.2% of the schools in Missouri failed to meet the adequate yearly progress requirement based on the spring 2003 MAP examination results (Robertson, 2003). These numbers included 80% of Missouri high schools and 78% of Missouri middle schools. Results of the MAP examinations posted on the Department of Elementary and Secondary Education (DESE) website indicated that in the area of communication arts, students in the Black, Hispanic, Free/Reduced Lunch, IEP, and LEP subgroups failed to meet the state proficiency goals in years 2002, 2003, and 2004. In the area of mathematics, students in the Black and IEP subgroups failed to meet the state proficiency goal for adequate yearly progress in 2002 and 2003. Students in the IEP subgroup also failed to meet the state proficiency goal in 2004 (Missouri Department of Elementary and Secondary Education).

Following publication of the 2003 results, the Department of Elementary and Secondary Education re-evaluated the number of students required in a subgroup for reporting disaggregated data related to adequate yearly progress at the school and district levels and subsequently raised the number from 30 to 50 for the Students with IEPs subgroup. Changing the number required for reporting reduced the number of schools required to demonstrate adequate yearly progress for students with IEPs. Table 1 identifies the percentage of students in

Missouri scoring in the proficient or above range on the mathematics examinations in all grades tested.

Table 1

*Percentage of Students Scoring Proficient or Above*

Mathematics MAP Results			
	<u>2002</u>	<u>2003</u>	<u>2004</u>
State Proficiency Goal	8.3	9.3	10.3
Total	21.1%	21.3%	22.9%
Asian	37.2%	42.1%	41.1%
Black	7.4%	8.3%	10.3%
Hispanic	13.5%	14.8%	15.6%
Indian	13.6%	13.0%	14.3%
Pacific Islander	16.1%	16.3%	*
White	24.2%	24.4%	25.9%
Other/Non-Response	15.6%	14.9%	14.3%
Free/Reduced Lunch	13.3%	13.3%	14.8%
IEP	7.3%	8.3%	9.0%
LEP	9.6%	14.8%	18.5%

\*Pacific Islander subgroup combined with Asian in 2004

Amrein and Berliner (2002) examined data from 18 states to determine whether high-stakes testing programs affected student learning. The authors hypothesized that test preparation programs, narrow curricular focus, and exclusion of certain students, such as those identified by NCLB, confounded

interpretation of test results. In all but one analysis, results indicated that student learning was indeterminate, remained at the same level, or decreased following the implementation of high stakes testing policies. When comparing state results with results on the National Assessment of Educational Progress (NAEP), the authors found that students from states with high-stakes testing did not achieve as well on the NAEP mathematics test at the eighth grade level. The authors concluded that increases in scores were the result of test preparation and exclusion of specific groups of students, including students with IEPs or classified as Limited English Proficient.

Maylone (2002) forwarded the idea that policymakers operated under a false assumption that student scores on standardized tests provided both a valid and reliable indicator for the quality of schools. The author examined the correlation between Michigan public school district socioeconomic factors and aggregate student achievement test scores. Socioeconomic factors demonstrating high correlation to achievement scores included the percent of students receiving free or reduced-price lunches, annual mean district household income, and percentage of single-parent households. Maylone suggested that policies focused on decreasing child poverty held greater potential for increasing student achievement than did accountability plans and high stakes testing.

Research results related to the impact of teacher experience or training on student achievement have been inconsistent. Greenwald, Hedges and Laine (1996) examined 68 studies in a meta-analysis on the relationship between student achievement and teacher factors. Forty-six of the studies found no

significant results when examining teacher experience as a factor in student achievement. Kirkpatrick (2002) reviewed research on the impact of teachers' advanced study on student achievement and found no evidence of consistent results yielding a positive relationship. Ponders (2001) cited a National Commission on Teaching and America's Future report on studies of more than 1,000 school districts and concluded that spending school resources on highly qualified teachers resulted in increased student achievement. Additional studies cited by the commission attributed more than 90% of variance in student achievement in reading and mathematics to differences in teacher qualifications when comparing high-achieving and low-achieving elementary schools. *The Secretary's Annual Report on Teacher Quality* (Paige, 2002) suggested a lack of scientific evidence demonstrating the relationship between student achievement and the knowledge of pedagogy, degrees in education versus an alternative certification process, and time spent in clinical placements prior to entering the profession.

The reauthorization of the Individuals with Disabilities Education Act in 1997 established the expectation for testing students with disabilities and that test results be included in a school's measure of accountability at some level. However, passage of NCLB took the level of accountability one step further, requiring students with disabilities to meet the same standards and goals as other students in the school and at the same time (Schwartzbeck, 2003). In a report from the Mid-Continent Research for Education and Learning Diversity

Roundtable III, Thurlow (2000) summarized the potential impact of including special needs students in standards-based reform with the following statement:

Including students with disabilities in standards-based assessments may be the best thing that has happened to these students since the introduction of Public Law 94-142. The inclusion of these students must be taken seriously by the entire system.

When that happens, we will have reached a new era in maximizing the potential of all individuals in our school systems today. (p. 33)

However, administrators, teachers, and parents question the validity of holding students with disabilities to the same level of accountability as other students. The 2003 Phi Delta Kappa poll of public attitudes (Rose & Gallup, 2003) stated that 66% of non-parents and 68% of parents opposed holding students with disabilities to the same standard as other students. In a report from the Center on Education Policy, state and district officials indicated that the accountability requirements for students with disabilities and English-language learners could create negative consequences (Robelen, 2004).

#### Purpose of the Study

The present study was designed to investigate factors that may lead to differential achievement of students with and without IEPs in mathematics, as measured by the MAP assessments. Research by McCall, Kingsbury, and Olson, (2004) cited limitations of the current method, which may reflect demographics more than effectiveness of instruction or student progress. Therefore, the current

study examined teacher characteristic and socioeconomic factors that contributed the mathematics success of students with and without IEPs.

In a letter to the director of the Student Achievement and School Accountability Programs of the federal government, Ziegler (2002) voiced support for most of the principles embodied in the No Child Left Behind Act. The current official position of the Council for Exceptional Children supports the inclusion of special education students in statewide accountability systems. The Council for Exceptional Children agrees that AYP definitions must apply the same standards of achievement to all public school children. In addition, Ziegler supported the inclusion of separate annual measurable goals for several groups of children, including those with disabilities, within the definition. However, Linn (2003) projected that reaching 100% proficiency by the year 2014 would be highly unlikely and that accountability systems should set ambitious, yet attainable, goals that are realistically obtainable with sufficient effort.

Testing results from 2004 indicated that of Missouri's 96 middle schools with 30 or more eighth grade students with IEPs, only two schools met the state proficiency goal in math. Additionally, the subgroup of students with IEPs demonstrated lower MAP Index scores than any other disaggregated subgroup. The purpose of this study was to examine the relationship between the performance of students with and without IEPs on the MAP mathematics examinations, socioeconomic factors, and teacher characteristics. Variables examined included teacher characteristics (level of education and years of teaching experience), and socioeconomic factors (per pupil expenditures,

number of students on free or reduced-price lunch, and annual mean district household income).

### Research Questions

In this study, the researcher examined variables that may be correlated to eighth grade mathematics MAP Index scores for students with and without IEPs. Students with IEPs include those students qualifying or having a disability under the Individuals with Disabilities Education Act and receiving special education services. Questions addressed in this study include:

1. What is the relationship between teacher experience and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores for the IEP subgroup?
2. What is the relationship between teacher level of education and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index score?
3. What is the relationship between per pupil expenditures and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index score?
4. What is the relationship between average annual household income and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index score?
5. What is the relationship between the percentage of students on free or reduced-price lunch and mathematics achievement for students with

and without IEPs as measured by eighth grade mathematics MAP Index score?

6. What combination of the five variables (teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch), predict achievement for students with and without IEPs as measured by eighth grade mathematics index score?

### Significance of the Study

Adequate Yearly Progress expectations of NCLB required all students, including those with disabilities, to demonstrate proficiency in reading and math by the 2013-2014 school year. Proficiency requirements of No Child Left Behind represented a particularly difficult impediment for students receiving special education services (Simpson, LaCava, & Graner, 2004). The approximately 6.6 million students nation-wide with disabilities and the educators responsible for their learning faced the challenge of meeting rigorous expectations for achievement. The percentage of students with IEPs that met the Missouri proficiency goal in mathematics (grades 4, 8, and 10) for years 2002, 2003, and 2004 are 7.3, 8.3 and 9.0, respectively. Results from the eighth grade level for the years 2002, 2003, and 2004 indicated that the percentage of eighth grade students with IEPs that met the state proficiency goals are 1.3, 1.6, and 1.8, respectively. The MAP Index score of eighth grade students with IEPs was 133.4 in 2003 and 134.5 in 2004. Additionally, these MAP Index scores are lower than results for all other disaggregated subgroups. This failure to meet the state

proficiency goal demonstrates the need for research in this area, as well as the importance of findings on future practice. While several studies examined the impact on students in general, few studies focused on possible correlations for students with IEPs as a specific group. This research seeks to provide insight into the influence of teacher characteristics and socioeconomic factors on the achievement of students with and without IEPs as measured by the eighth grade mathematics scores.

#### Limitations of the Study

Limitations of this study included the number of subject areas, grade levels examined and the availability of current data related to socioeconomic factors. The examination of only the students with IEPs subgroup also limited the scope of the study.

1. The population and sample for the study included public school students within the state of Missouri.
2. Mathematics MAP examinations are administered to students in the fourth, eighth, and tenth grades. Only results of student performance in eighth grade were included in the study.
3. The only available census data identifying annual household income is from the 2000 census. The next update of census data is not available until 2010.
4. MAP results are disaggregated into ten different subgroups; however, the scope of this study was limited to the performance of students in the subgroup referred to as Students with IEPs.

5. Results from 244 schools were not included based on the state identified criteria for reporting subgroup scores. Schools with fewer than 30 students in a subgroup were not reported based on confidentiality standards established by DESE.

#### Definition of Key Terms

*Adequate Yearly Progress (AYP):* Requirements of NCLB required districts and schools to demonstrate continuous and substantial academic improvement using statistically reliable and valid methods for all students, including separate measurable annual objectives for achievement for all students, racial or ethnic groups, economically disadvantaged students, students with disabilities, and students with limited English proficiency (NCLB Accountability and AYP, 2003).

*High Stakes Testing:* Mandatory standardized testing programs for the purpose of determining student performance levels. Schools face specific rewards and/or sanctions based on the results of such testing.

*Individual Education Program (IEP):* According to federal statute the term 'individualized education program' or 'IEP' means a written statement for each child with a disability that is developed, reviewed, and revised in accordance with section 614(d) (Individuals with Disabilities Education Improvement Act of 2004).

*Least Restrictive Environment (LRE):* According to federal statute, to the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are not disabled, and special classes, separate schooling, or other removal of

children with disabilities from the regular educational environment occurs only when the nature or severity of the disability of a child is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily (Individuals with Disabilities Education Improvement Act of 2004).

*Limited English Proficient (LEP):* Students demonstrating a limited ability to read, write or speak English based on the fact that English is not the primary language.

*MAP Index Scores:* Index points are calculated by first multiplying the percent of students scoring at each achievement level for each subject and each year by the following values: Advanced by 3, Proficient by 2.5, Nearing Proficient by 2, Progressing by 1.5, and Step 1 by 1. These products are then summed to produce the index.

*Middle School:* Schools typically including students in grades six, seven, and eight or a configuration of these grade levels.

*Per Pupil Expenditures:* The quotient of each districts' current expenditures and average daily attendance for 2004 as reported by the Department of Elementary and Secondary Education.

*State Proficiency Goal:* The percentage of students required to score at the Advanced or Proficient levels of the MAP for a district or school to demonstrate adequate yearly progress toward 100% of the students being proficient by the year 2014.

*Students with Disabilities:* According to federal statute the term *child with a disability* means a child with mental retardation, hearing impairments, speech or language impairments, visual impairments, serious emotional disturbance, orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities and who, by reason thereof, needs special education and related services (Individuals with Disabilities Education Improvement Act of 2004).

*Teacher Experience:* The average number of years of teaching experience as reported by the Department of Elementary and Secondary Education.

*Teacher Level of Education:* The percentage of teachers in a given building holding advanced degrees including masters and above.

### Summary

Chapter One contained an introduction to the proposed study including background information pertaining to the implementation of No Child Left Behind legislation as related to achievement testing of special education students; statement of the problem, purpose of the study, research questions, significance of the study, assumptions and limitations, and definition of key terms. Chapter Two presents a review of literature related to the proposed study including research on policy implementation, high-stakes testing and accountability, factors affecting achievement, and special education issues associated with achievement testing. Chapter Three presents the methodology proposed for the study. Chapter Four contains the findings for the study while Chapter Five provides a discussion of those findings.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### Introduction

Mandates established when President Bush signed No Child Left Behind (NCLB) into law January 8, 2002, required a shift in the paradigm of determining the adequacy of public education. Basic principles of NCLB included the use of scientifically based practices by highly qualified teachers, increased local control and flexibility related to funding, expanded options for parents of students attending low performing schools, and greater accountability for student performance or achievement. The law represented an assertive congressional attempt to create major reform in the American education system. Goals established by NCLB included holding every student accountable for meeting state-identified standards by the 2013-2014 school year. To this end, each state established benchmarks by which to measure progress at the school and school district level. The law required the development of a statewide accountability system that included all public school students (No Child Left Behind, n.d.).

Under NCLB, states must determine the level of achievement of all public schools on an annual basis. Student achievement that was both continuous and substantial formed the basis for determining Adequate Yearly Progress (AYP), with all students demonstrating proficiency in reading and mathematics by the 2013-2014 school year. While the law established expectations for all students, specific subgroups must also meet adequate yearly progress goals. Test results must be disaggregated to indicate the performance of students by ethnic

background, including Asian, Black, Hispanic, Indian, and White. In addition, performance must be reported for students receiving free or reduced-price lunch and students with an individual education program (IEP) or limited English proficiency (LEP). In an effort to ensure confidentiality and maintain rights to privacy, NCLB guidelines allowed states to determine the number of students needed for reporting disaggregated data. Other AYP accountability measures determined by each state included data such as graduation rates for high schools and attendance rates for middle schools. The law included provisions that required each state to develop an accountability system that is statistically valid and reliable (No Child Left Behind).

Marzano (2003) categorized factors affecting student achievement according to three areas: school, teacher, and student-related. School-related factors included a guaranteed and viable curriculum, challenging goals and effective feedback, parent and community involvement, safe and orderly environment, and collegiality and professionalism. Teacher-related factors affecting student achievement included instructional strategies, classroom management, and classroom curriculum design. Home atmosphere, learned intelligence and background knowledge, and motivation comprised the student-related factors affecting achievement. While the scope of this study did not include school-related factors established by Marzano, the study and subsequently review of related literature included teacher-related factors affecting student achievement, which may be acquired through training and

experience, as well as student-related factors associated with socioeconomic variables.

Testing practices and accountability expectations related to the implementation of No Child Left Behind represented a comprehensive change in policy and practice. These changes brought a new level of accountability to public schools with high stakes attached to the results. Therefore, the review of literature for the study will begin with a review of issues associated with policy implementation. The next section examines the impact of high-stakes testing. The review of literature examines research on factors affecting student achievement, including teacher perceptions and teacher characteristics. Socioeconomic factors and school expenditures will comprise the next area of investigation. The final area of review focuses on special education issues associated with statewide testing programs.

### Policy Implementation

Fowler (2000) defined policy as a dynamic and value-laden process. It is through this process that political systems handle public problems. Included in the definition of policy are governments' expressed intentions, official enactments, and patterns of activity as well as inactivity. Policy analysis involved evaluation of government policies in an attempt to determine the most appropriate policy based on given goals, constraints, and conditions. Fowler identified four types of policy analysis: monitoring, forecasting, evaluation, and prescription. Fowler identified the school leaders' role in policy study as policy makers, policy implementers, followers, and influencers of policy issues.

Fowler (2000) noted that as followers of policy, leaders should not restrict their awareness to building or district level concerns. To follow or predict policy, leaders must increase their awareness of major changes in the social and economic environment. Fowler also suggested that leaders should watch for issues examined and defined at the university or foundation level. Policy awareness warranted close attention to the legislative process at both the state and federal level. School leaders should stay active in professional organizations in an effort to stay informed. As influencers of policy, school leaders should seek out connections with others and maintain a network with colleagues in their field.

In a study conducted by Louis and Miles (1990), two-thirds of the problems associated with implementing new policy related to resources. Major problems identified in the study included teacher time and energy, money, arranging staff development, on-going communication, limitations of facilities, and teacher morale/resistance. Fowler (2000) further divided resources into the categories of money, time, personnel, space, and equipment and materials. The author supported the concept that the most appropriate expenditures provided ongoing assistance for the implementers. Time is the next critical resource mentioned because new skills or behaviors are usually more time-consuming than established routines. While few projects can afford to hire additional personnel, it is imperative that leaders consider the possibility of hiring project directors or at least take into consideration the availability of personnel for implementing new policy. Space is an often overlooked resource but important nonetheless. Inappropriate or inadequate space can significantly weaken the

quality and success of policy implementation. Although closely tied to available funds, materials or equipment needed to implement the policy were the final resources to consider. To create true policy changes, leaders must determine what resources are necessary and work to secure them before and during implementation.

Fullan and Miles (1992) presented reasons why reforms fail, as well as propositions for success. As change agents, effective leaders were cognizant of the needs of members of the organization throughout the change process and understood that change was a learning process, with the journey being as important as the destination. Implementing change utilized a significant amount of resources and required power to manage it. Leaders needed to realize that change was systemic and that large-scale change usually occurred at the local level.

Bruce Hunter, director of public policy for the American Association of School Administrators (Flanigan & Marion, 2003), suggested that a period of great change in school systems will follow the implementation of federal statutes association with NCLB for up to four to five years. States are concerned about the various consequences associated with failing to demonstrate adequate yearly progress and at least two states, Hawaii and Utah, considered ignoring the law and forfeiting federal funding (Flanigan & Marion). States expanded the size and scope of assessment programs and will continue to do so as NCLB requires testing for third through eighth grades by the 2005 – 2006 school year.

## High Stakes Testing

Goertz and Duffy (2003) identified four major implications for state and district accountability and assessment policies. First, provisions of NCLB required states to expand the size and scope of assessment programs, most noticeably by testing in up to six additional grade levels. Several states faced substantial increases in the cost and capacity of existing testing programs. Second, with a growing reliance on a single test, the author questioned the ability of such a test to serve multiple purposes. The ability of a single form of assessment to be a valid indicator of performance, to motivate students and teachers to perform better, to facilitate changes in instructional practice, and to assist in educational decisions about individual students is questionable. Third, there is an unspoken certainty that an increasing number of schools will fail to meet state improvement goals as the 2013-2014 deadline approaches. With the threat of sanctions looming, the author questioned whether teachers and principals attempt to and know how to act upon the right kind of student performance data. The fourth implication suggested by Goertz and Duffy (2003) regards the capacity of the system to support change. Teacher motivation to reach student achievement goals depended on capacity-building conditions such as professional development and teachers' knowledge and skills related to improved instruction. However, federal policies emphasize accountability with insufficient resources to develop meaningful activities necessary to create a capacity for change.

Abrams and Madaus (2003) reviewed a 1998 examination of the effects of high-stakes testing that identified seven principles regarding the intended and

unintended consequences of testing programs. First, large effects were dependent on the administrators', teachers', and students' beliefs that the results of such tests were important. Second, improvements in state test scores failed to reflect general gains in achievement, and the quantitative indicators used in decision-making increased the possibility of distorting and corrupting the results. The third principle noted that teachers tended to teach to the test when important decisions depend on test results. Fourth, the use of high-stakes tests led to curriculum defined by test content. Fifth, teachers adjusted methods of instruction based on the form of the questions on tests. The sixth principle suggests that test results became the major goal of schooling rather than an indicator of achievement when used as the sole or even partial judge of future choices. Finally, control over the curriculum unintentionally transferred to the agency that designed the exam.

Sloane and Kelly (2003) suggested four central themes or issues regarding high-stakes testing programs. First, a great deal of disagreement and variation exists regarding the appropriate type of test used. Given current social goals and limitations presented by testing format, educators should determine whether the test chosen provides useful data to support decision-making. Test results did not relieve the user from the responsibility of interpreting results for the purpose of decision-making. Secondly, the impact of high-stakes testing on student motivation and morale included both positive and negative consequences. The third issue, alignment between the test and curriculum, was imperative, and testing formats used in the classroom must align with those used

in statewide testing programs. The standards-based reforms of the 1990s supported the use of performance type assessments. Sloane and Kelly pointed out that some states, in response to NCLB requirements, opted to change to an objective test that fails to reflect the content and instructional methods associated with the curriculum. This misalignment often created a false impression that students failed to master the curriculum and that schools failed to demonstrate adequate yearly progress. The final issue challenged the purpose of testing and accountability expectations under NCLB. The authors suggested that a distinction exists between assessment of learning and assessment for learning. Current practices in high-stakes testing supported assessment of learning. Sloane and Kelly (2003) believed that,

The fact that a state or the federal government can aggregate a child's score with others and denounce an entire school as failing provides little service to either the child or the school, unless it comes with substantial remedial resources. (p. 15)

A study by Stecher, Hamilton and Gonzalas (2003) showed positive effects, such as providing students with better information about their knowledge and skills, motivating students to work harder, setting clear expectations for what to study, and helping students align effort with rewards. However, some of the negative effects included frustrating students, which discouraged them from trying; making students more competitive; and causing students to devalue grades and school assessments.

Clark, Shore, Rhoades, Abrams, Miao and Li (2003) studied the perceived effects of state-mandated testing programs on teaching and learning. The authors concluded that increasing the stakes attached to the test results does not necessarily bring about improvements in teaching and learning. In addition, the authors found adverse effects on the quality of classroom practice and negative impact on at-risk student populations. The study conducted through interviews with educators in low-, medium-, and high-stakes testing states provided eight recommendations. First, states should invest in high quality professional development for educators related to state standards. Second, instructors need high quality classroom materials and resources aligned with state standards. The third recommendation called for collaboration between state agencies and schools to ensure appropriate alignment of local and state standards with tests. Alignment must include both content and cognitive processes. The fourth recommendation suggested that states employ on-going monitoring and validation of the testing and accountability system in an effort to avoid unintended negative effects. State testing procedures should include a variety of options for students to demonstrate achievement. The authors encouraged educators to incorporate the teaching and learning process into standards-based reform. Finally, the authors warned against using test results to compare teachers and schools unless student demographics and school resources are comparable and the school resources are adequate to produce high student performance.

The accountability measures established by NCLB allowed each state to determine the level at which a test score would be considered proficient

performance. Linn, Baker, and Betebenner (2002) found a wide variability in the methods used by states to both define proficient and determine the level of scores needed. Based on information obtained from state department of education websites in 2001, the percentage of eighth grade students proficient in reading ranged from 27% to 91% while the percentage of eighth grade students proficient in mathematics ranged from 31% to 92%. Only 7% of students in Louisiana and 39% of those in Mississippi scored at the proficient level on eighth grade mathematics tests, while 92% of students in Texas met proficiency in this area. Linn, Baker, and Betebenner reviewed available test results against the National Assessment of Education Progress (NAEP) and found that gains demonstrated on state level tests exceeded those found on the NAEP. The authors noted concern regarding the variability between states in the rigor of tests used, content standards, and levels established for determining proficiency. These differences meant that states were not starting on a level playing field, and making judgments relevant to student progress is therefore questionable. The authors argued that even if educators agree that schools should improve and that holding schools accountable contributes to that improvement, it remained unreasonable to expect 100% of the students to reach the proficient level.

Reports from Olson (2004) and Popham (2003) further demonstrated the concerns associated with the accountability expectation for adequate yearly progress. A preliminary list showing results from 14 states recorded as few as 8% of schools that failed to make Adequate Yearly Progress in Minnesota to as many as 87% that failed to make AYP in Florida (Robelen, 2003). States

interested in adjusting accountability plans after 2003 test results had to do so by April 1, 2004. Many states filed state level appeals such as those in Minnesota, based on the fact that several tests had been coded incorrectly relevant to the disaggregation of data. Districts had 30 days to make necessary changes after the first round of testing. Over 14,000 individual data changes then resulted in the removal of 93 schools from the list of those that failed to demonstrate adequate yearly progress. The authors dubbed the concept of adequate yearly progress as a moving target and identified at least six states in the process of making amendments to accountability plans.

In response to the first publication of schools failing to make adequate yearly progress, Popham (2003) identified a variety of ways states are adjusting accountability plans in an effort to avoid the perception that schools are unsuccessful. First, some states changed the definition of proficient or lowered the test score necessary for a determination of proficient. By lowering the expectation for proficient scores, fewer schools fail. A second short-term adjustment involved the increments toward meeting the 100% proficient by 2013-2014 goal. While requiring a lower percentage of students to demonstrate proficiency in the early years lessened the pressure on schools, it also created unrealistic annual improvement goals in later years. The author theorized that by employing this method for addressing accountability, states reduced early school failure and hoped that future modifications in the federal law would make it less demanding or eliminate it. A third method for addressing accountability related to the minimum number required for reporting subgroup data. Several states

established what Popham referred to as outlandishly large numbers of students for determining statistical reliability. Data showing a range from five to 75 in the minimum number established by states supported this observation (Markowitz, 2002).

Chamblin (2003) compared high stakes test results for 52 general education students, 52 remedial students and 52 resource room students. Simple tests of means demonstrated increases in both reading and mathematics scores. The study found no significant differences in pre-test means of the three groups using analysis of variance. The analysis of co-variance identified pre-test scores as the most significant predictor of post-test scores and no significant differences when comparing groups by classification. Walstad (1984) investigated practices associated with increases in student test scores, including pre-testing, curriculum changes, and professional development. The only significant variable found to predict student performance was use of a pre-test that exposed students to test format.

Evidence from a study of 18 states with high stakes testing indicated that student learning was indeterminate, remained at the same level, or decreased after the implementation of high-stakes testing policies (Amrein & Berliner, 2002). For states demonstrating increased test scores, there was little support that it was the result of anything more than test preparation and/or the exclusion of students from the testing process. The authors believed that test scores are easily manipulated through test preparation programs, narrow curricular focus and the possible exclusion of certain students. In addition, the authors supported

the uncertainty principle that states, “the more important any quantitative social indicator becomes in social decision-making, the more likely it will be to distort and corrupt the social process it is intended to monitor” (Amrein & Berliner, p. 2).

Despite the findings cited above, statewide testing to measure student and school progress is a requirement of NCLB. Thurlow (2000) identified several reasons for including students with disabilities in accountability systems. The authors believed including students with disabilities not only provided a more accurate picture of education but that students with disabilities benefited from reforms. Including students with disabilities allowed for more accurate comparisons and avoided the possibility of unintended consequences of exclusion.

## Teacher Effects on Student Achievement

### *Teacher Perceptions*

The National Board on Education Testing and Public Policy conducted a survey in 2001 to assess teachers’ perceptions of state-mandated testing programs (Abrams, Pedulla, & Madaus, 2003; Pedulla, 2003). While 75% of the teachers indicated the district curriculum aligned with state-level testing, only 50% felt the same was true for classroom tests. Seventy-five percent felt that school-level curriculum aligned with the state-mandated testing, but again that percent dropped significantly when asked if instruction met those same criteria for alignment. Surveyed teachers believed that state-mandated tests narrowed instruction, and in actuality contradicted teachers’ views of good instructional practices. Teachers, feeling a significant amount of pressure for improving

student performance from both the superintendent and principal, consequently devoted less time teaching content not on the test.

Abrams, Pedulla, and Madaus (2003) included a variety of sources from states, such as Virginia, Kentucky, and North Carolina, that supported a strong relationship between curriculum and statewide testing. Teachers reported neglecting and de-emphasizing subject areas and content untested at the state level. Teachers felt an increased amount of pressure to improve student performance and spent more than 20% of their total instructional time practicing for end-of-grade tests. The authors expressed concern about the degree to which educators are teaching to the test and the extent to which that knowledge fails to transfer to other test formats. Koretz and Barron (1998) found that mathematics scores on the Kentucky state mandated test were substantially greater than scores on the math portion of the National Assessment of Education Progress (NAEP). Further, Abrams, Pedulla, and Madaus' review of the national survey suggested that, overall, high-stakes testing policies contributed to increased frustration, diminished student learning experiences, low morale, and restricted curricular options.

Kubow and Debard (2000) conducted a survey in an Ohio suburban school district and found that proficiency testing had a significant impact on the environment, curriculum, learning behavior, student learning needs, and community relations. School climate suffered when implementation of proficiency testing failed to consider school district opinion during the policy development process. The researchers found that the tests helped schools align their

curriculum and increased teacher awareness of educational outcomes. However, this increased student anxiety, resulting in little or no effect on student motivation. The proficiency testing created levels of social stigma, distracted students and teachers from the purpose of schooling, and raised concerns regarding the impact on students' views on learning. The only impact noted in relation to community relations was an increased level of competition among school districts.

### *Teacher Characteristics*

The 1998 reauthorization of Title II of the Higher Education Act required the Secretary of Education to issue annual reports on the state of teacher quality. The report identified highly qualified teachers as those holding full state certification or licensure and demonstrating competence based on an objective state standard for evaluation (Paige, 2002). Secretary Paige also outlined new certification requirements associated with No Child Left Behind legislation. Elementary school teachers must pass subject skill knowledge as well as teaching skills tests in the areas of mathematics, reading, and writing. Middle and high school teachers must either pass subject-matter tests or possess the equivalent of an undergraduate major, advanced certification or graduate degree in the necessary subject area.

Paige (2002) described research in Tennessee that found the effects of students' exposure to highly qualified teachers to be additive and cumulative. The study utilized student performance to categorize teachers into quintiles representing levels of effectiveness. After tracking the progress of third grade

students, the study found achievement gains of 83% for students assigned to the most effective teachers while students assigned to less effective teachers demonstrated a 29% gain in learning. Secretary Paige's report cited research on the important connection between student achievement and a teacher's cognitive and verbal abilities. Additionally, students demonstrated greater gains in learning with math and science teachers holding a major in that subject area. Finally, the report indicated a lack of scientific evidence related to knowledge of pedagogy, degrees in education versus an alternative certification process and time spent practice teaching.

Darling-Hammond and Youngs (2002) suggested that definitions of a highly qualified teacher, provided in an annual report by the United States Secretary of Education, were not based on scientific research. The report misrepresented findings from research and included unsupported statements about teacher education programs. The authors believed teacher education and certification are related to teacher effectiveness based on studies showing a negative relationship between student achievement and the percentage of teachers on emergency permits. While there was some evidence in research that verbal or general academic ability is related to student achievement, Darling-Hammond and Youngs pointed out that these studies did not include measures of teacher education or certification, making it impossible to sustain a claim that verbal ability matters more than professional knowledge. Findings in the Secretary's report suggested that fewer than 36% of new teachers felt very well prepared to implement curriculum. The Likert scale in the study cited included the

following choices, “very well prepared,” “moderately well prepared,” “somewhat well prepared,” and “not at all prepared.” Darling-Hammond and Youngs suggested that consideration of the entire Likert scale was more accurate in that data revealed 77 percent of all teachers felt moderately or very well prepared to implement curriculum. The authors suggested that meeting the highly qualified teachers challenge requires states to maintain current direction and focus as opposed to changing the definition proposed by the Secretary’s report.

Gallagher (2002) examined teacher efficacy, defined as one’s belief that a teacher’s ability to help students achieve high levels of achievement is limited by student characteristics. The research, based on studies, found that teachers with a high sense of efficacy promoted an expectation of achievement by employing a pattern of strategies that minimized negative effect. Teachers with a low sense of efficacy promoted an expectation of failure for low achievers, establishing a pattern of strategies that heightened a negative effect. In addition to teacher efficacy, Gallagher examined the relationship between curriculum alignment and student achievement. Findings of the study suggested that low alignment to state standards influenced the low relationship between teachers and classroom effects in mathematics.

Kirkpatrick (2002) focused on the teacher as a classroom resource as opposed to the examination of teachers’ personal characteristics. The study included 86 teachers in grades three through eight and examined the effects of teachers’ educational background, instructional practices, teaching experience, content knowledge, and efficacy beliefs on student performance in mathematics.

The author defined teaching efficacy as the conviction or belief that teaching has a greater influence on student learning than family background and home environment. Self-efficacy was a teacher's belief or conviction about the extent to which he or she individually had a greater influence than family background and home environment on student learning. Kirkpatrick found that prior knowledge had the greatest impact on student outcomes in mathematics achievement. Results demonstrated a positive relationship between student performance and teacher instructional practices and years of experience teaching mathematics. Students of teachers holding bachelor's degrees demonstrated higher achievement than students of teachers with advanced degrees. The remaining teacher quality factors (content knowledge, personal efficacy beliefs, and general efficacy beliefs) had no statistically significant effect on student performance.

Based on previous research, Ponders (2001) hypothesized that teacher certification, years of experience and educational levels significantly predicted student achievement. However, the researcher believed that findings of national studies did not represent conditions of urban school districts and, therefore, focused on an urban school district to determine whether teacher characteristics and preparation factors predicted student achievement. The study included qualitative factors focused on conditions in the school district as well as quantitative teacher factors, such as race, age, gender, preparation, certification, and educational level. Findings from the quantitative analysis indicated that teacher certification (i.e., provisionally and professionally certified teachers versus non-certified teachers) was a significant predictor of student achievement.

The researcher failed to reject the hypothesis that educational experience does not affect student achievement. Findings suggested that teachers with greater experience demonstrated both a significant and negative effect on student achievement. Ponders (2001) believed teachers with a greater number of years of experience became cynical and developed a psychological condition of exhaustion, cynicism, and inefficacy, referred to as burnout, which contributed to this negative effect. For the final hypothesis, Ponders found no statistically significant differences between student achievement and level of teachers' education.

Hanushek (1989, 1994) analyzed previous studies on the effects of student-teacher ratio, teacher education, teacher experience, salaries, per pupil expenditures, quality of facilities, and various administrative inputs on student achievement. Of the 152 studies analyzed, only 14 found a positive relationship between smaller class size and higher student achievement. Eight of the 113 studies on teacher education found a statistically significant positive effect between teacher education and student performance. Furthermore, teacher experience yielded a consistently positive relationship with student performance.

Studies specific to characteristics of special education teachers examined strategies for performance improvement (Schmitz, 2003) and supervisors' perceptions of teachers of exceptional children (Edmission, 1995). Schmitz examined the special education teacher evaluation process in Iowa and found that the selected sites' teacher evaluation criteria did not align with Council for Exceptional Children Standards for All Beginning Teachers. The author

recommended revising current teacher evaluation instruments and professional growth plans. Edmission's findings identified the following order of preference for ten characteristics for special education teachers: a genuine caring and concern for children, motivation, organizational skills, behavior management, communication skills, knowledge of content, flexibility, use of alternative instructional methods, holistic approach, and school-family-community relations. However, the perception of supervisors of special education teachers formed the basis for the results of this study without consideration for actual student achievement.

Wayne and Youngs (2003) reviewed 21 studies on the relationship between student achievement and teacher characteristics in four categories: college ratings, test scores, degrees and coursework, and certification status. The authors concluded that it was not possible to discern the relationship between college ratings and subsequent student achievement. Findings related to teachers' scores on tests of verbal skills and other tests indicated that students learn more from teachers with higher test scores. Wayne and Youngs determined that the strongest connection between student achievement and teachers with advanced degrees existed in mathematics at the high school level. Teachers' coursework and areas of certification again demonstrated a strong relationship to student achievement but only in the area of high school mathematics. While the report did not present information pertaining to the impact of years of experience, the authors noted evidence of a positive relationship between student achievement and teachers' years of experience.

Mandates established by No Child Left Behind required schools to demonstrate that all teachers of core academic subjects are highly qualified by the 2005-2006 school year. To be considered highly qualified, teachers must have a bachelor's degree, full state certification or licensure, and prove knowledge of each applicable subject (No Child Left Behind, n.d.). Means for demonstrating competency for middle school and high school teachers included a major in the applicable subject, credits equivalent to a major, passage of a state-developed test, an advanced certification, or graduate degree. No Child Left Behind regulations allowed states to develop an additional means for current teachers to demonstrate competency referred to as High, Objective, Uniform State Standard of Evaluation (HOUSSE). Possible criteria for competency under HOUSSE included a combination of teaching experience, professional development, and knowledge in the subject acquired over time in the profession. Highly qualified standards pertained to special education teachers providing direct instruction in core academic subjects. Special educators not directly instructing students in core academic subjects or who provide only consultation to highly qualified teachers did not need to demonstrate subject matter competency.

#### Socioeconomic Factors and School Expenditures

Sutton and Soderstrom (1999) sought to identify the relationship between school demographic variables and the Illinois Goal Assessment Program measuring student achievement. The researchers divided variables into two categories: variables that can be controlled (average class size, pupil-teacher

ratio, teacher experience, teacher salary, and per pupil expenditures) and variables not under the control of the school district (percentage White, attendance, mobility, low income, and high school dropout rate). Multiple regressions confirmed that variables that could be controlled were statistically significant in accounting for variance in third and tenth grade student achievement. However, multiple regression results yielded much stronger values for variables that could not be controlled. Low income, percentage White, high school graduation rate, and dropout rate yielded the strongest correlation to student achievement. Although some shared variance among the variables existed, results indicated that each variable contributed enough unique variance to remain as school achievement predictor variables. Based on findings from the study, the researchers suggested that using achievement scores to compare schools and school districts adversely affects schools with a population of low-socioeconomic demographics while favoring schools that serve advantaged students.

### *Socioeconomic Factors*

An underlying assumption of NCLB maintained that student scores on standardized tests provide a reliable, valid measure of school success. However, Maylone (2002) believed socioeconomic factors to be a more reliable predictor of school test scores. Maylone conducted a quantitative study to determine the degree to which Michigan public school district socioeconomic factors predicted state test scores. The author used percent of students receiving free or reduced-priced lunches, percent of district single-parent households, and annual mean

district household income as indicators of socioeconomic status. Maylone found the percent of students on free or reduced-price lunch was the strongest predictor of test scores. The combination of factors producing the highest power of prediction included percent of students eligible for free or reduced-price lunch, percent of single-parent households, and mean annual household income. Maylone believed that findings from the study called into question the practice of using test scores to determine school success. Results of the study included what the author referred to as a few outliers or low socioeconomic districts with high test scores. Maylone recommended further study to determine factors that contributed to success in these schools.

Powers (2003) utilized three categories of variables (socioeconomic status, teacher training and teacher experience) and school characteristics in an analysis of performance-based accountability. The study focused on elementary schools and the state measure of performance known as the academic performance index. Powers used the percentage of students eligible for reduced-price or free lunch, the percentage of students attending school for less than one year, and the percentage of students reported as English learners to create a composite indicator of socioeconomic status for each school's population. Findings suggested academic performance scores decreased as the percentage of teachers holding emergency credentials increased. Results indicated that student performance improved as the average number of years teaching and the percentage of teachers with master's degrees increased. However, results of regression modes with each category of variable added incrementally yielded a

model in which the socioeconomic status category accounted for 75% of the variability in student achievement on the state accountability performance index.

Hedges and Nowell (1999) used data from available research databases to examine the degree to which the distribution of scores on achievement tests differed for Blacks and Whites and the degree to which subsequent differences were attributed to social class differences. Data provided evidence that while group differences have decreased over time, the mean differences between achievement test scores for Black students and White students continue to be significant. The authors, examining the rate of change over the past 30 years, concluded that it would require more than 50 years to close the gap in mean reading achievement between these two groups. Additionally, it would require a century or more to close the achievement gap between Black students and White students when comparing mathematics and science achievement. While the researchers observed some narrowing of group differences at the top of the achievement distribution, it was attributed to relative changes in social class. The study also found that randomly-selected Black students were no more likely to score at the top of the distribution in 1992 than in 1965. The researchers suggested that a more rapid trend toward equality in reading reflected school policies that emphasized early intervention programs for poor readers.

Phillips (2002) studied the relationship of socioeconomic status, computer access, teacher turnover, early learning experiences, and ethnicity to student achievement. The author used free or reduced-price lunch rates as a measure of socioeconomic status. Results from the study found no relationship between

student achievement in English and math and the school district's expenditures on technology. While the study, conducted in South Carolina, found a significant relationship between ethnicity and academic achievement, no other significant relationships were found. Researchers suggested that future research efforts focus on understanding differences and needs of specific student groups.

McCoy (2005) also studied the effects of attitude and demographics on student achievement in mathematics. Demographic variables, gathered by questionnaire, included gender, ethnic group, and highest education level of the most educated parent. The researcher used parents' education level to approximate the socioeconomic status for the family based on the belief that it is a less intrusive alternative to salary or other sensitive data. The study included use of the Fennema-Sherman Mathematics Scales as a measure of attitude toward mathematics. The students in the study did not show gender differences in algebra achievement at the eighth grade level. Analysis of variance results showed that ethnicity, socioeconomic status, and students' attitudes toward mathematics significantly affected achievement scores in mathematics.

#### *Per Pupil Expenditures*

Miles and Darling-Hammond (1997) examined the allocation of human resources and identified six basic principles that influenced student achievement. Schools that are more successful created generalized roles for teachers integrating remedial, special education, Title I, and bilingual education into the regular education setting. Restructuring schedules and groupings offered reduced teacher loads and created smaller, contained teacher/student groups.

Longer and more varied blocks of instructional time provided the flexibility to match daily schedules to learning requirements. Common planning time and professional development time allowed teachers to plan and develop curriculum together. Finally, schools matched resources with greater flexibility for part-time positions and varied job schedules. The researchers found these common principles among successful schools at both the elementary and secondary levels in Ohio, Tennessee, Massachusetts, and New York.

Elliot (1998) examined the relationship between the allocation of school funds and student achievement. The study, which focused on tenth grade students in science and math, measured the change in test performance between eighth and tenth grades. The author hypothesized that when funds are used to hire and train the most qualified teachers, student achievement increases. Secondly, Elliott hypothesized that students' achievement increases when funds are spent on materials and equipment. Variables studied in the research included student background characteristics such as socioeconomic status, racial background, and gender. The researcher determined socioeconomic status by incorporating parents' educational level, occupation, and income. School expenditures were calculated to a per-pupil level for each district based on costs of instruction, including teacher salaries, spending on materials and equipment, and support services for the staff. Findings suggested that per-pupil expenditures indirectly increased students' achievement by providing access to trained teachers who utilized effective instructional methods. Based on results in mathematics, the researcher found that teachers' level of

education and years of experience accounted for part of the positive effects of expenditures.

Wenglinsky (1997) believed that schools could make a difference when economic resources are allocated in a manner conducive to positive school social environments. The study examined the relationship between student academic achievement and per-pupil expenditures on instruction and central office administration, teacher-student ratios, teachers' education, and school social environment. The researcher found a significant relationship between student achievement and per-pupil expenditures on administration of school districts and instruction. Wenglinsky believed the relationship existed because increases in spending translated to reduced class size which, in turn, led to higher levels of achievement.

Reduced pupil-teacher ratio is a frequently studied factor when examining school success or student achievement. Mosteller (1995) suggested that students in small classes outperformed students in larger classes on both norm-referenced and criterion-referenced achievement tests. Benefits of smaller class size were greater for minority students, and the greatest benefits resulted from continuous participation in smaller classes. Even after returning to full-sized classes, pupils who attended small classes in grades K-3 performed significantly better in all academic subjects in subsequent grades and were more likely to graduate from high school and take college admissions tests. Hanushek's (1989, 1994) review found a positive relationship between smaller class size and higher student achievement which, in turn, required increased spending in only 14

studies. Per-pupil expenditures were positively related with student achievement in 13 of 16 studies analyzed.

Okpala, Okpala, and Smith (2001) studied the influence of parental socioeconomic status, parental involvement, and instructional supply expenditures on mathematics achievement at the fourth grade level. The researchers used Pearson product-moment correlation and ordinary least squares regression to examine the strength of each relationship and the variables with the greatest impact on mathematics achievement. Findings demonstrated a significant negative relationship between academic performance in mathematics and the percentage of students in the free or reduced-price lunch program. The study failed to identify a statistically significant relationship between mathematics achievement and instructional supplies expenditures and parent volunteer hours.

Research on the relationship between student achievement and resource allocation yielded mixed results. In addition, many of the factors aimed at increasing student achievement also lead to an increase in per pupil expenditures (Eaton, 2004). While provisions of No Child Left Behind increased the expectations for schools as measured by student achievement, it did not include provisions for additional funding. Therefore, Eaton suggested resource allocation and the subsequent impact on student achievement should continue to be a source of future research.

## Special Education Issues Associated with Statewide Testing

The Education for All Handicapped Children Act (Public Law 94-142), first enacted in 1975, provided guidelines and regulations for the education of special needs students. Programs created during the initial response to the law separated students with special needs in an effort to create specialized instruction. Within 10 years, experts in the field of special education called for more integration with regular education students (Braaten & Gable, 1995). The balance between the amount and location of special education services a student needs and an assurance to provide as much integration in regular education environment/curriculum as possible is described as least restrictive environment. Amendments in 1997 placed a legal responsibility on educators to involve students with disabilities in the general education curriculum. Special education advocates began supporting a higher level of inclusion, with many envisioning a system of public education without a need for separate special education services (known as full inclusion). Supporters asserted that elimination of a separate system of special education would cause general education to become more responsive to special needs students (Braaten & Gable). Prior to the 1997 amendments, students with disabilities were excluded from general state and district-wide standardized assessments. The passage of No Child Left Behind, in conjunction with changes in special education guidelines, increased the attention to inclusion for students with disabilities and an expectation that accountability measures, including state assessments, apply to all students.

In a letter to the Acting Director of Student Achievement and School Accountability Programs, Deborah Ziegler, Assistant Executive Director for Public Policy for the Council for Exceptional Children (CEC), expressed support for the statewide accountability system established by NCLB, as well as the opportunity for alternative assessments for some special education students (Ziegler, 2002). The organization opposed the establishment of an artificial cap on the number of students allowed to participate in alternative assessments and believed that the IEP team should determine the level of participation for each student on an individual basis. Based on the disproportionately high dropout rate for youth with disabilities, the letter suggested that AYP considerations include progress on graduation rates. Ziegler expressed concern for the NCLB requirement for highly qualified teachers. Expectations of NCLB, establishing a highly qualified teacher standard, referred specifically to core academic teachers and did not include special education teachers or related services providers.

In January 2004, the 108<sup>th</sup> Congress voted to reauthorize the Individuals with Disabilities Education Act, subsequently called the Individuals with Disabilities Education Improvement Act of 2004 (Pub. L. No. 108-446, 2004). Felton (2005) described some of the key provisions of the new law which should result in less-adversarial relationship with parents. The first major change in the act focused on improving results for students in special education. The act placed an emphasis on substantive aspects of programming and accountability assurance through progress monitoring as well as scientifically based instructional strategies and positive behavior supports. In addition, Yell (2005)

suggested that enhancing teacher quality by means of scientifically based professional development activities supported the development of highly qualified teachers. The second impact of the legislation involved streamlining the special education process, thus making it more flexible and less bureaucratic. Finally, the law was designed to enhance the quality of special education programs at the state level.

The Individual with Disabilities Education Improvement Act reinforced and clarified several aspects of the participation of students with IEPs in the accountability measures established by NCLB. The reauthorization of IDEA required the participation of students with IEPs in annual statewide testing as well the inclusion of assessment results in AYP calculations. Each student's IEP identified how the student would participate in state assessments as opposed to whether or not he or she should participate. Regulations established what has become known as the 1% Rule. This ruling allowed schools to assess students with significant cognitive disabilities using an alternate measure to meet AYP goals. Students receiving a score of proficient on the alternate assessment may not exceed 1% of all students in the grade tested. In addition, the US Department of Education proposed a 2% Rule that allowed out of level testing for students with persistent academic difficulties. States must continue to develop and implement effective and rigorous plans designed to increase the academic achievement of students with disabilities.

McDonald (2003) conducted a differential item functioning analysis to compare the performance of students with learning disabilities to the

performance of non-disabled students on standards-based assessments. While students with learning disabilities scored lower than non-disabled peers in general, the study investigated differences in item performance and included non-disabled students classified as poor performers or low achievers. Results of the study did not support differences between non-disabled and learning disabled students in mathematics when controlling for overall ability.

Albrecht and Joles (2003) described a number of ramifications regarding the inclusion of students with disabilities in high-stakes testing. The authors quoted an Office of Civil Rights report that stated, "Generally, if a statistical analysis shows that the success rate for a particular group of students is significantly lower than what would be expected from a random distribution, then the test has disproportionate adverse impact" (p. 89). High-stakes testing that significantly determines opportunities and outcomes for test-takers contravenes federal statute that provides access to opportunities without discrimination based on disability. Albrecht and Joles believed that, regardless of use of accommodations, enough variability existed to significantly limit the ability to compare student performance across districts and even states. Finally, the authors proposed that the expectations of NCLB that required students to reach a specific level of performance on a generic assessment directly conflicted with the intent of the process used to develop and implement individualized education programs (IEP). Federal regulations outlined by the Individuals with Disabilities Education Act (IDEA) specifically state decisions related to annual performance

goals, inclusion in assessments, and assessment accommodations are made by the IEP team.

No Child Left Behind required that states establish measurable objectives for determining improved achievement by all students and for specific groups, including students from major racial and ethnic groups, economically disadvantaged students, students with disabilities, and students with limited English proficiency (LEP). Students with disabilities are recognized as such based on the existence of an Individual Education Program (IEP) as established through IDEA criteria. States are required to disaggregate test result data and report outcomes for all students, as well as those in each subgroup. If the students in any one subgroup fail to demonstrate adequate yearly progress, then the whole school fails based on federal government standards. However, provisions of NCLB allowed states to establish specific conditions for reporting disaggregated results for subgroups that would ensure confidentiality for an individual student as well as the statistical reliability of such data (Erpenbach, Forte-Fast & Potts, 2003). Therefore, each state determined the minimum number of students necessary for reporting AYP results, while at the same time protecting the confidentiality of students and ensuring reliability of results. Project Forum at the National Association of State Directors of Special Education surveyed state education agencies and found that the minimum number ( $N$ ) ranged from three to 40 students for the purpose of concealing individual identity and from five to 75 for ensuring statistically reliable results (Markowitz, 2002). The state of Missouri initially identified 30 as the minimum number of students

needed to ensure confidentiality and provide statistical reliability when reporting test results. Revision (Maddox, 2004) to cell-size requirements maintained 30 as the minimum cell size for racial/ethnic groups and the free or reduced-price lunch subgroup but increased the cell size requirement to 50 for reporting results of students with IEPs and students with limited English proficiency.

A recent survey of Virginia special education administrators revealed support for the involvement of students with disabilities in high-stakes assessment (Defur, 2002). The author proposed two underlying assumptions as the basis of this support. The first assumption anticipated that including students with disabilities in educational reform efforts resulted in higher expectations because students gained access to the general curriculum, participated in state assessments, and demonstrated higher achievement. Each of these elements resulted in the acquisition of a broader range of skills and knowledge, accountability, and mastery of standards respectively. The second assumption stated that high-stakes assessments led to data-based decisions that resulted in improved teaching, academic and nonacademic success, and enhanced educational experiences and opportunities. Despite these two assumptions, the author suggested that a philosophical conflict existed between the belief that disability does not lesson the right of individuals to participate in society and a system of standards that separates individuals into those who can and those who cannot participate.

Allbritten, Mainzer, and Ziegler (2004) suggested that elements of NCLB conflict with federal and state requirements for students with disabilities. Parents

and teachers of students with disabilities have the latitude to establish learning outcomes based on individual student needs, which may not align with narrowly defined grade level assessments. The NCLB requirement that 1% of students with disabilities may participate in alternative forms of assessment conflicts with the requirement that inclusion is an IEP team decision. The authors described recommendations from the Council for Exceptional Children that AYP determinations included progress of students with disabilities based on drop out rates, graduation rates, and grade promotions. No Child Left Behind assumes research-based instructional practices have been identified that will surmount the deficits of students with disabilities. The reality of the situation, as described by the authors, is that the Federal What Works Clearinghouse designed to identify such practices is only in its first year. The program has yet to establish the criteria and procedures used to recognize effective, research-based instructional practices. Allbritten, Mainzer, and Ziegler equated NCLB mandates to a normative model much like that found in an industrial hierarchy. This top-down model expected all students to reach an identical level of quality in a specified amount of time. Special education programs were non-normative, child-centered systems created in response to a general education normative system that did not fit the needs of students with disabilities. The authors believed that special educators welcome the inclusion of students with disabilities and the promise of improved educational services but that there are a significant number of unintended consequences and that not all aspects of NCLB are based on scientific knowledge.

McDermott and McDermott (2002) studied the effects of a high-stakes testing program in Alaska that required students to pass an exit exam in order to earn a diploma. The authors used two categories for students with disabilities, including those with primarily physical disabilities (i.e., orthopedic disabilities, speech impairment, visual impairment, health impairment, and the hard of hearing, deaf, or deaf/blind) and those with cognitive-processing or emotional disabilities (i.e., mentally retarded, learning disabled, emotionally disturbed, multiple handicapped, developmentally delayed, autistic, and traumatic brain injury). In the area of reading, 75% of all students earned passing scores while 52% of students with physical exceptionalities and 39% of students with cognitive/emotional disabilities passed. Forty-eight percent of all students passed in the area of writing, while 25% of students with physical exceptionalities and 6% of those with cognitive/emotional disabilities passed. In the area of mathematics, 5% of students with cognitive/emotional disabilities and 9% of students with physical exceptionalities passed, whereas 33% of all students passed the state high school exit exam. The authors stated that considerable differences between the special education and the general school population raised significant concerns. In addition, the authors noted that parents and legislators often maintained that special education students did not receive effective instruction.

Although opinions regarding the validity of including students with disabilities in high-stakes assessments vary, the fact is that regulations established by NCLB mandate it. Therefore, it is the responsibility of educators to

become knowledgeable. Washburn-Moses (2003) stated that special educators could take charge of a difficult situation by working to maintain high academic expectations, increase student motivation, and prepare students in an open and honest manner. The authors made several recommendations, beginning with the need to become knowledgeable regarding the accommodations available to students with disabilities. Because students with disabilities participate in high-stakes testing and have access to the general education curriculum, collaboration with both general and special education teachers is imperative. The author recommended that educators seek out information and training in test administration as well as the availability of alternative exams. Finally, many legal and ethical issues surround high-stakes testing. Teachers need to be knowledgeable of issues involving the accommodations and waivers, test validity, test bias, and the balance between academic and vocational or functional skills training. The final recommendation Washburn-Moses made is that educators need to take part in the ongoing debate regarding the involvement of students with disabilities in the high-stakes assessment associated with No Child Left Behind.

### Summary

As followers of policy, leaders should not restrict their awareness to building or district level concerns. Leaders must examine the social and economic implication and impact of changes in policy (Fowler, 2000; Louis & Miles, 1990). Flanigan and Marion (2003) suggested that a period of great change in school systems for four to five years will follow the implementation of

guidelines related to No Child Left Behind legislation. Several studies report a lack of consistency as states struggle to implement the mandates of No Child Left Behind and establish greater accountability for student performance (Linn, Baker, & Betebenner, 2002; Olson, 2004; Popham, 2003). Goertz and Duffy (2003) believed that an increasing number of schools will fail to meet state improvement goals as the 2013-2014 deadline approaches. The implementation of high stakes testing carries with it an increased risk for misuse and negative consequences (Abrams & Madaus, 2003; Sloane & Kelly, 2003; Amrein & Berliner, 2002) Therefore, it is time educators study factors related to the success of students on state examinations used to determine adequate yearly progress.

Kirkpatrick (2002) examined the effects of teachers' educational background, instructional practices, teaching experience, content knowledge and efficacy beliefs. The research demonstrated a positive relationship between student performance and years of experience. A negligibly lower level of achievement was associated with teachers holding advanced degrees. McDonald (2003) also found a significant link between teacher experience, teaching efficacy and content knowledge, and the use of reform practices, which, in turn, affected student performance. Guidelines established by the NCLB definition of a highly qualified teacher suggest a belief that teachers holding advanced degrees also have a significant impact on student achievement.

Research related to teacher perceptions of high stakes testing concluded that teachers believed testing policies contributed to increased frustration, low

morale, restricted curricular options and diminished student learning (Abrams, Pedulla & Madaus, 2003; Pedulla, 2003; Kubow & Debard, 2000). In an ERIC Digest, Goldhaber and Anthony (2003) summarized research on five indicators of teacher quality, including degree levels, preparation, licensure, years of experience, and academic proficiency. The authors failed to find conclusive evidence in current research to support a statistically significant relationship between student achievement and a teacher's degree level, preparation, licensure, and years of experience. Some researchers (Mc Donald, 2003; Kirkpatrick, 2002) found a positive effect between student achievement and years of experience while others (Hanushek, 1989, 1994; Ponders, 2001) found no significant effect.

Louis and Miles (1990) suggested that two-thirds of the problems associated with implementing new policy related to the availability and use of resources. Factors found to predict student achievement included percent of students on free or reduced-price lunch, percent of lone parent households, mean annual household income and per pupil expenditures (Hanushek, 1989, 1994; Maylone, 2002). Studies related to class size suggested that students participating in smaller class sizes outperform students in classes with larger student to teacher ratios (Miles & Darling-Hammond, 1997; Mosteller, 1995).

The final area of review focused on assessments and high stakes testing as related to students with IEPs. McDermott and McDermott (2002) reviewed studies that showed little difference between learning disabled and non-disabled students in mathematics achievement as well as studies that showed that high-

stakes testing had a negative impact on students with disabilities. On the other hand, Defur (2002) suggested that including students with disabilities in educational reform efforts resulted in higher expectations, increased access to general curriculum, and consequently higher achievement. Linn, Baker, and Betebenner (2002) argued that the possibility of 100% of the students reaching a proficient level of performance on state testing was unreasonable. Finally, Clark, Shore, Rhoades, Abrams, Miao and Li (2003) studied the perceived effects of state mandated testing and found adverse effects on the quality of classroom practices and negative impact on at-risk student populations.

## CHAPTER THREE

### RESEARCH DESIGN AND METHODOLOGY

Missouri's Department of Elementary and Secondary Education (DESE) required the administration of Missouri Assessment Program examinations to third, seventh, and eleventh grade students in the area of communication arts and fourth, eighth, and tenth grade students in mathematics to meet the requirements of No Child Left Behind (NCLB). The state of Missouri established annual proficiency goals in communication arts and mathematics for determining adequate yearly progress toward the NCLB requirement that all children demonstrate proficiency by 2014 (Beck, 2003). Reports of testing results posted on the Department of Elementary and Secondary Education website included scores of several disaggregated subgroups of students including Asian, Black, Hispanic, Indian, Pacific Islander, White, Other/Non-Response, Free or Reduced-Price Lunch, Students with an Individual Education Program (IEP), and Students with Limited English Proficient (LEP) students. A review of available data demonstrated limited ability of students with IEPs to meet the state's annual proficiency goal.

Missouri began implementing a performance-based assessment system in the spring of 1997 (Missouri Department of Elementary and Secondary Education, 2005b). The 73 standards created by Missouri educators described the skills and knowledge graduates of the state's public schools must acquire. The MAP assessments incorporated three types of questions to evaluate student achievement, including multiple-choice; short answer, referred to as constructed

response; and performance events. Constructed response items required students to supply an appropriate response, and performance events required students to work through more complicated problems or issues. As an integral part of the test development, Missouri educators wrote and piloted MAP items. In addition, each item of the MAP was field tested to ensure reliability and validity of the items and scoring criteria. Mathematics testing with the MAP was first required in 1998.

The purpose of this study was to examine middle school mathematics scores on the Missouri Assessment Program assessments for the students with and without IEPs. Testing results from 2004 indicated that of the 96 middle schools with 30 or more eighth grade students with IEPs, only two met the state proficiency goal in math. Additionally, the subgroup of students with IEPs demonstrated lower MAP Index scores than any other disaggregated subgroup. The purpose of this study was to examine the relationships between the performance of students with and without IEPs on the MAP examinations and socioeconomic factors and teacher characteristics. Variables included teacher characteristics (percent of teachers with advanced degrees and average years of experience), and socioeconomic factors (per pupil expenditures, number of students on free or reduced-price lunch, and annual mean district household income).

The review of literature related to teacher characteristics suggested a possible relationship between student achievement and teachers' years of experience (Kirkpatrick, 2002) as well as student achievement and teachers'

level of education (Paige, 2002). Socioeconomic factors affecting student achievement included the number of students on free or reduced-price lunch, and mean annual income (Maylone, 2002) and per pupil expenditures (Eaton, 2004; Hanushek, 1994, 1989).

### Definition of Population and Sample

The population for this study included 340 public middle schools or junior high schools in Missouri. Charter and private schools were not included. For the purpose of this study, a middle school was defined as any school housing students in grades six, seven, and eight, or a configuration of those grade levels. While middle school students were administered MAP examinations in the areas of communication arts, mathematics, social studies, and science, this study examined eighth grade mathematics test results only. Based on regulations associated with NCLB, the Department of Elementary and Secondary Education (DESE) established 30 as the minimum number of students required for reporting results of a subgroup. The sample for this study consisted of 96 middle schools with 30 or more eighth grade students with IEPs taking the MAP examination in mathematics. Data files provided by the Department of Elementary and Secondary Education and public information from the DESE website supplied the necessary information for identifying the sample.

### Variables Studied

Five levels defined student performance on the MAP examinations: Step 1, Progressing, Nearing Proficient, Proficient, and Advanced. Appendix A provides a more complete description of the criteria for each level of performance

on the examinations. The Department of Elementary and Secondary Education calculated a mathematics MAP Index score for each school by first multiplying the percent of students scoring at each achievement level by the following values: Advanced by 3, Proficient by 2.5, Nearing Proficient by 2, Progressing by 1.5, and Step 1 by 1. The sum of these products produced the final MAP Index score, which could range from 100 to 300. The dependent variables examined in the study were the MAP Index score in mathematics for students with and without IEPs. The MAP Index score represented as a continuous variable.

The first independent variable examined was the average years of experience for teachers at each school building. The second variable studied was the percentage of teachers with a master's degree or higher. Independent variables used to examine socioeconomic factors included per pupil expenditures, average annual household income, and percentage of students on free or reduced-price lunch. Data analyzed in the study were continuous in nature and available from the Missouri Department of Secondary and Elementary Education. While the data were available from the DESE website, information was obtained in cooperation with the Division of Special Education Data Coordination office.

### Research Questions

This study examined variables that may affect eighth grade mathematics index scores for students with and without IEPs. Questions addressed in this study include:

1. What is the relationship between teacher experience and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
2. What is the relationship between teacher level of education and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
3. What is the relationship between per pupil expenditures and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
4. What is the relationship between average annual household income and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
5. What is the relationship between the percentage of students on free or reduced-price lunch and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
6. What combination of the five variables (teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch), predict achievement for students with and without IEPs as measured by eighth grade mathematics MAP index scores?

## Hypotheses

To address the research questions, the following null hypotheses were tested:

- Ho<sub>1</sub>: There is no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>2</sub>: There is no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>3</sub>: There is no statistically significant correlation at the .05 level between teacher level of education and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>4</sub>: There is no statistically significant correlation at the .05 level between teacher level of education and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>5</sub>: There is no statistically significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

- Ho<sub>6</sub>: There is no statistically significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>7</sub>: There is no statistically significant correlation at the .05 level between average annual household income and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>8</sub>: There is no statistically significant correlation at the .05 level between average annual household income and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>9</sub>: There is no statistically significant correlation at the .05 level between the percentage of students on free or reduced-price lunch and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>10</sub>: There is no statistically significant correlation at the .05 level between the percentage of students on free or reduced-price lunch and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>11</sub>: There is no statistically significant relationship between a linear combination of the five predictor variables of teacher experience, teacher level of education, per pupil expenditure, average annual

household income, and the percentage of free or reduced-price lunch and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>12</sub>: There is no statistically significant relationship between a linear combination of the five predictor variables of teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

## Data Analysis

### *Descriptive Statistics*

Data analysis began with summarizing the data using descriptive statistical techniques. The distribution of data for the independent and dependent variables was examined for measures of central tendency, including range and mean. The study employed univariate analysis to examine distribution frequencies for each variable including range and standard deviation.

### *Hypothesis Testing*

The study utilized Pearson  $r$  as a means for examining the correlation between MAP Index scores for students both with and without IEPs and teachers' average years of experience, percentage of teachers with advanced degrees, per pupil expenditures, average annual household income, and the percentage of students on free or reduced-price lunch. A forward stepwise regression identified the optimum combination of parameters to include in the

model for predicting MAP Index scores. At each step, the variable with the most statistically significant term (the one with the highest F statistic or lowest p-value) was added until none were left. The study used SPSS statistical software for all analyses. The resulting correlations established a measure for determining whether to reject or fail to reject null hypotheses one through ten at the .05 level of probability.

### Summary

The study examined middle school mathematics scores on the Missouri Assessment Program assessments for the subgroup of students with and without IEPs. Requirements of NCLB required schools with 30 or more students with IEPs to disaggregate results for that group. This requirement provided a sample, which included 96 of the 340 middle schools or junior highs in Missouri. The dependent variable included MAP Index scores for students with and without IEPs. Independent variables included teachers' average years of experience, the percent of teacher with advanced degrees, per pupil expenditures, mean annual household income, and the percent of students receiving free or reduced-price lunch. Descriptive statistics identified the mean, range and standard deviation for each variable. Analyses included Pearson r correlations to determine the relationship between the dependent and independent variables, and a forward stepwise regression to identify the optimum combination of parameters to include in a model for predicting MAP Index scores.

Chapter 4 presents the procedures employed to analyze the data collected from the study, the study design that contains the research questions,

null hypotheses, population sample, data collection, and method of analysis. Presented next are the descriptive findings that contain school demographic data, hypotheses testing, and summary of findings.

## CHAPTER FOUR

### PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to examine the relationship between MAP mathematics examination performance of students with and without IEPs related to socioeconomic factors, and teacher characteristics. Variables examined included teacher characteristics (level of education and years of teaching experience), and socioeconomic factors (per pupil expenditures, number of students on free or reduced-price lunch, and annual mean district household income).

#### Study Design

##### *Research Questions*

This study examined variables that may correlate to eighth grade mathematics MAP Index scores for students with and without IEPs. Students with IEPs include those students qualifying or having a disability under the Individuals with Disabilities Education Act and receiving special education services.

Questions addressed in this study included:

1. What is the relationship between teacher experience and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
2. What is the relationship between teacher level of education and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?

3. What is the relationship between per pupil expenditures and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
4. What is the relationship between average annual household income and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
5. What is the relationship between the percentage of students on free or reduced-price lunch and mathematics achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores?
6. What combination of the five variables (teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch), predict achievement for students with and without IEPs as measured by eighth grade mathematics MAP index scores?

### *Hypotheses*

The study utilized the following null hypotheses to address the research questions:

- Ho<sub>1</sub>: There is no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

- Ho<sub>2</sub>: There is no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>3</sub>: There is no statistically significant correlation at the .05 level between teacher level of education and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>4</sub>: There is no statistically significant correlation at the .05 level between teacher level of education and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>5</sub>: There is no statistically significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>6</sub>: There is no statistically significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.
- Ho<sub>7</sub>: There is no statistically significant correlation at the .05 level between average annual household income and mathematics

achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>8</sub>: There is no statistically significant correlation at the .05 level between average annual household income and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>9</sub>: There is no statistically significant correlation at the .05 level between the percentage of students on free or reduced-price lunch and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>10</sub>: There is no statistically significant correlation at the .05 level between the percentage of students on free or reduced-price lunch and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>11</sub>: There is no statistically significant relationship between a linear combination of the five predictor variables of teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.

Ho<sub>12</sub>: There is no statistically significant relationship between a linear combination of the five predictor variables of teacher experience, teacher level of education, per pupil expenditure, average annual

household income, and the percentage of free or reduced-price lunch and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

### *Population and Sample*

The population for this study included 340 public middle schools or junior high schools in Missouri. Charter and private schools were not included. For the purpose of this study, a middle school was defined as any school housing students in grades six, seven, and eight, or a configuration of those grade levels. While middle school students were administered MAP examinations in the areas of communication arts, mathematics, social studies, and science, this study examined eighth grade mathematics test results only. Based on regulations associated with NCLB, the Department of Elementary and Secondary Education (DESE) established 30 as the minimum number of students required for reporting results of a subgroup. With this definition in mind, the sample for this study included 96 middle schools with 30 or more eighth grade students with IEPs taking the MAP examination in mathematics. Data files provided by the Department of Elementary and Secondary Education and public information from the DESE website supplied the necessary information for identifying the sample.

### *Data Collection*

Five levels defined student performance on the examinations, including Step 1, Progressing, Nearing Proficient, Proficient, and Advanced. A MAP Index Score is also calculated by first multiplying the percent of students scoring at each achievement level for each subject and each year by the following values:

Advanced by 3, Proficient by 2.5, Nearing Proficient by 2, Progressing by 1.5, and Step 1 by 1. The sum of the products produces the MAP Index Score. The minimum index score possible was 100 and the maximum index score was 300. The director for the Missouri Department of Elementary and Secondary Education Division of School Improvement – Data Analysis & Reporting provided MAP results in spreadsheet format. The files contained MAP Index Scores for students with and without IEPs from the 214 schools that contained 30 or more students with IEPs in 2004.

Sorting the data provided a revised listed of schools that included results for eighth grade students only. The final sorted list provided a sample that included 96 of the state's middle and junior high schools. Additional data, downloaded from the Missouri Department of Elementary and Secondary Education website, contained data files for the sample schools related to the independent measures including percentage of teachers with advanced degrees, teachers' average years of experience, percentage of students on free or reduced-price lunch, and per pupil expenditures. Files from the DESE Demographic Data Access Application from the Office of Social and Economic Data Analysis website supplied information related to Annual Household Income for each district in the sample. Appendix B contains a table of all information collected for the study. All data were transformed into an Excel spreadsheet and then transferred into the Statistical Package for Social Sciences (SPSS), version 13.0 for analysis.

### *Method of Statistical Analysis*

Data analysis began with summarizing the data using descriptive statistical techniques. The distribution of data for the independent and dependent variables were examined for measures of central tendency, including mode, median, and mean. The study employed univariate analysis to examine distribution frequencies for each variable including range and standard deviation.

The study utilized Pearson  $r$  as a means for examining the correlation between MAP Index scores for students both with and without IEPs and teachers' average years of experience, percentage of teachers with advanced degrees, per pupil expenditures, average annual household income, and the percentage of students on free or reduced-price lunch. A forward stepwise regression identified the optimum combination of parameters to include in the model for predicting MAP Index scores. At each step, the variable with the most statistically significant term (the one with the highest F statistic or lowest p-value) was added until none were left. The study used SPSS statistical software for all analyses. The resulting correlations established a measure for determining whether to accept or reject the null hypotheses at the .05 level of probability.

### Descriptive Findings

The data from sample schools represented a total of 3,002 students with IEPs and 16,789 students without IEPs. Demographic data presented in Table 2 includes the mean, range, and standard deviation for each of the variables examined.

Table 2

*Descriptive Statistics for All Variables*

Descriptive Statistics			
<u>Variable</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>Range</u>
IEP Index Score	137.55	15.68	67.5
NonIEP Index Score	179.74	23.66	104.7
Mean Household Income	59578.02	20360.12	103141
% Teachers w/Advanced Degrees	53.36	14.64	62.3
Average Years of Experience	12.65	3.70	33.8
% Students on Free/Reduced Lunch	36.49	25.91	95.3
Per Pupil Expenditures	7858.90	1837.50	8830

The mean MAP Index Score for schools with 30 or more student with IEPs was 137.55 with a range of 67.5 and a standard deviation of 15.68, while the mean MAP Index Score for students without IEPs in the same schools was 179.74 with a range of 104.7 and a standard deviation of 23.66. The mean household income for all schools in the sample was \$59,578.02 with a range of \$103,141.00 and a standard deviation of \$20,360.12. The mean percentage of teachers with advanced degrees was 53.36 with a range of 62.3 and a standard deviation of 14.64. Teachers' average years of experience demonstrated a mean of 12.65, range of 33.8, and a standard deviation of 3.70. The percentage of students receiving free or reduced-price lunch yielded a mean of 36.49, a range of 95.3,

and a standard deviation of 25.91. The mean per pupil expenditures was \$7858.90, with a range of \$8830.00, with a standard deviation of \$1837.50.

### Quantitative Findings

Table 3 provides the statistical results of the Pearson r correlation coefficient between students with and without IEPs and each of the independent variables tested for the study including teachers' average years of experience, the percentage of teachers with advanced degrees, per pupil expenditures, means annual household income, and the percentage of students receiving free or reduced-price lunch. Appendix C and Appendix D contain results of correlations between all variables.

The first null hypothesis proposed no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores. Based on data presented in Table 3, the study failed to reject the null hypothesis  $H_{0_1}$  based on a Pearson r of -.115, which is not significant at the .05 level of probability. The study also failed to reject the second null hypothesis,  $H_{0_2}$  that proposed no statistically significant correlation at the .05 level between teacher experience and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index score. Results yielded a Pearson r of .000, which is not significant at the .05 level of probability.

Table 3

*Pearson r Correlations*

Pearson r Correlations			
	<u>Variable</u>	<u>IEP Index Score</u>	<u>NonIEP Index Score</u>
Average Years of Experience	Pearson Correlation	-.115	.000
	Sig. (2-tailed)	.267	.999
	N	95	95
Percent of Teachers with Advanced Degrees	Pearson Correlation	.282**	.482**
	Sig. (2-tailed)	.006	.000
	N	95	95
Per Pupil Expenditures	Pearson Correlation	-.261*	-.336**
	Sig. (2-tailed)	.011	.001
	N	95	96
Mean Annual Household Income	Pearson Correlation	.012	.064
	Sig. (2-tailed)	.910	.536
	N	95	96
Free and Reduced-Price Lunch	Pearson Correlation	-.594**	-.819**
	Sig. (2-tailed)	.000	.000
	N	95	95

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Findings suggested a positive relationship between the percentage of teachers with advanced degrees and the achievement of students with and without IEPs. Based on information presented in Table 3, the study rejected  $H_{o3}$  and  $H_{o4}$ . Statistical analysis revealed a Pearson  $r$  of .282 when comparing the percentage of teachers with advanced degrees and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores, which is significant at the .01 level of probability. Findings yielded a

Pearson  $r$  of .482, which is also significant at the .01 level of probability for the correlation between the percentage of teachers with advanced degrees and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

The correlation between per pupil expenditures and achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores indicated a negative relationship. Based on the Pearson  $r$  of -.261 presented in Table 3, the study rejected the null hypothesis  $H_{05}$  due to a significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.  $H_{06}$  stated that there is no statistically significant correlation at the .05 level between per pupil expenditures and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores. The study also rejected this null hypothesis based on a Pearson  $r$  of .064, which was significant at the .01 level of probability.

Mean annual household income failed to demonstrate a significant correlation to achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores. Based on the Pearson  $r$  of .012 presented in Table 3, the study failed to reject the null hypothesis  $H_{07}$  which projected no statistically significant correlation at the .05 level between average annual household income and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores.  $H_{08}$  stated that there is no statistically significant correlation at the .05 level between average

annual household income and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores. The study failed to reject the hypothesis based on a Pearson  $r$  of .064, which is not significant at the .05 level of probability.

Findings suggested a negative relationship between the percentage of students receiving free or reduced-price lunch and the achievement of students with and without IEPs. Based on information presented in Table 3, the study rejected  $H_{o9}$  and  $H_{o10}$ . Statistical analysis revealed a Pearson  $r$  of -.594 when comparing the percentage of students receiving free or reduced-price lunch and mathematics achievement for students with IEPs as measured by eighth grade mathematics MAP Index scores, which is significant at the .01 level of probability. Findings yielded a Pearson  $r$  of -.819, which is also significant at the .01 level of probability for the correlation between the percentage of students receiving free or reduced-price lunch and mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores.

The study utilized a forward stepwise regression to determine the optimum combination of parameters to include in a model for predicting MAP Index scores. Results of the regression analysis provided in Tables 4 and 5 failed to reject  $H_{o11}$ : There is no significant relationship between a linear combination of the five predictor variables and mathematics achievement of students with IEPs as measured by eighth grade mathematics MAP Index scores.

Table 4

*Regression Model Summary – IEP Index Scores*

Model Summary				
<u>Model</u>	<u>R</u>	<u>R Square</u>	<u>Adjusted R Square</u>	<u>Std. Error of the Estimate</u>
% Students on Free or Reduced-Price Lunch	.594 <sup>a</sup>	.353	.346	12.68

a. Predictors: (Constant), % Students on Free or Reduced-Price Lunch

Table 5

*Regression Model, Excluded Variables – IEP Index Scores*

Excluded Variables					
	<u>Beta In</u>	<u>t</u>	<u>Sig.</u>	<u>Partial Correlation</u>	<u>Tolerance</u>
% Teachers w/Advanced Degrees	-.043 <sup>a</sup>	-.432	.667	-.045	.723
Per Pupil Expenditures	.028 <sup>a</sup>	.296	.768	.031	.774
Average Year of Experience	-.055 <sup>a</sup>	-.650	.517	-.068	.990
Mean Household Income	-.081 <sup>a</sup>	-.962	.338	-.100	.976

The model summary identified the percent of students on free or reduced-price lunch with an  $R^2 = .353$ ,  $R^2_{\text{adjusted}} = .346$ ,  $F(1, 93) = 50.71$ ,  $p < .000$  as the only significant predictor of mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores. The percent of students receiving free or reduced-price lunch accounted for 35% of the variance

in MAP Index scores for students with IEPs. Appendix E contains complete results of the stepwise regression for students with IEPs.

Results of the regression analysis failed to reject  $H_{012}$ : There is no significant relationship between a linear combination of the five predictor variables and mathematics achievement of students with IEPs as measured by eighth grade mathematics MAP Index scores. The model summary presented in Table 6 and 7 identified the percent of students on free or reduced-price lunch with an  $R^2 = .671$ ,  $R^2_{\text{adjusted}} = .667$ ,  $F(1, 93) = 189.67$ ,  $p < .000$  as the only significant predictor of mathematics achievement for students without IEPs as measured by eighth grade mathematics MAP Index scores. The percent of students receiving free or reduced-price lunch accounted for 67% of the variance in MAP Index scores for students without IEPs. Appendix F contains complete results of the stepwise regression for students without IEPs.

Table 6

*Regression Model Summary - NonIEP Students*

Model Summary				
<u>Model</u>	<u>R</u>	<u>R Square</u>	<u>Adjusted R Square</u>	<u>Std. Error of the Estimate</u>
% Students on Free or Reduced-Price Lunch	.819	.671	.667	13.05

b. Predictors: (Constant), % Students on Free or Reduced-Price Lunch

Table 7

*Regression Model, Excluded Variables – NonIEP Students*

Excluded Variables					
	<u>Beta In</u>	<u>t</u>	<u>Sig.</u>	<u>Partial Correlation</u>	<u>Tolerance</u>
Mean Household Income	-.038 <sup>a</sup>	-.628	.531	-.065	.976
% Teachers w/Advanced Degrees	.070 <sup>a</sup>	1.00	.320	.104	.723
Per Pupil Expenditures	.085 <sup>a</sup>	1.43	.157	.147	.990
Average Year of Experience	.109 <sup>a</sup>	1.63	.107	-.167	.774

## Summary of Findings

Presented in this chapter were the descriptive data obtained for each of the variables tested. The data collected represented 96 middle or junior high schools. The mean MAP Index score for students with IEPs was 137.55 and the mean MAP Index score for students without IEPs was 179.74. Based on Pearson r correlations, teachers' average years of experience and mean annual household income failed to demonstrate a significant correlation to the achievement of students either with and without IEPs as measured by eighth grade mathematics MAP Index scores. Pearson r correlations demonstrated a significantly negative correlation between the achievement of students with IEPs and per pupil expenditures at the .05 level of probability and for students without IEPs at the .01 level of probability. There was a significantly negative correlation

between the percent of student receiving free or reduced-price lunch and the achievement of students both with and without IEPs at the .01 level of probability. Findings indicated a significantly positive relationship between the percent of teachers with advanced degrees and the achievement of students both with and without IEPs at the .01 level of probability.

Provided in Chapter Five are the summary, discussion, conclusions, and recommendations that resulted from this study.

## CHAPTER FIVE

### SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

Adequate Yearly Progress expectations of NCLB required all students, including those with disabilities, to demonstrate proficiency in reading and math by the 2013-2014 school year. Proficiency requirements of No Child Left Behind represented a particularly difficult impediment for students receiving special education services (Simpson, LaCava, & Graner, 2004). The approximately 6.6 million students nation-wide with disabilities and the educators responsible for their learning faced the challenge of meeting rigorous expectations for achievement.

The percentage of students with IEPs that met the Missouri proficiency goal in mathematics (grades 4, 8, and 10) for years 2002, 2003, and 2004 are 7.3, 8.3 and 9.0, respectively. Results from the eighth grade level for the years 2002, 2003, and 2004 indicated that the percentage of eighth grade students with IEPs that met the state proficiency goals are 1.3, 1.6, and 1.8, respectively. MAP Index scores are lower than results for all other disaggregated subgroups. This failure to meet the state proficiency goal demonstrated the need for research in this area as well as the importance of findings on future practice. While several studies examined the impact on students in general, few studies focused on possible correlations for students with IEPs as a specific group.

This study was designed to investigate factors that led to differential achievement of students with and without IEPs in mathematics as measured by

the MAP assessments. Research by McCall, Kingsbury, and Olson, (2004) cited limitations of the current method, which may reflect demographics more than effectiveness of instruction or student progress. Therefore, the current study examined teacher characteristic and socioeconomic factors that contributed the mathematics success of students with and without IEPs.

The study reviewed literature and research that provided information on the following: (1) research on policy implementation, (2) high-stakes testing and accountability, (3) teacher factors affecting achievement, (4) socioeconomic factors and school expenditures, and (5) special education issues associated with achievement testing. Information collected through the Missouri Department of Elementary and Secondary Education provided the data that formed the basis for the analysis. The study employed descriptive statistics, correlations, and linear regressions to determine patterns and relationships that affect the achievement of students with and without IEPs.

### Discussion

As suggested by McDonald (2003), students with disabilities are not demonstrating the same level of performance as students without disabilities. Results of the study suggest that MAP Index scores for students with IEPs were significantly lower than MAP Index scores for students without IEPs. The mean score for students with IEPs was 1.63 standard deviations below the mean for students without IEPs. Students with IEPs failed to demonstrate the same levels of performance and progress as students without IEPs. This trend suggests that the possibility of students with IEPs maintaining adequate yearly progress and

meeting the goal of 100% of students demonstrating proficient skills by the year 2014 as established by NCLB is extremely unlikely.

When examining the overall demographics of the sample schools, analyses indicated a large variability in teacher characteristics examined. The percent of teachers with advanced degrees ranged from 18.6 to 80.9 while the average years of experience ranged from 6.4 to 40.2. One unanticipated finding was the large variability in the percent of students on free or reduced-price lunch as indicated by a range of 95.3. The least percent of students on free or reduced-price lunch was 4.7% while the greatest amount was 100%. As a measure of socioeconomic conditions, this indicated a significant amount in variance in the status of students within the state.

Given these variations in the demographic profile of students and teachers, it is evident that the conditions under which students are expected to demonstrate adequate yearly progress are not equitable. In fact, while not tested as part of the hypotheses, results of the analysis indicated a significant and negative relationship between the percent of teachers with advanced degrees and the percent of students receiving free or reduced-price lunch. There are fewer teachers with advanced degrees teaching in schools with a higher percentage of students receiving free or reduced-price lunch.

Based on results of the study, the performance of students without IEPs did not appear to be significantly affected by teachers' average years of experience or mean annual household income. However the study revealed a significantly positive relationship between the percent of teachers with advanced

degrees and MAP Index scores for students without IEPs. Conversely, MAP Index scores for students without IEPs demonstrate a negative relationship or dropped as per pupil expenditures increased and as the percent of students receiving free or reduced-price lunch increased.

Results from the study yielded a similar profile for students with IEPs. Teachers' average years of experience and mean annual household income did not significantly affect the performance of students with IEPs. However there was a positive correlation between the performance and the percent of teachers with advanced degrees as measured by the MAP Index score. Students with IEPs performed better in schools with a higher percent of teachers holding advanced degrees. On the other hand results of the study determined that as per pupil expenditures increased and the percent of students receiving free or reduced-price lunch increased the MAP Index scores for students with IEPs actually decreased.

A multiple regression analysis sought to identify the combination of the five variables (teacher experience, teacher level of education, per pupil expenditure, average annual household income, and the percentage of free or reduced-price lunch), that might predict achievement for students with and without IEPs as measured by eighth grade mathematics MAP index scores. One of the more significant findings to emerge from this study is the resulting model that identified the percent of students receiving free or reduced-price lunch as the only significant contributor to the model. The percent of students receiving free or reduced-price lunch accounted for 35% of the variance in MAP Index scores for

students with IEPs and 67% of the variance for students without IEPs. The model excluded all other variables as not being significant contributors to the variance in MAP Index scores.

### Conclusion

This study set out to determine the relationship between teacher characteristics, socioeconomic factors and student achievement for students with and without IEPs as measured by eighth grade mathematics MAP Index scores. The current study indicated that students with IEPs are performing at a lower level than students without IEPs on measures of mathematics achievement as measured by the MAP Index scores. These findings are consistent with those of McDonald (2003) that identified significant differences between achievement scores for disabled and non-disabled students. The gap between the performance of students with and without IEPs may be a sign that educational practice and remedial instruction targeted at students with disabilities do not appear to meet the needs of students with IEPs as measured by performance on mathematics MAP examinations.

Some researchers (Mc Donald, 2003; Kirkpatrick, 2002) found a positive effect between student achievement and years of experience while others (Hanushek, 1989, 1994; Ponders, 2001) found no significant effect. The current study examined the relationship between teacher experience and mathematics achievement for students with and without IEPs. Results supported findings that indicate that the average years of experience for teachers does not significantly affect student performance. Teacher factors that did appear to have a positive

affect on mathematics achievement included the percent of teachers with advanced degrees. Student performance increased for both students with and without IEPs in schools with a greater percent of teachers holding advanced degrees. While not addressed in the present study, findings also suggested that there were greater percentages of teachers with advanced degrees in schools with fewer students receiving free or reduced-price lunch decreased.

Socioeconomic factors in the research included mean annual household income, per pupil expenditures and the percent of students on free or reduced-price lunch. Previous studies have shown that factors found to predict student achievement included percent of students on free or reduced-price lunch, percent of lone parent households, mean annual household income and per pupil expenditures (Hanushek, 1989, 1994; Maylone, 2002). In contrast to earlier findings, data did not identify a relationship between mean annual household income and performance in mathematics for student with or without IEPs. Student performance on mathematics measures demonstrated a negative correlation to per pupil expenditures indicating that achievement for students with and without IEPs actually decreased as per pupil expenditures increased. Similarly, achievement for students with and without IEPs decreased as the percent of students receiving free or reduced-price lunch increased. Despite the various levels of correlation between the variables and student achievement, the percent of students receiving free or reduced-price lunch appeared to be the only predictor of student achievement.

## Implications

The present study was designed to investigate factors that may lead to differential achievement of students with and without IEPs in mathematics as measured by the MAP assessments. Findings from this study supported research by McCall, Kingsbury, and Olson (2004) suggesting that limitations of the current methods of assessment, which may reflect demographics more than effectiveness of instruction or student progress. Findings also added substantially to an understanding of factors contributing the ability of schools to meet the adequate yearly progress standard established by No Child Left Behind legislation.

Significant factors included the number of students receiving free or reduced-price lunch, per pupil expenditures, and the percent of teachers with advanced degrees all had a significant affect on student achievement. In order for schools to continue to progress toward the expectation that all students perform at the proficient level or above by the year 2014, educators must examine options for addressing demographic differences between districts. Educational practice and remedial instruction need to be examined in an effort to identify the most effective practices for remediating learning difficulties experienced by students with disabilities.

Educators should examine the manner in which funds are being distributed in schools and recognize that more money does not always equal increased achievement. Based on the fact that students in schools with a higher percentage of teachers with higher degrees out performed students with fewer

teachers with advanced degrees, educators should examine methods for promoting teacher training and professional development. However, the most significant impact may be seen by addressing the number of students living at a low socioeconomic status as indicated by eligibility for the free or reduced-price lunch program. While providing free or reduced-price lunch programs addresses one aspect of the needs of student living at a lower socioeconomic level it does not address the educational delays identified by this study. Educators need to develop programs that take a proactive approach to providing programs or supports for students that have demonstrated a history of failing to demonstrate adequate yearly progress as mandated by No Child Left Behind.

#### Recommendations for Future Research

Results and limitations of this study call attention to the following recommendations for future study:

1. Additional research should include an examination of all subgroups required for disaggregation, including students in the identified ethnic groups, students receiving free or reduced-price lunch, and students with limited English proficiency (LEP).
2. Based on current findings, a paired study of schools with high and low percentages of students receiving free or reduced-price lunch should be utilized to investigate factors affecting student performance.
3. Additional research, using a case study methodology to examine factors at the individual student level, is recommended.

4. Based on the significantly lower scores for student with IEPs additional research should examine student performance based on disabling conditions for relationships.
5. Further research should investigate assessment results in other areas of the country to identify factors affecting student performance.

Adequate Yearly Progress expectations of NCLB require all students, including those in disaggregated subgroups, to demonstrate proficiency in reading and math by the 2013-2014 school year. Proficiency requirements of No Child Left Behind represented a particularly difficult impediment for students receiving special education services (Simpson, LaCava, & Graner, 2004). Maylone (2002) suggested that policies focused on decreasing child poverty held greater potential for increasing student achievement than did accountability plans and high stakes testing. Results of the current study also suggested that socioeconomic factors had the greatest impact on student performance. While socioeconomic status is not something that educators can directly control or change for students, findings from this study do not present an excuse for failure. Instead, findings from this study demonstrate the need for further investigation. Educators must set aside old paradigms and accept the responsibility to continue the search for supports and programs for students at-risk for failure to meet the adequate yearly progress standards.

## APPENDICES

## APPENDIX A

### Grade 8 Mathematics Abbreviated Achievement-Level Descriptors

**Step 1** - Students perform basic operations with whole numbers; solve simple word problems with whole numbers; identify, describe, compare, and classify geometric figures; read information from tables, graphs, and charts; recognize and extend simple numeric patterns; and order integers.

*MAP score range: 541-667.*

**Progressing** - Students perform basic operations of rational numbers; solve simple word problems using rational numbers; use protractor and ruler to measure; identify lines of symmetry; interpret information from tables, graphs, and charts; find measures of central tendency; extend pictorial patterns; solve equations using a replacement set; order rational numbers; and interpret simple Venn diagrams.

*MAP score range: 668-707.*

**Nearing Proficiency** - Students solve problems with decimals, percents; identify congruent, similar figures; find elapsed time; convert measurements; find area, perimeter, volume; find probability; use sampling procedure; find measure of central tendency; solve equations; use order of operations; find, order equivalent fractions, decimals; create tree diagrams; generalize patterns; use deductive, inductive reasoning.

*MAP score range: 708-743.*

**Proficient** - Students show processes; apply ratios, proportions, percents; use concepts of congruent, similar shapes; show rotations, reflections, translations; apply perimeter, area, volume; predict from data displays; apply measures of central tendency; describe patterns, relationships, using algebraic equations; apply properties of real numbers; identify primes, multiples, factors, exponents.

*MAP score range: 744-784.*

**Advanced** - Students justify answers; use scale drawings; apply transformation in coordinate grid; compare theoretical and experimental probability; defend data predictions; recognize dependent, independent variables; describe patterns, relationships using algebraic inequalities; use diagrams, patterns, functions in problem solving; apply primes, factors, multiples, exponents; solve problems using strategies.

*MAP score range: 785-915.*

## Appendix B

### Master Data

School Code	IEP Acct.	IEP Rptd	IEP Index	NonIEP Acct.	NonIEP Rptd	NonIEP Index	MHI	ADVD	YRS	FRL	PPE
96098-3000	34	34	157.4	166	166	181.3	43251	56.4	11.7	26.9	7,552
19152-3000	37	35	124.3	319	319	169.9	49576	29.7	11.2	30.2	6,658
48068-3060	40	39	152.6	300	297	197.5	54706	70.6	12.7	12.9	6,892
15002-3000	40	39	152.6	335	329	196.0	45466	45.5	14	43.7	7,222
16096-2050	51	48	121.9	299	294	173.6	107454	49.4	14.7	39.3	7,220
96102-3000	33	30	140.0	166	165	205.5	37362	80.9	14.1	19.2	13,739
10093-2060	63	62	119.4	337	333	177.3	49775	42.6	8	37.4	7,719
10093-2075	59	57	141.2	424	422	194.1	53716	62.5	15.3	19	7,719
50014-2050	46	46	152.2	170	170	196.8	52276	31.7	14	33.3	6,557
94078-3000	44	44	133	211	209	192.1	55856	61.6	14.5	40.8	6,357
96089-3030	75	75	129.3	316	315	170.2	95704	45.8	16.2	37.4	8,543
96089-3050	100	97	111.3	296	295	150.8	95704	54.2	13.1	63.3	8,543
48066-3000	62	62	130.6	335	334	174.6	63232	56.8	13.9	37.8	6,827
92087-3050	35	35	128.6	288	287	186.6	69239	48.7	10.7	14	6,290
92087-3000	53	46	153.3	301	299	193.8	69239	46.9	11.1	14	6,290
92087-3070	46	45	137.8	295	294	194.4	69288	45.6	14.8	8.2	6,290
92087-3090	62	60	141.7	322	321	194.1	42871	53.8	9.9	12.1	6,290
50012-2050	37	34	152.9	225	221	193.7	57829	39.7	7.9	25.3	6,760
50012-2100	37	37	168.9	244	244	190.4	57829	45.9	7.4	28.5	6,760
50012-2150	48	47	161.7	330	326	187.9	46871	53.1	10.9	18.5	6,760
92088-3000	42	39	117.9	272	272	180.7	64176	61.3	11.4	13.9	7,244
92088-3400	42	41	137.8	277	275	185.1	53695	54.7	9.6	7	7,244
92088-3200	47	47	141.5	253	253	197.0	64176	62.5	15	4.7	7,244
92088-3100	48	48	130.2	261	260	185.6	64176	66.8	11.4	8.8	7,244
92088-3300	49	47	131.9	258	258	185.3	64176	71.6	14.4	5	7,244
64075-3000	46	40	121.3	228	224	186.2	43033	35.8	12.9	51.6	5,963
96088-2050	82	81	147.5	475	470	176.5	68073	36.5	10.5	20.8	7,202
96088-2100	126	119	112.6	498	490	130.5	68073	29	9.6	51.7	7,202
48077-3050	77	76	124.3	814	808	173.4	72580	55.2	10.3	32.4	7,166
26006-3000	41	41	141.5	270	268	185.3	48309	38.9	15.7	38.5	7,173
26006-3020	44	39	162.8	284	282	199.8	50427	35.6	14	35.5	7,173
49148-3030	43	38	119.7	188	186	187.6	42646	43.4	15.1	49.9	5,566
48078-3120	45	43	122.1	147	144	155.2	72580	38.8	13	83.9	10,702
48078-3100	43	42	109.5	220	218	128.9	72580	37.7	16.7	91.3	10,702
48078-3035				118	112	109.4	72580				10,702
96092-3000	39	38	153.9	158	157	197.1	42828	66.4	15.4	23.4	9,203
96092-3025	42	42	164.3	162	161	203.1	42828	76.7	13.8	21.3	9,203
96106-3000	52	51	149	215	215	204.4	37362	44.3	14.9	9.4	12,608
48071-3000	45	42	154.8	491	490	204.1	54706	55.8	12.6	11	7,064
48071-3080	40	38	146.1	385	385	206.5	54706	47.4	12.6	10	7,064
96093-3070	91	90	161.1	374	371	202.8	40799	73.1	12.5	18.1	7,732
97129-3000	39	36	136.1	177	176	181.3	37362	66	16.4	52.6	6,953
96094-3060	55	55	142.7	251	250	183.8	97496	73.6	9.3	23.1	6,974
96094-3000	31	29	134.5	234	228	167.3	40799	66.2	13.3	40.2	6,974
96094-3020	46	44	152.3	219	219	195.0	97496	70.5	14.5	13.6	6,974
96094-3040	44	43	141.9	188	188	190.7	97496	71.5	14.5	21.7	6,974

Appendix B (continued)

School Code	IEP Acct.	IEP Rptd	IEP Index	NonIEP Acct.	NonIEP Rptd	NonIEP Index	MHI	ADVD	YRS	FRL	PPE
36126-3000	44	43	140.7	253	251	174.3	63232	61.2	11.7	39.1	5,448
22089-3000	38	36	154.2	263	261	184.1	49576	40.1	11	21.3	5,225
96109-3000	104	98	113.3	325	312	134.0	37362	44.3	13.2	76.4	9,453
24093-3000	32	32	143.8	257	257	197.5	45652	78.2	14.6	20.6	7,329
24093-3100	52	50	133	210	207	166.4	41165	60.2	11.6	52.3	7,329
24093-3150	44	42	132.1	192	192	168.5	48309	64.4	11.9	35.3	7,329
83005-3030	61	50	151	331	329	188.4	82884	66.8	10.1	16.9	8,008
83005-3000	40	39	135.9	313	312	190.9	82884	70.4	13.7	16.8	8,008
96095-3020	54	51	146.1	272	272	200.6	97496	70.4	14.2	18	8,746
96095-3040	80	74	133.1	284	281	187.7	97496	68.9	14.5	19.3	8,746
96095-3060	47	47	145.7	206	203	201.5	54941	71	14.1	17	8,746
96095-3000	53	52	136.5	237	237	198.3	97496	77	15.8	19	8,746
96095-3080	84	83	149	281	279	205.6	54941	78.5	14.9	18.2	8,746
96090-3025	50	47	144.7	203	203	184.5	95704	70.6	12.7	41.7	10,904
96090-3050	38	37	140.5	194	193	193.8	95704	54.2	10.6	30.3	10,904
79077-3000	43	42	136.9	127	127	172.4	43033	53.4	12.7	43.2	6,768
12109-2050	41	40	126.3	295	293	163.0	45456	48.2	14.4	54.2	5,486
48073-3000	40	39	134.6	343	338	178.3	72580	68.2	13.1	38.7	6,586
96110-3000	65	58	121	215	214	163.6	37362	61.1	11	55.4	7,817
96110-3050	62	60	139.2	220	218	168.1	37362	61.8	9.2	55.3	7,817
96111-4040	49	48	118.7	177	172	143.3	37362	63.6	9.5	79.7	6,918
96111-3000	83	78	128.2	318	312	148.4	37362	64	11.8	74.3	6,918
96091-3020	56	53	140.6	317	317	206.2	53377	62.7	9.9	11.8	7,351
96091-3040	66	65	152.3	211	211	201.9	53377	54.6	11	16.3	7,351
96091-3080	39	37	143.2	193	193	198.4	50419	57.4	9.5	20.4	7,351
96091-3060	56	54	142.6	278	276	202.9	38957	59.2	11.7	17.7	7,351
96091-3000	30	30	153.3	243	243	210.5	95704	60.9	13.4	10.9	7,351
96091-3050	43	41	140.2	229	229	199.1	42674	63.4	10.8	15.2	7,351
92090-3000	45	45	148.9	180	180	172.5	55856	34.1	9.6	34.9	8,109
92090-3010	44	44	147.7	191	191	197.1	55856	38.8	15.6	22.1	8,109
11082-3050	43	42	170.2	174	174	175.3	68601	36.1	13.2	56.1	6,137
80125-3000	43	42	107.1	273	269	172.1	43033	22.6	10.5	97.7	11,289
115115-3020	31	31	161.3	118	115	123.0	48980	30.8	11.1	78.1	11,289
115115-3070	38	38	106.6	159	159	163.8	45652	46.9	17	84.3	11,289
115115-3230	37	37	102.7	178	176	146.0	61109	36.5	6.4	100	11,289
115115-3210	37	36	119.4	79	79	110.8	41751	33.6	12.8	99.8	11,289
115115-3240	52	52	109.6	81	79	155.7	42779	29.7	10.7	100	11,289
115115-3280	38	38	103.9	77	76	147.4	73787	44.9	40.2	89.5	11,289
115115-3540	57	55	118.2	96	94	125.0	45983	26.3	10.2	94.8	11,289
115115-3310	32	32	131.3	187	178	136.0	66953	18.6	8.9	98.3	11,289
115115-3420	52	47	137.2	115	115	126.5	66953	52.2	14.4	44.1	5,673
57003-3000	58	58	137.1	364	363	185.7	43347	52.9	11.3	29	4,909
109003-2050	46	40	132.5	198	195	179.2	40131	26.4	7.6	31.2	5,193
51159-3000	44	42	147.6	212	212	199.3	52276	52.8	11.8	27.7	6,129
36139-3000	61	58	135.3	243	243	193.2	63232	59.2	13.4	19.4	6,769
85046-3000	35	32	148.4	213	213	205.2	140503	58.7	14.7	31.3	7,225

## Appendix C

### Correlations – Students with IEPs

Pearson Correlation – Students with IEPs		IEP Index Score	MHHI	ADVD	YOE	FRL	PPE
IEP Index Score	Correlation	1	.012	.282(**)	-.115	-.594(**)	-.261(*)
	Sig. (2-tailed)		.910	.006	.267	.000	.011
	N	95	95	95	95	95	95
Mean Household Income (MHHI)	Correlation	.012	1	.175	.179	-.153	.027
	Sig. (2-tailed)	.910		.089	.083	.138	.795
	N	95	96	95	95	95	96
% Teachers w/Advanced Degree (ADVD)	Correlation	.282(**)	.175	1	.149	-.527(**)	-.108
	Sig. (2-tailed)	.006	.089		.148	.000	.300
	N	95	95	95	95	95	95
Average Years of Experience (YOE)	Correlation	-.115	.179	.149	1	.102	.206(*)
	Sig. (2-tailed)	.267	.083	.148		.324	.046
	N	95	95	95	95	95	95
% Students on Free/Reduced Lunch (FRL)	Correlation	-.594(**)	-.153	-.527(**)	.102	1	.476(**)
	Sig. (2-tailed)	.000	.138	.000	.324		.000
	N	95	95	95	95	95	95
Per Pupil Expenditures (PPE)	Correlation	-.261(*)	.027	-.108	.206(*)	.476(**)	1
	Sig. (2-tailed)	.011	.795	.300	.046	.000	
	N	95	96	95	95	95	96

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix D

### Correlations – Students without IEPs

Pearson Correlation – Students without IEPs		NonIEP Index Score	MHHI	ADVD	YOE	FRL	PPE
NonIEP Index Score	Correlation	1	.064	.482(**)	.000	-.819(**)	-.336(**)
	Sig. (2-tailed)		.536	.000	.999	.000	.001
	N	96	96	96	95	95	96
Mean Household Income (MHHI)	Correlation	.064	1	.175	.179	-.153	.027
	Sig. (2-tailed)	.536		.089	.083	.138	.795
	N	96	96	95	95	95	96
% Teachers w/Advanced Degree (ADVD)	Correlation	.482(**)	.175	1	.149	-.527(**)	-.108
	Sig. (2-tailed)	.000	.089		.148	.000	.300
	N	96	95	95	95	95	95
Average Years of Experience (YOE)	Correlation	.000	.179	.149	1	.102	.206(*)
	Sig. (2-tailed)	.999	.083	.148		.324	.046
	N	95	95	95	95	95	95
% Students on Free/Reduced Lunch (FRL)	Correlation	-.819(**)	-.153	-.527(**)	.102	1	.476(**)
	Sig. (2-tailed)	.000	.138	.000	.324		.000
	N	95	95	95	95	95	95
Per Pupil Expenditures (PPE)	Correlation	-.336(**)	.027	-.108	.206(*)	.476(**)	1
	Sig. (2-tailed)	.001	.795	.300	.046	.000	
	N	96	96	95	95	95	96

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix E

### Stepwise Regression – Students with IEPs

#### Variables Entered/Removed <sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	% Students on Free/Reduced Lunch	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: IEP Index Score

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.594 <sup>a</sup>	.353	.346	12.6793

a. Predictors: (Constant), % Students on Free/Reduced Lunch

#### ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8152.623	1	8152.623	50.712	.000 <sup>a</sup>
	Residual	14951.11	93	160.765		
	Total	23103.74	94			

a. Predictors: (Constant), % Students on Free/Reduced Lunch

b. Dependent Variable: IEP Index Score

#### Coefficients <sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	150.670	2.255		66.815	.000
	% Students on Free/Reduced Lunch	-.359	.050	-.594	-7.121	.000

a. Dependent Variable: IEP Index Score

#### Excluded Variables <sup>b</sup>

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	% Teachers w/Advanced Degrees	-.043 <sup>a</sup>	-.432	.667	-.045	.723
	Per Pupil Expenditures	.028 <sup>a</sup>	.296	.768	.031	.774
	Average Years of Experience	-.055 <sup>a</sup>	-.650	.517	-.068	.990
	Mean Household Income	-.081 <sup>a</sup>	-.962	.338	-.100	.976

a. Predictors in the Model: (Constant), % Students on Free/Reduced Lunch

b. Dependent Variable: IEP Index Score

## Appendix F

### Stepwise Regression – Students without IEPs

**Variables Entered/Removed<sup>a</sup>**

Model	Variables Entered	Variables Removed	Method
1	% Students on Free/Reduced Lunch	.	Forward (Criterion: Probability-of-F-to-enter <= .050)

a. Dependent Variable: NonIEP Index Score

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819 <sup>a</sup>	.671	.667	13.0535

a. Predictors: (Constant), % Students on Free/Reduced Lunch

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32319.19	1	32319.185	189.672	.000 <sup>a</sup>
	Residual	15846.75	93	170.395		
	Total	48165.93	94			

a. Predictors: (Constant), % Students on Free/Reduced Lunch

b. Dependent Variable: NonIEP Index Score

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	206.597	2.322		88.990	.000
	% Students on Free/Reduced Lunch	-.716	.052	-.819	-13.772	.000

a. Dependent Variable: NonIEP Index Score

**Excluded Variables<sup>b</sup>**

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Mean Household Income	-.038 <sup>a</sup>	-.628	.531	-.065	.976
	% Teachers w/Advanced Degrees	.070 <sup>a</sup>	1.000	.320	.104	.723
	Average Years of Experience	.085 <sup>a</sup>	1.427	.157	.147	.990
	Per Pupil Expenditures	.109 <sup>a</sup>	1.625	.107	.167	.774

a. Predictors in the Model: (Constant), % Students on Free/Reduced Lunch

b. Dependent Variable: NonIEP Index Score

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## VITA

Barbara J. Woolsey was born in Cincinnati, Ohio on August 21, 1958. She attended elementary and high school in Des Moines, and received a Bachelor of Science in Education with a major in Elementary Education and a minor in Special Education in 1981 from Northwest Missouri State University. She taught special education in the North Andrew R-IV School District for one year and then moved to Iowa while her husband, Ron, pursued a Ph.D. in Industrial Education. After moving to Indiana, she completed her Master of Science in Special Education at Indiana State University in 1985. She taught elementary special education in the Sullivan School Corporation for 10 years. While teaching in Indiana she also obtained certifications in Gifted and Talented Education and Elementary Administration. She has taught the last 12 years in the Blue Springs School District and is currently employed as a special education Process Coordinator at the middle school level.