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The Impact of Class Size on Student Achievement

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in partial fulfillment of the requirements for the degree of

Doctor of Education

School of Education

DECLARATION OF ORIGINALITY

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university here or elsewhere.

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THE IMPACT OF CLASS SIZE ON STUDENT ACHIEVEMENT

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This dissertation has been approved as partial fulfillment of the requirements for the degree of
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at Lindenwood University by the School of Education

Dr. Terry Reid, Dissertation Chair	Aug 14, 2009 Date
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DEDICATION

First, I must thank God for granting me the knowledge and resources to accomplish this task, while testing me to overcome the obstacles that were presented along the way. I am profoundly indebted to my family who sacrificed in order to support my career goals and educational aspirations. My husband, Donald, has provided unwavering encouragement, enthusiastic support, and an unyielding belief in my ability when mine own confidence had once diminished. My children, Michelle and Brody, inspired me to persevere and provided the much needed love and affection that encouraged me in my time of need.

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Abstract

This study detailed the significance of class size on student achievement. The dependent variable represented in this study was AYP (Annual Yearly Progress) cumulative scores of Missouri schools. The dependent variables for this study were class size (student/teacher ratios) of schools in Missouri and socioeconomic status of students in Missouri schools. The intention of this study was to examine the effects of small class assignments, with special attention given to disaggregating the results by economic status, school size, and student achievement scores. Student achievement measures included district's AYP (Annual Yearly Progress) scores for the 2007-2008 school year as reported by DESE. Additional quantitative information was gleaned from the data pertaining to socioeconomic status of students and school size. This study indicated a statistically significant relationship between class size and student achievement. A truism exists in relation to the ability of educators to attend to individual student needs when the class size remains below seventeen. The more individualized attention the student receives the more they will achieve. The findings of this study indicated the need for reduced class size. All quantitative data were represented in a comparison study with the use of a Pearson *r* correlation coefficient model. The results of this study proved to reject the null hypothesis and set the stage for further study in area of class size and student achievement. Additional information is available in the study regarding the impact of socioeconomic status on student achievement.

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CHAPTER ONE - INTRODUCTION

The educational community has developed various means of recognizing schools with the highest scores and achievement levels; however, the conclusions of those results fail to be proven (Hill, 2008). Hill proposed that the public education system is based on assumptions of certainty. Educators can assume that by reducing class size, student achievement scores would increase. Of all the topics researched and represented in the ongoing battle for funding, class size reduction efforts are at the top of the list. Hill concluded that the resistance to new ideas discourages the kind of rigorous research and development necessary to create and prove targeted results.

Recent research indicates a link between smaller classes and a variety of societal benefits. For example, reducing class size in elementary schools may be more cost-effective than most public health and medical interventions. The authors of this 2008 research conclude that students in smaller classes graduate from high school at higher rates, therefore their increased earnings and improved health generate almost $170,000 over a lifetime for each additional graduate. The American Federation of Teachers (2008) published,

> Higher earnings and better job quality enhance access to health insurance coverage, reduce exposure to hazardous work conditions, and provide individuals and families with the necessary resources to move out of unfavorable neighborhoods and to purchase goods and services. The net effect of graduating from high school is roughly equivalent to taking twenty years of bad health off your life. (para. 4)

Educational study has served to provide a wealth of learning benefits that translates to improved instructive services for students. The overarching obstacle hindering a sustainable policy change is funding. Costs associated with implementing a class-size reduction reform model are not readily available and cannot be guaranteed indefinitely. Cromwell (1998) suggested the most clear-cut problem with reducing class size is the cost. Significantly, more must be spent on added teachers and added space to limit class size. In addition, while some states have reduced class size and then completed research to make sure that doing so actually enhances student performance, others have not spent money on this kind of research, so they do not know what the added cost is buying (Cromwell, 1998). Gilman and Kiger (2003) stated "the current focus on reducing class size has become a controversial topic in the education world, and contradictory findings from various research studies have yielded speculation about whether smaller classes actually improve student achievement."(p. 80) President Clinton's plan brought about a new emphasis on the longstanding debate over the issue of class size. Hopkins (1998) focused on the critics of Bill Clinton's class-size initiative. In addition to a renewed focus, Clinton's plan also caused critics of reduced class size initiatives to surface and be heard. The existing controversy on this topic emerged from conflicting research about the benefits of smaller classes, classroom space and quality teachers to fill new positions, and the financial means necessary to support a class size reduction reform model (Hopkins, 1998). Recent policy debates have centered on the issue of class size as an ambiguous variable that may or may not influence student achievement (Winters, 2002).

According to Hanushek (1999), nationally, class sizes have fallen dramatically for decades, while student achievement has not improved. Achilles (1999) stated that some of

the most compelling evidence of the connection between class size and student achievement has come from Tennessee's experiment with class size reduction and the systematic tracking of student performance after the initiation of the program. This research leaves no doubt that small classes have an advantage over larger classes in reading and math in the early primary grades (Achilles). These are just a small sampling of the points made in regards to the opposing views related to class size reduction and the costs associated with an all all-encompassing reform model. To achieve the ideas expressed by Achilles, educational reform must occur. A systematic, funding supported, and research based reform model must be initiated at the state level. A systematic plan of action with research based methods, on going data collection, and sustainable funding would insure the foundation necessary to regulate the expected outcomes for improved student performance. Krueger (2002) suggested it is unfortunate that the federal government has not sponsored a large-scale experiment like Project STAR. Krueger states that the nation should not have to depend only on one study from Tennessee to determine whether class-size reduction is an effective strategy for improving student achievement."(p.3)

Another point of contention is whether the teacher instructs any differently in a smaller class setting than in a larger class setting. If the dynamics of the instructional process remain the same and an educational reform model negates to restructure the instructional process, then all potential gains are lost or void. Therefore, further research is necessary to determine the cost benefit of a class size reduction plan and the potential instructional benefits for students.

Many variables must be considered before a quality conclusion can be confirmed about the impacts class size has on student achievement; therefore, this study will be

guided by the findings derived from larger class size studies. Research conducted for the purposes of this study will simulate larger national studies, evident in Chapter Two.

Class size variance is notable at both ends of the spectrum. Ehrenberg, Brewer, Gamoran, and Willms (2001) reported that there could be one or more adults facilitating learning with one or two students receiving the information in a formal learning scenario. At the other end of the spectrum, a student may be one of a few hundred instructed by a single educator. Achilles (1999), who stated, "establishing appropriately sized classes in the early primary grades benefits the children first, foremost, and directly"(p. 18) further studied this topic.

In the pages that follow, the researcher will summarize the literature, set out the research model, and present new results that stress the importance of class size or the necessity to address the variables effecting class size and student achievement.

Conceptual Underpinnings

Achilles (1999), a known author, professor, and researcher, is often cited by colleagues and peers as an expert in class size reduction research. He is looked to for answers related to the conundrums surrounding class size reduction reform models and the research to support the need for educational change related to class size. Utilizing the concept espoused by Achilles, this study was guided by an overarching question, Do students experiencing smaller class sizes learn more, as measured by student achievement tests, than otherwise similar students? Hanushek, Kain, & Rivkin (1998) have provided a multitude of research both contradicting the findings of Achilles and supporting specific variables related to class size discussions. Hanushek's research notes the variances in

teacher quality and classroom dynamics are more likely to generate connections between class sizes and improved learning.

The foundation for this study exists in the answers to many of the educational questions that school administrators face in meeting students' needs. The motivation subsists when educational leaders ponder the question: Is student achievement worthy of additional state and federal funding, needed to reduce class size?

In spite of contradictory findings, the US federal government allocated $12 billion (over a seven-year period) to reduce class sizes (Hoxby, 2000). The state of California has spent over 3.6 billion on class size reduction since 1996. Twenty states, within the United States are currently undertaking or discussing policies to reduce class sizes, and the Dutch government decided to allocate approximately $500 million (in United States dollars) to reduce class sizes (Levin, 2001). If the all-encompassing answers are found in one area of school reform then more emphasis on research in this area is necessary. Gursky (1998) suggested that the benefits of smaller class size include better discipline, individual attention for students, and opportunities for teachers to vary their instructional strategies. Gursky goes on to acknowledge smaller class sizes increase student attendance rates and significantly increase student performance. More students complete courses, earn higher grades, and graduate because of reduced class sizes (Gursky, 1998). Gursky further confirmed that parents, teachers, students, and school patrons are more satisfied with their schools. The supporting researchers believe in the work of the educators and support the vision of the school to continue to grow and improve (NEA, 2004). Hanushek (1998) maintained that micro-level variables like good teachers in specific class settings with

specific cohorts of students are more likely to generate direct connections between class sizes and improved learning.

Significant research models, such as Project STAR, SAGE, CSR, and Project Prime Time support the theory that the greatest impact on reducing class size effects students more at the elementary level. There is also research to support the idea that smaller classes greatly effect the achievement levels of students in poverty. Achilles (1999) stated, "small classes offer student many benefits, especially disadvantaged and minority students in early grades" (p. 103).

This study compared the findings related to students in the state of Missouri and provided research regarding their educational needs. A thorough comparison of the financial structure influencing policy makers and a comparison of the student achievement levels impacted by low socioeconomic factors were examined. The findings in this study detailed the specifics related to teacher experience in reference to class size. Pool (2002) stated that an experienced educator's ability to manage a large class and teach effectively would significantly determine a student's overall success, compared to a less experienced teacher in the same role striving for the same goal. Identifying the factors most relevant to student achievement standards is important to parents, school leaders, and policymakers. Policymakers carry the burden of initiating financial means to maximize the use of funds available for public schools.

The impact reaches far beyond the school walls and begins to open doors into long-term outcomes associated with completed education, future earnings, racial disparities, and economic competitiveness. Achilles (1999) reported, "class-size policy initiatives and legislation reflect the happy marriage of solid research and common sense." (p. 4) The

factor most consistently discussed in research is class size, given the ease at which it may be manipulated by policy, previous studies and research findings conclude a modest impact on student learning (Boozer & Rouse, 2001).

Problem Statement

The size of a class has the potential to impinge on the educational outcomes associated with the level of learning. Lynn Winters (2002) confirmed that reducing class size diminishes the distractions in the room and gives the teacher more time to devote to each child. Mosteller (1995) also suggested when children first come to school, they are confronted with many changes and much confusion, hindering the level of learning. Students enter this new setting from a variety of homes and circumstances and may need training in paying attention, carrying out tasks, and interacting with others in a working situation. In other words, when children start school, they need to learn to cooperate with others, learn how to learn, and become oriented as students.

Other contributing factors that exist in the quality of services offered to students are the; socioeconomic status of the students within the classroom, and the size of the school. When focused on the overarching research question outlining this study, one could conclude that class size can directly and indirectly effect all aspects of a students learning potential. As stated by Ehrenberg, Brewer, Gamoran, and Willms (2001) class size could determine how students interact with each other and the level of social engagement. This may result in more noise and disruptive behavior, which in turn defines the nature of the activities the teacher is able to promote.

Class size could alter how much time the teacher is able to focus on individual students and their specific needs rather than on the group as a whole. Ehrenberg, Brewer,

Gamoran, and Willms stated that since it is easier to focus on one individual in a smaller group, the smaller the class size, the more likely individual attention could be given, in theory at least For these reasons, and many others, changes to the class size standards are potentially beneficial to the overall educational standards currently set forth by the federal government. However, the role of the federal government and their action as policy makers will be defined in this study as well.

A deeper understanding of the costs associated with reducing class size will paint a clearer picture as to the means that holds us back from educational reform associated with class size, that so evidently needs to be initiated. Ehrnberg, Brewer, Gamoran, and Willms noted that, ironically, not only is class size potentially one of the key variables in the "production" of learning or knowledge, it is one of the simplest variables for policymakers to manipulate. However, the amount of student learning is dependent on many different factors. Some are related to the classroom and school environment in which the class takes place, but others are related to the student's own background and motivation and broader communication influences (Ehrenberg et al., 2001). This study will investigate both the classroom effects as well as elements related to the school environment and outside influences associated with student achievement.

Class size and the implications associated with the topic can potentially change how students learn and acquire knowledge. Research presented in this study indicates a direct relationship between class size and student achievement, signifying a negative impact on student achievement in classes representing a larger than seventeen to one ratio of students to teacher. The problem that prompted this study derived from the overwhelming

conclusive research that indicates a direct correlation between class size and student achievement with the lack of sustainable educational reform models to support the findings.

This study will also investigate the impact the socioeconomic status of students has on a school's success, related to class size. The socioeconomic status of students can influence the dynamics of classroom, negatively influencing the learning potential for all students. The problem associated with the socioeconomic status of students in relation to class size is that this is just one area impacting the dynamics of the learning environment and should be considered when investigating student achievement standards and expectations, in regards to the legislative guidelines set forth by the Department of Elementary and Secondary Education (DESE). In Chapter Three the researcher will outline the potential obstacles that will present themselves when classes are diverse, in regards to the student's socioeconomic background.

School size is an additional variable to be considered in reviewing the related topics that effect class size and student achievement. This study will clearly define a small school and a large school and relate the effects of school size to student achievement. School size was a repeated theme in this study and warranted an investigation in relation to class size.

R*esearch Questions*

1. What relationship exists between class size and student achievement in Communication Arts?
2. What relationship exists between class size and student achievement in Mathematics?
3. How does the socioeconomic status of students relate to student achievement in terms of class size?

Purpose of the Study.

The benefactors of this study will be students, parents, educators, policy makers, and school leaders. The benefits will be evident in all areas associated with the development and presentation of quality reform models, instructional services, and more accurate perceptions related to the class size, socioeconomic status of students, and school size, directly impacting decision makers involved in school design and structure.

The purpose of this study is to discover the relationship between class size and student achievement of students in Missouri schools. Research in the literature review of this study indicated there are positive effects on student achievement when class size is reduced; the problem arises in the duration of the effects. Are the positive effects of student achievement long term or short term only? Class size effects persist throughout a child's educational experience, therefore the need is for consistent policy reform that will be continuous from primary grades through their high school years.

Hypothesis

Null Hypothesis #1. There is no significant correlation between class size and student achievement in Communication Arts.

Null Hypothesis #2. There is no significant correlation between class size and student achievement in Mathematics.

Null Hypothesis #3. There is no significant correlation between socioeconomic status and student achievement.

Limitations of Study

A multitude of limitations that may have effected the results of this quantitative study. Teacher experience could effect the quality of the educational practices used in the

classroom. Educators all enter the classroom with a wide variance of strengths and talents as educators; this opens the door for leveled quality instructional practices in the classroom. The students relationship with the educator, performance rates, and individual targeted growth are examples of areas effected by the teachers quality effectiveness in the educational setting. If the teacher is faulty in any area related to student success, the number of students in the classroom is secondary to the lack of best practices in place to meet the student's needs.

The study is limited to the data collected during the 2007-2008 school year and reflective of a random sampling of Missouri schools. The data collected is representative of a district cumulative score calculated from data prepared by DESE. The AYP score is a cumulative representation of the district's rate of success on the MAP test. This score indicates all areas of review in two categories; met or not met. The data is compiled and a district AYP score is created.

Similar to the levels of experiences of teachers, students also come to the classroom with their life experiences that will ultimately affect the dynamics of the classroom setting. Their unique knowledge and experience impacts the outcome of this study specifically, students representing the low socioeconomic tier of the population. Students in poverty skew the results due to the lack of parental support, lack of means, and statistically students in poverty score lower on standardized tests. A districts AYP data would be effected by a large percentage of students qualifying for free and reduced lunch services.

Each district is allocated a set amount for per pupil expenditures. This per pupil allotment is determined by DESE and is calculated based on the district's assessed valuation. The random sampling presented in this study represents a wide variety of per

pupil expenditure rates in the districts selected. These allocated funds can drastically enhance a student's educational experience or hinder the resources necessary to obtain a quality instructional program rich in extracurricular experiences.

Classroom dynamics is the last limitation to be noted in this study. A classroom's dynamics are based on student/teacher relationship, peer interactions, climate, and management style. These are areas of subjective reflection and could have a positive or negative effect on the student's performance. Classroom dynamics can change based on student class assignment, relational interactions, and teacher leadership. Regardless of the classroom dynamics, it is no secret that the success of all students is dependent on quality services offered at each level of the students educational experiences. Limitations are only factors that impact the results of the study, however it is important that the reader be mindful that while the limitations effect the results, that does not necessarily mean they negate the outcome. As the researcher, I recommend the reader reflect on the limitations throughout the study and consider the effects of each on the quality services offered.

Definition of Terms

For the purpose of this study, the following definitions apply to the teams used in the discussion. Terms are listed alphabetically and operationally defined for the purpose of this research.

AYP data. A measurement defined by the United States federal No Child Left Behind Act that allows the U.S. Department of Education to determine how every public school and school district in the country is performing academically according to results on standardized tests (MO DESE, 2008).

Class size. "The number of students regularly in a teacher's room and those for whom that teacher is responsible and accountable. Class size can be determined by counting the number of students in a teacher's class. Class size can be set experimentally, as in Project STAR, but even there researchers used a range, such as 13-17 for a small class. (Achilles, 1999, p. 32)

Diverse needs of students. Different academic levels of students within the same classroom.

Diversity. The fact or quality of being diverse; difference. (Merriam-Webster, 2009).

Duration. Continuance in time(Merriam-Webster, 2009).

Early intervention. Early school intervention programs that are designed to prevent problems in academics from developing rather than trying to correct a problem after it is established.(AFT, 2005)

Elementary school. "A public school containing students in grades Kindergarten through sixth grades, in any combination." (Locke, 2001).

Missouri Assessment Program (MAP). The assessment tool used to gather data for this study, which is the standardized test for all Missouri students (MO DESE, 2008).

Pupil teacher ratio. A number manufactured by dividing the number of students at a site (e.g., a building) by the number of professionals serving that site (sometimes includes instructional aides). According to Glass, Cahen, Smith, and Filby (1982), "the search for an appropriate descriptive ratio has a long history in the research on class size. Any ratio is, at best a crude indicator…" (p. 492). The accuracy of any PTR will greatly influence the results of any studies that use the ratio as one variable. Note that in STAR, the range for

small classes was set at 13-17 to 1 teacher, but PTRs for these small classes were the same as the PTR for the building. Even though the class sizes were different, the PTR for both small and regular classes was the same at the building level (Achilles, 1999).

"Derived by dividing the total number of students by the total number of educational professionals in the building (including but not limited to: principals, instructional aides, librarians, specialists such as music, art, math, reading and physical education instructors)" (Contra Costa Times, 2002).

R*egular class.* A class ranging from 22-26 students set experimentally and randomly to be the "control" condition in STAR. The *r* classes in STAR averaged about 25:1. (Achilles, 1999)

Small class. For practical purposes, and considering current legislation and practice, a "small" class has about 15-18 students per teacher and is designated in this study as 15:1 or 18:1. (Achilles, 1999)

*STA*R. Student Teacher Achievement Ratio, a longitudinal class-size experiment(1985-1989) conducted in Tennessee. The study eventually included more than 11,600 students. STAR provided experimental evidence to support prior meta-analyses and studies. (Word et al., 1990) (Achilles, 1999)

Summary

In her research, Pool asked several questions regarding the effects of class size on student achievement. "Does research support the relationship between small class size and high achievement? For what grade levels? For which students? How much will this cost? Are there creative alternatives" (Pool, 2002, p.104). The researchers would also like to find answers to these questions.

This study will conclude if there is a correlation between reduced class size and increased student achievement. The purpose of this study is to discover the relationship between class size and student achievement of fourth grade students. While several limitations can be identified within this study, the data collected is of value and can lead the reader to their own assumptions. Many educational reform models remain controversial; however, reducing class size is a popular strategy to allow for more individualized instruction that is strongly supported by parents, teachers, and educational researchers (NEA, 2004).

There are three areas school leaders could consider in order to implement effective class size reduction: early intervention, duration, and intensity. Merely reducing class size will not directly impact student achievement, quality educational reform models must be adhered to in order for positive change to occur. According to Achilles, Finn, and Pate-Bain (2002), educators should first implement small classes in Kindergarten and first, and slowly expand to include other grades. Students should remain in small classes for as long as possible, and finally students should be in a classroom that is free from disruption.

The problem that prompted this study derived from the overwhelming conclusive research that indicates a direct correlation between class size and student achievement with the lack of sustainable educational reform models to support the findings. Class size reduction is just one aspect of educational reform demanding educators attention. There is a multitude of other variables that effect student achievement. The researcher conducting this study supports the need for reduced class size, while maintaining a realistic approach to educational reform. This study could reveal controversial opinions regarding the effects of class size on student achievement.

CHAPTER TWO-LITERATURE REVIEW

Introduction

Education reform has been a topic of debate for many decades. Due to President George W. Bush's dedication to comprehensive education reform, the No Child Left Behind Act (NCLB) of 2001 was adopted. This act systematically detailed the federal role in education to close the achievement gap between disadvantaged, minority students, and their peers. The NCLB of 2001 embodies four principles: stronger accountability for results, expanded flexibility and local control, expanded options for parents, and research-based teaching strategies (U. S. Department of, 2001).

The American Federation of Teachers (AFT) released a budget update for the No Child Left Behind Act in 2005. The state-by-state funding chart (see Appendix A) referenced the fiscal year 2005 in regards to budget allocations promised by the George W. Bush administration (Bass, 2004). This chart also detailed the programs and initiatives that could be funded with the necessary resources. The details represented on the funding chart detail the gap between George W. Bush's 2005 budget for NCLB's Title 1 and what is needed to fully fund the program.(Bass, 2004).

The financial chart is necessary for the purposes of this study, in that it accounts for the cost associated with class size reduction. The chart details the number of teacher salaries that could be afforded out of this one funding source. It is necessary for future researchers to have readily at the hand the data to conclude what was once available, financially, compared to the deprivation in funds schools are facing now and may in face in the future. The fiscal year 2005 budget shortchanged billions of promised dollars that states needed to help disadvantaged students accomplish the goals of the NCLB. Title 1 funds

were made available to students that have been targeted as disadvantaged (AFT, 2005).The effects of reducing class size are null and void without adequate funding at the federal level. In order for radical school reform to occur the federal government must start the change process, as they did with the NCLB, but then sustain the momentum with consistent and adequate funding for the change to be effective and long lasting.

According to AFT (2005),

> The White House and Congress can't have it both ways—tout the law as a giant step forward but deny billions of dollars to carry out its requirements. If we want to reap the benefits of this important law, we must keep our eye on the ball and focus on—and support—the programs that improve student achievement. (p. 2)

In chapter two the conceptual framework of class size on student achievement was examined. Additionally, the advantages and disadvantages of class size reduction and the relationship were explored between socioeconomic status and class size. Four different programs were studied in regards to the correlation between class size reduction and student achievement. Through the review of literature four relevant studies emerged:

- SAGE (Student Achievement Guarantee in Education, Wisconsin 1996
- STAR (Student Teacher Achievement Ratio), Tennessee 1985
- California California's Class Size Reduction Program (CSR), California 1995
- Project Prime Time, Indiana 1985

A commitment to class size reduction would be financially advantageous to school districts that have identified class reduction as a research-based initiative. The NCLB Act

holds school districts accountable for student achievement and continuous school improvement. By supporting the national reform model for student achievement along with the necessary financial responsibilities of the state and local school boards the entities function as a cohesive unit, dedicating their efforts to improve student performance, then student success is to be expected (Achilles et al., 2002).

Conceptual Underpinnings

For the purposes of this study, two specific concepts regarding the effects of class size reduction were considered. Proponents have agreed that a correlation exists between small classes and improved student-teacher relations. A second group has supported the connection between reduced class size and improved classroom environment and student conduct.

The first concept details the importance of healthy interactions between student and teacher. Classroom culture standards are established in the early grades, therefore aiding the students' relational development. A key element in the structure of the classroom culture is a smaller class size setting to enable the educator to connect with all students individually. When an appropriate class size is maintained, the teacher can establish a higher level of morale among students, which enhances a conducive learning environment for all. Functional coping skills developed early on as a result of reduced class size, will enhance the students' effective habits to serve them in their later years of education (Achilles et al., 2002). This concept also explains why class size reduction in upper grades will not result in the level of significant gains evident in students who were influenced by smaller class size in the lower grades. Students in the upper grades have already established their methods of coping with the disadvantages of a larger class size setting (Achilles et

al.). In addition to this burden they have predetermined attitudes toward school. These predetermined views are not likely to change based on a reduction of class size in the upper grades. These predetermined attitudes are likely negative in nature due to the lack of a quality connection with a teacher in the early grades (Achilles et al.).

Extraneous factors such as experienced and enthusiastic teachers, related and challenging curriculums, positive physical learning environments, and schools that are conducive to learning are all relevant to increased student achievement. If these conditions are not present, then a reduction in class size will have little impact in the early grades. Therefore, when implementing programs for reducing class size, educators should analyze the professional development necessary to create these exceptional learning environments (Achilles et al., 2002).

The second concept analyzed in this study emphasizes the behaviors of the students, rather than the teacher. When student-teacher ratios exceed desirable limits, discipline and classroom management problems interfere with instruction. These problems are not as evident in smaller classes; therefore, student engagement is increased (Achilles et al., 2002). When an increase in student engagement occurs, gains in student achievement are expected. A reduction in teacher stress, due to reduced class size, will result in optimum classroom management and improved classroom climate (Achilles et al.). When a well-managed classroom climate is established student success is more likely to occur. Peer relationships are more likely to be developed in small groups rather than larger class settings (Achilles et al.). When these appropriate peer relationships exist, a less competitive environment is in place to enhance student success. When class size is reduced, various benefits to the environment are masterfully created to increase student achievement. These

benefits include more quality instructional time, less time on classroom management, higher levels of student participation, more individualized support for learning, and improved student relations (Achilles et al., 2002). While these two concepts are not mutually exclusive, both provide insights into the climate of a small class environment. The advantages and disadvantages that exist when research methods are analyzed regarding the effects of class size on student achievement (Biddle & Berliner, 2002) are critical to understanding the importance of both variables.

Class Size Effect on Student Achievement

A current policy discussion of great interest is reducing class size to increase academic achievement. Numerous small-scale studies and some vaguely interpreted large-scale studies indicate positive short-term effects of small classes. Some researchers categorize the findings as ambiguous while valuing the efforts put forth to research this ever-growing need for attentive research and reform (Nye, Hedges, & Konstantopoulos, 2001). Educators have not been able to agree about whether class size reduction leads to an increase in academic achievement. There has not been a consensus among educators on interpreting the evidence on the correlation between class size and academic achievement (Nye, Hedges, & Konstantopoulos).

The research compiled found that students in smaller class settings spent more time on task, less frequently misbehaved, and performed at higher levels on assessments (Achilles et al., 2002). Achilles suggested that a closer relationship among students and educators would exist within a smaller class size environment, resulting in more intimate and personal social relations. As recognized in other formal studies, the effects of improved social relations alone will directly impact student achievement (Gursky, 1998). Reducing

class size can enhance the level of responsibility the teacher takes to ensure success for all students (Achilles, et al 2002). When class size reduction methods are enforced, the teacher can prioritize his/her efforts resulting in increased levels of accountability and improved student performance. “The research really confirms common sense. The benefits boil down to better discipline, more individual attention for students, and opportunities for teachers to use more varied types of instruction that engage students” (Gursky, 1998, p. 17).

Another advantage to reduced class size is enhanced safety and security for all students. Supervision of students is hindered when teacher-pupil ratio is greater than the state standard (Gursky, 1998). It is imperative to maintain functional levels of student-teacher ratios to ensure maximum student safety procedures are followed (Gursky).

History of Class Size

The controversy over class size effects in education is a well saturated topic in education. Plato, Socrates, Aristotle, and other great teachers of antiquity lavished individual attention on their students (Achilles, 1999). Some pioneering class-size studies may have been too brief, conducted in upper grades, or were weakened by unsophisticated design or analyses so that their results were inconclusive or inconsistent. Large-scale, random-assignment experiments are not common in education. Without random assignment, policies and practices such as assigning low-performing students to small classes can negate the findings of a class-size effect (Perkins-Gough, 2006). Several early class-size studies, however, were substantial, and their results consistently favored the small classes. Lindbloom (1970) summarized the reported relationships between studies and concluded that the evidence favored small classes and supported the assertion that teachers in small classes use more desirable practices than do teachers in larger classes.

Olson (1971) conducted thousands of observations in elementary and secondary classrooms in suburban United States schools. Based on the findings of that study, Olson generated a comparable list of student and teacher behaviors related to performance score outcomes. All of his data was correlated to a targeted class size of either 5, 15, 25, or 35 students per class. A prepared list of Olson's Nine Defensible Generalizations to support the idea that small class size directly impacts student outcomes is listed below:

1) Teachers employ a wider variety of instructional strategies and learning activities and are more effective with them.
2) Teacher attitudes and morale are more positive.
3) Classroom management and discipline are better.
4) Students develop better human relations and have greater regard for others.
5) Students benefit from more individualized instruction.
6) Students learn the basic skills better and master more subject matter content.
7) Students engage in more creative and divergent thinking processes.
8) Students learn how to function more effectively as members and leaders of groups of varying sizes and purposes.
9) Student attitudes and perceptions are more positive (Cavenaugh, 1994).

The most compelling research regarding the impact of class size on student achievement can be attributed to and Smith (1979). Their meta-analysis study of class size and teacher, student, and classroom variables triggered significant changes in management styles, curriculum content, and the amount of material covered, among other topics. The work of Glass and Smith was followed by two publications from the Education Research Service, the publication of an Experimental Study of the Effects of Class Size, and by

results of observations in second grades in two schools (Achilles, 1999; Filby et al., 1980). The forward moving momentum of research seeking studies is essentially the result of looking backward. The renewed interest in class size both in the late 1970's and again in the early 1990's was initiated by a growing uneasiness in regards to the generally poorly designed research available to analyze educational practices, analyses of studies, and observations. Policy makers at the state and federal level are beginning to take the findings of recent class size studies more seriously. Further discussion of the history of research conducted on this topic leads to speculation on the future of class size (Shapson, Wright, Eason, & Fitzgeral, 1978).

Studies

Many studies have been conducted detailing the effects of class size on student performance. Four popular experimental studies that exemplify the effects of reduced class size were selected for review. The first study analyzed was Wisconsin's Student Achievement Guarantee in Education (SAGE) Program. The research project lead by Molner (1997), focused on the needs of disadvantaged students. The five-year pilot project began in K-3 classes in school districts where the poverty level of students was above 50 percent. Participating school districts were invited to apply for this project; however, funding was only available for a select few school districts. Once the project began, additional schools were not able to participate.

SAGE classrooms that catered to low-income students received additional funding. For each impoverished student, that classroom was granted an additional $2000 dollars for each student who met the qualifications for low-income. The project began with 30 schools

in 21 districts at the K-1 grade level in 1996, with second grade added in 1997, and third grade in 1998.

Biddle and Berliner (2002) provided the details of the SAGE program focusing on reducing class size ratios to fifteen students per educator. Comparisons of SAGE classrooms versus standard classrooms were used to analyze the effects of the SAGE program on student achievement levels. The results were obtained from districts having similar K-3 enrollments, student demographics, family socioeconomic status, and previous reading levels. Findings from the SAGE Project indicated larger gains for students from smaller classes. Due to the positive effects on student achievement the Wisconsin SAGE Project was extended to other primary schools in the state by legislative action. Therefore, a small trial project was extended into a statewide program that allowed for smaller classes to better serve needy students in the primary grades (Biddle & Berliner).

As reported by Biddle and Berliner (2002), the positive effects on student achievement indicated in the SAGE Project findings, allowed educators to conclude that reduced class size does clearly effect student performance levels. Therefore, reducing class size is beneficial both financially and statistically at the local and state levels (Biddle & Berliner).

The best-known study to compare student achievement and the effects of class size reduction was Project Student Teacher Achievement Ratio (STAR) that originated in Tennessee. In 1985 the Tennessee legislature was convinced to provide support for an experimental study on class size (Gilman & Kiger, 2003). This study was conducted to analyze the effects of class size on student achievement with the placement of students in

three different classroom designs: standard class size, supplemented classes with aides, and small class.

The project participants represented various primary schools within the state of Tennessee. Each participating school committed to remain for four years in the program, to provide appropriate classrooms for the project, and to have at least fifty-seven Kindergartners enrolled as active participants in the project (Gilman & Kiger, 2003). Primary schools that participated in the project received no additional support, other than the funds necessary to hire additional teachers and aides. Due to the stated stipulations, several schools were disqualified from participating in the STAR Project because of over crowding, inadequate funding, and lack of adequate facilities for classrooms (Gilman & Kiger). The sampling for the first year consisted of 79 schools, 328 classrooms, and approximately 6300 students. The STAR Project was the largest study on class size to be conducted.

Data were collected on each participating student, via the Stanford Achievement Test (SAT). Biddle and Berliner (2002) stated that the results indicated similarities in student achievement data among the standard class design [traditional classroom setting] and the supplemented class design [reduced class size setting]. However, the results of the students instructed in the smaller class design were significantly different. The student achievement data collected from participating students in the smaller classes indicated significant gains in their achievement levels. Students who had long-term exposure to the small class design developed significantly higher levels of achievement with gains becoming greater with increased exposure to a small class design (Biddle & Berliner, 2002). The STAR Project yielded four significant findings: (1) students instructed in

smaller class settings demonstrated significant gains in overall academic achievement; (2) benefits occurred regardless of student demographics, such as, school location and student gender; (3) greater benefits occurred for minority students and those attending inner-city schools; (4) student motivation was uneffected by the reduction of class size (Biddle & Berliner). With the conclusion of the STAR Project in 1990, a question of long-term benefits rendered further research (Gilman & Kiger, 2003). A second study, entitled *The Lasting Benefits of Class Size* was conducted to further analyze the long-term effect of reduced class size.

Gilman and Kiger (2003) noted that the second study was initiated by the Tennessee legislature to analyze the long-term effects of class size on student achievement. The additional financial support necessary to conduct the second study occurred due to the significant findings from the STAR Project. The goal of the second study was to determine STAR Project outcomes during students' upper elementary and secondary academic experiences. Students participated in the Comprehensive Test of Basic Skills at the end of each academic year through twelfth grade. The data revealed that average students who were instructed in a smaller class setting were months ahead of their classmates who had been exposed to standard class design (Gilman & Kiger, 2003). There were two significant findings of the second study: academic achievement gains were significant for students participating in smaller class size dynamics, and students enrolled in smaller classes demonstrated increased effort, initiated self-guided learning experiences, and demonstrated less disruptive behavior (Gilman & Kiger, 2003).

The conclusions of the STAR Project in addition to the results of the second study indicated several advantages of smaller class size design. Advantages of the smaller class

design include: (1) students earned better grades on average; (2) fewer students dropped out; (3) fewer students retained; (4) more students opted for advanced classes; such as Foreign Language, in high school; (5) more students took the SAT and ACT for college entrance; (6) more students graduated high school; and (7) more students from small class sizes were in the top twenty five percent of their class (Biddle & Berliner, 2002). These findings, while inconclusive due to the need for additional support, did succor the majority of research findings that support the need for reduced class size.

Biddle and Berliner (2002) reported that the validity of the STAR Project was challenged by many researchers for a variety of criticisms. These criticisms included: (1) participating schools were voluntary; therefore, the selection process would warrant bias; (2) the lack of diverse populations among the sample and a transient rate of more than fifty percent precluded definitive disaggregated data collection; (3) the assumption that the results of the study would assure a state wide policy of class size reduction could have prompted teachers to work harder to insure positive results; and (4) the lack of supportive data for other researchers to examine; therefore, all data were interpreted by the original researchers (Biddle & Berliner, 2002).

Based on the findings of the Tennessee STAR Project, K-3 class size was reduced to fifteen to one [fifteen students to one teacher] in schools where one-third of their population qualified for free or reduced lunch (Gilman & Kiger, 2003). The Tennessee Board of Education supported the concept of reduced class size, but they had no plans to extend class size reduction to other schools with varying demographics. Therefore, if a school was not a part of the initial phase of class size reduction, then financial support for

additional teachers and facilities was not available for reducing class size (Gilman & Kiger).

The California Class-size Reduction (CSR) 1994, occurred due to the results of the Tennessee Project Star study. The second factor leading to the implementation of the California CSR Initiative occurred as a result of a surplus of funds. Finally, California's governor at that time strongly supported the CSR Initiative and led the way for statewide small class requirements in grades K-3 (Gilman & Kiger, 2003). Mandatory participation was not a factor in the implementation of the California CSR Initiative. Due to the popularity among parents and teachers over ninety-seven percent of K-3 students were enrolled in smaller classes. In fact, many educators complained to the director of the CSR Initiative, Lynn Piccoli, when their class size reached 21 students (Gilman & Kiger, 2003). The state of California faced a teacher shortage at the onset of the CSR Initiative, and the need for more educators compounded the problem. Therefore, due to the implementation of the CSR Initiative hiring quality educators posed a significant challenge. School leaders were forced to fill positions with non-certificated individuals which negatively impacted the quality of instruction. (Gilman & Kiger, 2003).

Gilman and Kiger (2003) believed that the CSR Initiative was difficult to implement at the local level due to the lack of flexibility built into the program guidelines. For example, enrollment was to remain under twenty students per each K-3 classroom. However, participating school districts planned proactively by limiting their class size to eighteen students. This planning strategy allowed for enrollment growth throughout the year while maintaining the class-size requirement of the CSR Initiative. While the school districts were attempting to plan proactively for pupil growth, they did not consider the

additional financial burden of a ten percent salary increase for teachers, to initiate the program (Gilman & Kiger, 2003).

Another specific guideline that challenged the successful execution of the CSR Initiative was the importance of the order in which class size reduction was implemented. The need for the sequential grade ordering presented an additional funding issue for the implementation of the initiative (Gilman & Kiger, 2003). Legislative issues also created a challenge during the initial implementation stages of the CSR Initiative. The California Department of Education attempted to address some of the rigid guidelines that posed a problem for local school leaders of CSR schools. Gilman and Kiger suggested that several organizations, such as, teacher unions, Parent Teacher Organizations, and some legislators were against any changes to the initial CSR Initiative guidelines.

A consortium was hired by the CSR Initiative directors to study the program effects. Data analysis of study by the consortium revealed that average achievement scores of CSR participating students increased each year. Gilman and Kiger (2003) rebutted by pinpointing extraneous variables that negated the consortium's findings, thereby concluding that achievement gains were not a direct result of the CSR Initiative.

While the initial implementation of the CSR Initiative came about during a surplus of state money, California continued to experience deficit spending (Gilman & Kiger, 2003). The deficit may or may not have been a direct result of the initiative. One cause might have been the increase in teacher compensation by 24%. Financial strains required school districts to supplement the cost of CSR participation from their general funds. The largest financial burden of the CSR Initiative was the need for supplemental

funds to sustain the program. This financial crisis directly impacted facility maintenance and administrative services (Gilman & Kiger).

Other organizations were encouraged to lobby for the necessary increases to sustain the CSR Initiative (Gilman and Kiger, 2003). Members of these organizations felt strongly about the positive effects the initiative had on student achievement. Most California educational stakeholders were in favor of expanding the CSR Initiative to grade four. At the same time, some school districts opted to withdraw from participating in the CSR Initiative. All districts were faced with the choice to cutback their participation or discontinue their role in the CSR Initiative due to the financial burden of sustainability (Gilman & Kiger).

The final study selected for review was the Indiana Project Prime Time Study. The Indiana Project Prime Time study was a K-3 class size reduction initiative that took place during the 1984-1985 school year. While the Indiana Project Prime Time study was not as popular as the California CSR Initiative and the Tennessee STAR Project, Indiana was one of the first states to implement a class size reduction program. This program proved popular with the participation of all 300 Indiana school districts, with the exception of one district opting out of participation. Due slow implementation and steady enrollment rates of participating schools, the Project Prime Time experienced fewer challenges than the programs detailed earlier in this Chapter. Project Prime Time participants did not face a teacher shortage crisis as experienced in previous studies. While Project Prime Time had successes to celebrate, they experienced similar funding issues as previous initiatives.

Project Prime Time guidelines dictated that class size must not exceed more than eighteen students per class in grade one and no more than twenty students in grades K, 2,

and 3 (Blatchford & Mortimore, 1994). This program highlighted the significance of smaller class size and curriculum in first grade. When enrollment numbers exceeded the stipulated class size guidelines, the participating school districts were burdened with the need to hire additional teachers. The state of Indiana did not provide the necessary funding for the additional staff needed to meet the requirements. Therefore, participating school districts supplemented state funding by appropriating money from other programs in the school. While there were many benefits of Project Prime Time, the implementation of this program may have hindered the quality of instruction offered to students (Blatchford & Mortimore, 1994). Administrators often wondered how they could remain financially solvent and still meet Project Prime Time guidelines.

Two follow-up studies were conducted to reveal the effects of Project Prime Time. After the first year of implementation a study was initiated in first grade and, a second study was conducted after the completion of one year in grades 1-3. The results of both studies proved positive and encouraging regarding the effects of Project Prime Time. The results indicated student gains in achievement, improved self-concept, and a positive attitude toward school (Gilman, 1994). The results of the second study indicated no favorable results for students who experienced smaller classes in grades 1, 2, and 3 after the third year program evaluation was concluded (Gilman). After the third year of implementation two independent studies were conducted which concluded that the effects on student achievement were inconclusive and the gains reported in the first year of implementation no longer existed.

In conclusion, Project Prime Time's popularity caused many school districts to make tough decisions about whether to take money from other school programs for smaller

classes or to increase class size. Indiana experienced a budget short fall which negatively effected the state's funding of local school districts. These cuts may have contributed to teacher cuts, which would increase class size. If schools attempted to create smaller class sizes, they could receive Project Prime Time funding. These factors caused serious concerns of the effectiveness of Project Prime Time. The parental support and teacher buy-in were reasons to continue the implementation of Project Prime Time; however, the state of Indiana could never fully funded the initiative (Gilman & Kiger, 2003).

The Relationship Between Class Size and Student Achievement

The benefits to students are first, foremost, and direct when appropriately sized classes are established (Achilles, 1999; Biddle & Berliner, 2002; Gilman & Kiger, 2003). Parents, families, and teachers benefit from smaller class settings. Not only is the classroom more manageable, but the impact on children can be targeted to meet their individualized needs (Achilles, 1999).

Differing Instructional Practices in Smaller Classes

In the 1970's, many researchers suggested that reducing class size would have no significant effect if teachers taught exactly the same way in a small class as in a large class (Achilles, 1999). Two decades later, it was argued that students would learn more in a large class with an effective teacher than in a small class with an ineffective teacher (Achilles). According to Achilles, the discussion of class size centered around myth, tradition, and folklore for too long. A logical question to ponder is; "How much more will students learn with an effective teacher in a small class than with the same effective teacher in a large class?" (Achilles).

Spurred by the Glass and Smith (1979) study between class size and student achievement, Cahen , Filby, McCutcheon, and Kyle (1983) investigated the effects of quality instruction. Glass and Smith did not recognize that the relationship was conditioned by a set of variables effecting quality of instruction; which prompted the question: How does effective and ineffective teaching or environmental conditions alter the findings?

Segments from the results of the Cahen & Filby study of 1979 further delineated the effects of small class instruction. Teachers were observed administering similar practices in both small and large class settings; however, the quality and quantity of instruction changed considerably. Cahen & Filby (1979) recognized the need to address a paradigm shift in data collection methods, in that, researchers needed to redefine their purpose and study the direct impact on quality instructional practices when class size is reduced (Cahen et. al., 1982). The small class size environment allowed for an enhanced curriculum and more individualized instruction. The changes noted were not radical or new approaches but rather modifications to existing practices. Teachers within a small class setting welcomed the opportunity for greater individualization of instruction. Changes in curriculum also occurred in the form of enrichment activities, such as more instructional games, reading for pleasure, and field trips (Cahen et. al.). In basic reading and mathematics curriculum, teachers found that students completed lessons and progressed through the curriculum at a faster pace. Educators assigned to smaller class settings had the opportunity to develop lessons rich in content. Teachers expressed a sense of greater freedom from the constraints imposed by a large class and were able to focus on teaching and learning. Most of the changes could be described as modifications or improvements within the teachers' existing styles and models of instruction (Cahen et.al.).

A compilation of findings were collected among researchers to support the benefits of improved teacher strategies within a smaller class setting. The consistency of findings will not be surprising to any person with experience in education, parents, teachers, administrators, etc. (Achilles, Cavenaugh, Gilman & Kiger). Olson's succinct comparisons (as cited in Cavenaugh, 1994) articulated the parallel benefits that are created for both the learner and the teacher in a small class setting:

1. A wider variety of instructional strategies are employed.
2. Teachers exhibited a more positive attitude toward their work, effecting the overall morale among teachers and students.
3. Classroom management and behavior improvements are observed.
4. Students engage in more individualized instruction.
5. Students develop better social skills and have more regard for their peers.
6. Students master skills more rapidly.
7. Students practice higher order thinking skills.
8. Students have the opportunity to engage in whole group activities that recognize their potential as leaders.
9. Students have an improved self-esteem.

Olson's findings supported other research studies that class size effects student outcomes, and that the focus on achievement vastly understates the value of small classes (Achilles). Olson found comparable benefits for both the teacher and the students in a small class setting. The findings supported cognitive and behavioral benefits as to the effects of a smaller class size. The overall classroom climate changes when the instructor has the

ability to focus on individual needs and less on classroom management of the class as a whole (Achilles, 1999).

Costs Associated with Smaller Classes

Many factors are present when considering competing ideologies, limited funds, and choices. Unfortunately, policy and politics are considered when stakeholders are faced with choices regarding tax dollars and the future of education. Supporting data is necessary in the process of decision-making. Policies that have been taken seriously and are supported with data and research are considered to be more rational and sustainable when in place, if elected officials have taken appropriate action throughout the process (Robelen, 1998).

Critics of class size reduction claim that maximum can be accomplished without the financial burden of reducing class size. More often than not, the discussion for reduced class size has not included the policy makers. Even if one could deduce that smaller class sizes could significantly increase student performance, the implementation of such policy change would not come without careful weighing of benefits and costs (Ehrenberg et.al., 2001). Not only are there costs associated with lowering class size, but other policies designed to accomplish the same goal bear equal economic hardship (Ehrenberg et.al.).

Economists, policy-makers, and educators have sparked lively debates regarding the cost-to-benefit in reducing class size. Achilles (1999) noted that teachers and parents often express in surveys and polls their support of tax increases if the funds will only go to improve education. Achilles suggested that the outcomes of class size reduction may include findings related to societal topics: improved dropout rates, young adult participation in society, and reverse declining adult participation in government [voting]

(Achilles, 1999). The costs associated with significant reform in the area of class size reduction must be compared to the value placed on improved quality of life and future effects associated with an improved educational system. When education is viewed as an investment rather than a cost, the seeds of reform can begin to be planted (Achilles, 1999). Achilles offered his perspective of policymakers "If you think that education is expensive, try ignorance. Pay now or pay more later" (p.12)

These phrases reinforced the findings and supported the benefits of early childhood intervention. Achilles suggested that by investing in the child early on would cost less in remediation later. Achilles proposed that the benefit from education is a productive investment and the, potential social-to-benefit returns, such as less vandalism or violence, reduced teen pregnancy and unemployment, and fewer dropouts, are education's equivalent to the miracle of compound interest.

Socioeconomic Status of Students, Class Size, and Achievement

According to a public interest paper by the American Educational Research Association (2003), during the past twenty years, an annual earning discrepancy has continued to grow. The bottom 20 percent of the population's income (the deprived) shows a 6 percent decrease and the top 20 percent of the population's income (the wealthy) is up 30 percent. In 1998, 12.7 percent of all people in the United States were living in poverty (Leithwood & Jantzi, 2009).

Often when socioeconomic factors are mentioned, one may think of finances; however, socioeconomic status is a complex topic with many qualifiers all possessing their own separate attributes. Duncan and Magnuson (2005) recognized attributes that would indicate a families' socioeconomic status: occupational status, family income, parental

education level, living needs (rent, medical, etc.), number of children in the home, number of parents in the home, and the presence of a grandparent. Duncan and Magnuson listed indicators that may impact an individual's socioeconomic status:

1) mother being a dropout
2) having a single parent
3) having no or a low-prestige job
4) living in a low-quality neighborhood
5) having three or more siblings
6) living in residential instability
7) spanking
8) having access to few children's books
9) having had a low birth weight
10) having had a teen mother
11) having a mother who is depressed (p.35)

Socioeconomic status is classified by financial capital (material resources), human capital (nonmaterial resources, such as education), social capital (resources achieved through social connections), or a combination of these three principal categories (Rusk & Mosley, 1994). Rusk and Mosley concluded that a common predictor of poverty is a single parent household.

It is imperative to understand how the impact socioeconomic status may have on a child's educational experiences. One must first interpret the meaning of a low socioeconomic classification and the weight the burden of the label within society. Tarter and Hoy (as cited in Maxwell, 2007) reinforced findings that social class and school

outcomes were interconnected and are related to social and economic community resources. The social irregularities occurring at home are brought to school, a place where attempts of maintaining and establishing equities are in effect. Student populations represent diverse and varied backgrounds, and teachers attempt to educate all students in the same manner with the same level of expectations. Tarter and Hoy reported that the educational level of parents was important and directly associated with their child's success; The higher the educational level attained by the parent(s), the more likely it was that neither the student nor the family would live in poverty (Maxwell).

The American Psychological Association (2000) declared that, "The impact of poverty on young children is significant and long lasting" (n.p.). Furthermore, the American Psychological Association added;

> Poverty is associated with substandard housing, homelessness, inadequate child care, unsafe neighborhoods, and under-resourced schools and poor children are at greater risk than higher income children for arrange of problems, including detrimental effects on IQ, poor academic achievement, poor socio-emotional functioning, developmental delays, behavioral problems, asthma, poor nutrition, low birth weight and pneumonia. (n.p.)

The socioeconomic status of a student may be a reflection of the child's home environment. Duncan and Magnuson (2005) stated the home is the first school; having a home rich in resources for appropriate child development, should give students a head start on their academic journey. Students from homes with a large number of books, newspapers, and learning opportunities have achieved greater academic success than

students from homes lacking such resources (Duncan & Magnuson, 2005). As the income of the family grew the chances for academic success increased dramatically (Duncan and Magnuson). Borman and Overman (2004) concluded that students from high poverty homes were more likely to become successful when schools offered support and guidance.

The socioeconomic status of students should be considered as policy makers make decisions about the allocation of funds. The guiding force for the decisions made by policy makers should be research driven. This responsibility weighs heavily on the minds of policy makers in their attempt to prioritize funds. Policy makers are charged with the duty to fully investigate and understand the reason for the application of funds.

Early research on the effects of socioeconomic status on student achievement was conducted by Coleman (Kahlenberg, 2001). Coleman concluded that a student's relatives have a significant impact in the academic potential of the student. The amount of money spent on formal education did not appear to have direct effect on academic success (Kahlenberg). According to Bradley and Corwyn (2002), the relationship between the child's socioeconomic status and cognitive competence are associated with the degree of crowding and number of siblings present in the home (Kahlenberg).

Parents of low socioeconomic status were found "less likely to purchase reading and learning materials for their children, less likely to take their children to educational and cultural events, and less likely to regulate the amount of television their children watched" (Bradley & Corwyn, 2002, p. 11). According to Battin-Pearson et al., (as cited in Bradley & Corwyn), "low socioeconomic status children will frequently experience school failure (even in the early grades) that moves them on a trajectory of either conduct problems or withdrawal behaviors" (p. 11.).

Bradley and Corwyn (2002) stated that parents of high socioeconomic status engaged their children more frequently in conversation, reading and teaching experiences. Their conversations are richer, and include more efforts to develop their children's speech skills from infancy through adolescence (Shonkoff &Phillips, as cited in Bradley & Corwyn, 2002). Documentation exists to support a correlation between a parent's occupational status and parenting skill level; what parents experienced at work they incorporated into their style of parenting (Bradley & Corwyn). In addition, Persell (2000) found that mothers who worked in occupations with a variety of tasks and problem-solving opportunities provided more warmth and support and a greater number of stimulating materials. Children of parents in a higher socioeconomic environment manifested more advanced verbal competence (Leithwood & Jantzi, 2009). According to Entwisle et al., (Maxwell), although a parent's education and the level of educational attainment were most strongly reflected by the family's socioeconomic status, family's attitude, and the child's personality also affected their academic success. As an example, factors such as community, race, socioeconomic status, and gender of first graders have produced the ability to predict their educational status at age twenty-two (Leithwood & Jantzi, 2009).

Even though this study highlighted the importance of factors related to students' socioeconomic status on the academic achievement levels of children, perhaps more important for students' achievement in school would be the expectations placed on the students by their families. A student's socioeconomic status weighs heavily on his or her academic achievement; however, a student's family perceptions regarding education, and the goals set forth by the family unit, could out-weigh the factors presented from the student's socioeconomic status. The factors that may negatively effect the student's

performance in school may be negated by the family's role reversal in educational beliefs. Hope for the future exists when the cycle of failure is interrupted by a family's dedication and commitment to a better life for their children, and the action steps are taken to make this change.

The importance of academic achievement has become necessary, not only for students, but also for schools and educators. The standards at which all children are expected to perform have been delineated in the No Child Left Behind Act of 2001. The Missouri Department of Elementary and Secondary Education (MDESE, 2008) has determined that the qualifications for the free-or-reduced meal program is determined by the student's socioeconomic status. The National School Lunch Program is a federally assisted meal program that has provided low-cost or free meals to eligible students. The cost of living changes, as well as the guidelines for the free-or-reduced-price meal program are established annually by the federal government (MDESE). Free meals are offered to those students whose family income is at or below 130 percent of the poverty level; reduced-price meals have been offered to students whose family income is between 130 percent and 185 percent of the poverty level (Leithwood & Jantzi, 2009). Researchers have determined that there is a correlation between student's qualification for a federal free-or-reduced price meal program and their academic achievement (Okpala, Okpala, & Smith, 2001). The socioeconomic status of a household is dependent upon the level of educational background and experience within the family dynamics. The influence of the family affects the child's ability to persevere and obtain higher educational goals.

The R*elationship Between School Size and Student Achievement*

Many factors may be correlated to the achievement predictors of students: socioeconomic status, class size, teacher experience, and school size. Researchers support the concept that school size has an impact on achievement based on socioeconomic status of the students enrolled (Viadero, 2001). Viadero cited that a report published by a nonprofit education and advocacy group, based in the State of Washington, concluded that schools with smaller enrollment sizes consistently and significantly outperformed larger schools when considering the achievement of children from low-income families. Howley (as cited in Viadero) stated, "The effect is such that the lower the students' socioeconomic status, the smaller the school should be" (p.5). The same was true according to Maxwell (as cited in Viadero),"Students from poor families fared best of all in small schools located in small districts" (p. 5). Large schools and districts compound the effects of poverty. Walberg (as cited in Viadero), suggested that curriculum might make a difference, "If you had a good curriculum in a large school, you might easily overcome a small school with a bad curriculum" (p.5).

Lyons (as cited in Leithwood & Jantzi) also found that school size appeared to have an impact on students. As school size increased the performance levels of disadvantaged students decreased (Leithwood & Jantzi, 2009). On average, the achievement of students, as measured by standardized tests, tended to be higher in small school settings than in large schools; with specific indicators of students from minority groups and from low socioeconomic backgrounds (Tung, Ouimette, & Feldman, 2004).

Summary

While all students gain from small class size in the early grades, the gains are more

significant for disadvantaged students. Results indicate that disadvantaged students will progress throughout the educational experiences. The verdict on smaller class size is, with adequate funding and the availability of certified teachers, student achievement gains are likely. However, researchers disagree on the issue of the effects of smaller class size on student achievement. While some studies support the positive effects of class size reduction (Tennessee STAR), other studies (Indiana Project Prime Time) denote the effects on student achievement. Anecdotal and qualitative evidence indicates a direct correlation between reducing class size and student achievement scores. A form of qualitative data, teacher summaries, indicates lower levels of stress and job dissatisfaction with smaller class size, which resulted in higher quality instructional methods delivered to students. The quality, individualized instruction resulted in increased student motivation and decreased discipline problems. Parents believed that the individual instruction methods lead to academic gains.

School districts faced with the financial burden of reducing class size, were compounded by the knowledge of conflicting research findings. Even when research findings support reducing class size, financial needs are often too high for school districts to consider. Further conclusive research is needed to seek out means to support reduced class size initiatives. It is crucial to obtain on-going evaluations and maintain adequate follow through of programs geared toward reducing class size.

Various conclusions can be drawn from the studies presented in this Chapter; however, the results of each individual study indicated advantages of reduced class size. When adequate funding is provided and appropriate preparation tactics are implemented, student gains are evident in the early grades (Biddle & Berliner, 2002). There is potential for these

gains to result in long-term effects when a small class size is maintained. When the class size consistently averages less than twenty students, significant gains may be evident (Biddle & Berliner). These gains will occur in both traditional measures of student achievement and other indicators of student success.

Class size reduction continues to be a priority in many states. There is convincing evidence to support both arguments, but is indisputable that class size does impact student learning. Research supports and negates the effects of class size reduction on student achievement; therefore, there is a need for further research on class size reduction (Gilman & Kiger, 2003).

Chapter Three detailed the methodologies used for the purposes of this study, and defined the process of comparing the effects of socioeconomic status and student achievement. In Chapter Four the statistics indicated a relationship between a student's socioeconomic status and their performance indicators. Their socioeconomic status is represented by the percentage of student's qualifying for the Missouri Free and Reduced Lunch Program. The comparative performance indicators are evident in the student's performance on the Missouri Assessment Program, and those scores are calculated into a district performance rating indicated by the AYP (Annual Yearly Progress) score for the districts represented in this study.

CHAPTERTHREE - METHODS

Purpose

The purpose of this study was to discover the relationship between class size and student achievement of students in Missouri schools. In chapter two, the research indicated that it is necessary to implement a longitudinal design for class size reduction to be effective. Reducing class size allows for more individualized instruction methods, less behavior monitoring, and more quality instructional time to occur (Maxwell, 2007). While reducing class size is popular among politicians and the public, federal funding will not be supported without adequate data collection. This chapter will outline the research questions, methodology, research setting and participants, data collection procedures and instruments, and analytic procedures used in this study.

Research in the literature review of this study indicated there are positive effects on student achievement when class size is reduced; the problem arises in the duration of the effects. Are the positive effects of student achievement long term or short term only? Class size effects persist throughout a child's educational experience; therefore, the need is for consistent policy reform that will be continuous from primary grades through his or her high school years.

R*esearch Questions*

1. What relationship exists between class size and student achievement in Communication Arts?
2. What relationship exists between class size and student achievement in Mathematics?

3. How does the socioeconomic status of students relate to student achievement in terms of class size?

Hypothesis

Null Hypothesis #1. There is no significant correlation between class size and student achievement in Communication Arts.

Null Hypothesis #2. There is no significant correlation between class size and student achievement in Mathematics.

Null Hypothesis #3. There is no significant correlation between socioeconomic status and student achievement.

Limitations of Study

There was a multitude of limitations that may have effected the results of this quantitative study. Teacher experience could effect the quality of the educational practices used in the classroom. Educators all enter the classroom with a wide variance of strengths and talents; this opens the door for leveled quality instructional practices in the classroom. The student's relationships with the educator, performance rates, and individual targeted growth are examples of areas effected by the teachers quality effectiveness in the educational setting. If the teacher is faulty in any area related to student success, the number of students in the classroom is secondary to the lack of best practices in place to meet the student's needs.

The study is limited to the data collected during the 2007-2008 school year and reflective of a random sampling of Missouri schools. The data collected is representative of a district cumulative score calculated from data prepared by DESE. The AYP score is a cumulative representation of the district's rate of success on the MAP test. This score

indicates all areas of review in two categories, met or not met. The data is compiled and, a district AYP score is created. Similar to the levels of experiences of teachers, students also come to the classroom with their life experiences that will ultimately affect the dynamics of the classroom setting. Their unique knowledge and experience impacts the outcome of this study specifically, students representing the low socioeconomic tier of the population. Students in poverty skew the results due to the lack of parental support, and lack of means and statistically, students in poverty score lower on standardized tests. A districts AYP data would be effected by a large percentage of students qualifying for free and reduced lunch services. Each district is allocated a set amount for per pupil expenditures. This per pupil allotment is determined by DESE and is calculated based on the district's assessed valuation. The random sampling presented in this study represents a wide variety of per pupil expenditure rates in the districts selected. These allocated funds can drastically enhance a student's educational experience or hinder the resources necessary to obtain a quality instructional program rich in extracurricular experiences.

Classroom dynamics is the last limitation to be noted in this study. A classroom's dynamics are based on student/teacher relationship, peer interactions, climate, and management style. These are areas of subjective reflection and could have a positive or negative effect on the student's performance. Classroom dynamics can change based on student class assignment, relational interactions, and teacher leadership. Regardless of the classroom dynamics, it is no secret that the success of all students is dependent on quality services offered at each level of the students educational experiences.

Limitations are only factors that impact the results of the study, however it is important that the reader be mindful that while the limitations effect the results, that does

not necessarily mean they negate the outcome. As the researcher, I recommend the reader reflect on the limitations throughout the study and consider the effects of each on the quality services offered.

Methodology

The variables identified in this study were chosen based on the need at both the state and local levels to initiate educational reform to better meet the needs of Missouri students. Quantitative data were collected from the DESE, including class size ratios and student achievement proficiency levels. The independent variables in this study were class size, socioeconomic status, and school size. The dependent variable was student achievement scores. A quantitative study of students enrolled in Missouri public schools was conducted to determine the relationship between class size and the achievement of students, the impact of socioeconomic status of students and the achievement level of students, and the relationship between school size and student achievement.

R*esearch Participants*

A random sampling was used to select the schools represented in this study for the following areas: class size, student achievement, socioeconomic status of students, and class size. A simple random sampling allows for each participant of the population an equal chance of being chosen (Hunt, 2005). One way of achieving a simple random sample is to number each element in the sampling frame and then use random numbers to select the required sample (Hunt). Random numbers can be obtained using a calculator, spreadsheet, or the use of printed tables of random numbers (Hunt). Hunt suggested that random sampling is ideal for statistical purposes. Random sampling requires an accurate list of the whole population and is expensive to conduct as those sampled may be scattered over a

wide area (Hunt). Since the entire population was easily accessible and all data were available, the location of participating schools did not present a challenge. Therefore, a random sampling was the best option of minimizing the sampling population in an effort to produce findings representative of the schools in Missouri.

Data collected from 80 randomly selected school districts were used for the purposes of this study. School district data were retrieved from DESE and all information was reflective of the school district's performance levels in regards to state standards. Data collected were reflective of the 2007-2008 school year.

Data Collection Procedures and Instruments

Data were collected relevant to the following topics: class size, socioeconomic status, and student achievement. The data for determining the relationship between class size and student achievement were gathered from the school districts' profiles available on the DESE website. The information obtained included staff and student ratios and percentages of students scoring in each of the four proficiency levels on the Missouri Assessment Program (MAP) in the areas of Communication Arts and Math. The Adequate Yearly Progress (AYP) reports for school districts were selected to identify student achievement scores. Socioeconomic status was evidenced by the percentage of students enrolled who qualified for the free-and-reduced lunch program. This specific data were collected from the DESE website, a public access site; therefore, confidentiality was not breeched.

Analytic Procedures

The independent variables in this study were class size and socioeconomic status.

Socioeconomic status was measured by students who participated in the free-and-reduced meal programs. Class size was based on the school's reported student/teacher ratio. The dependent variable was student achievement as indicated by the district's AYP score.

The procedures used to analyze data included rank order of class size and rank order of student achievement data in communication arts and math. The Pearson *r* was used to determine the correlation coefficient. The most common measure of correlation is the Pearson Product Moment Correlation (called Pearson's correlation for short).The Pearson *r* correlation coefficient is a number between +1 and -1. This number tells about the magnitude and direction of the association between two variables. The correlation coefficient will determine if there is a relationship between class size and student achievement.

Summary

This chapter provided information pertinent to the design of the study. Methods used to respond to the research questions were identified and detailed. The population to be studied and procedure for data collection were outlined. A complete description of the design used in this study included identification of variables and the method for analyses. Results from the data analysis were presented in Chapter Four. The findings, conclusions and implications, and recommendations for further study were discussed in Chapter Five.

CHAPTER FOUR-RESULTS

This chapter reviewed the purpose of the study, the research questions and the participants and methodology used to conduct the research. A description of the data collected and data results were presented. The study yielded findings from the statistical analyses which determined the impact of class size on student achievement in relation to a student's socioeconomic status.

Research supports that a small class setting enables all students the opportunity to work in an educational environment where their individual needs can be addressed (Achilles, 1999). By eliminating the challenge of an over-populated classroom, teachers may focus their efforts on improved instructional practices that will optimize student achievement.

It is no secret that cost considerations are a priority for school boards, and government officials when faced with the standards of class size, however research can play a role in the decision making process. Educational quality must be considered as a fundamental need when legislatures and school boards act on the decision to lower class size. The problem arises when faced with the reality that all decisions centering on class size are influenced, first and foremost, by funding availability and local fiscal priorities (Achilles & Lintz, 1991).

Purpose of the Study

The purpose of this study is to discover the relationship between class size and student achievement of students in Missouri schools.

R*esearch Questions*

The following questions guided this study:

1. What relationship exists between class size and student achievement in Communication Arts?
2. What relationship exists between class size and student achievement in Mathematics?
3. How does the socioeconomic status of students relate to student achievement in terms of class size?

Hypothesis

Null Hypothesis #1. There is no significant correlation between class size and student achievement in Communication Arts.

Null Hypothesis #2. There is no significant correlation between class size and student achievement in Mathematics.

Null Hypothesis #3. There is no significant correlation between socioeconomic status and student achievement.

Methodology

The independent variables represented in this study were class size, socioeconomic

status, and school size. The dependent variable was student achievement scores. The study population was representative of school districts within the state of Missouri. Random sampling procedures were used to minimize the population size to 80 school districts. The school size and structure was not specified for the purposes of the study, thus K-8 and K-12 schools were represented in the data collection process. The student achievement score for each school district was drawn from each school district's cumulative AYP score, provided for public information by DESE. The AYP (Annual Yearly Progress) score is the percentage of students performing at the proficient or advanced level on the state MAP (Missouri Assessment Program) test. Students in grades three through eleven participate in the MAP test and this is Missouri's measure of student achievement for a school district. The class size data collected from each selected school district was calculated by the district's student-to-teacher ratio as reported by DESE. The socioeconomic status of the selected school districts representative of the school district's reported free-and-reduced meal program percentage, also retrieved from DESE.

Data analyses procedures were conducted to determine the relationship among the variables detailed in this study. A Critical Movement Table was used to calculate a p value to determine a level of confidence. A covariance details how two variables change together through a correlation formula. A Pearson *r* correlation coefficient was utilized to understand any significant statistical correlations existing between the variables. The data were entered, processed, and analyzed with the use of the SPSS software program. Finally, the results were analyzed for relational patterns.

Descriptive Information

The literature review indicated positive effects related to reducing class size. The problem evident in the investigation of statewide studies, revealed that the sustainability of such reform models posed a financial burden. School officials are challenged with the decision of assuming the financial burden associated with reducing class size and the potential improvements in student achievement garnered from reduced class size.

Table 1 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2006. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 34.82, and the mean for class size was 22.17. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 2.401 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note

the 12.674 standard deviation of the AYP scores. The N represents the numbers available for calculation in this study.

Table 1

2006 Descriptive Statistics Communication Arts: Class Size (>20) and AYP

	Mean	Std. Deviation	N
Class Size	22.17	2.401	6
AYP	34.82	12.674	6

Table 2 represents the correlation between Class Size (>20) and AYP in Communication Arts for the 2005-2006 school year. The Pearson *r* correlation, -.249 represented in Table 2 does not indicate a statistically significant relationship between 2006 Class Size (>20) and AYP scores in Communication Arts.

Table 2

2006 Correlation Communication Arts: Class Size (>20) and AYP

		Class Size	AYP
Class Size	Pearson Correlation	1	-.249
	Sig. (2-tailed)	.	.635
	Covariance	5.767	-7.563
	N	6	6
AYP	Pearson Correlation	-.249	1
	Sig. (2-tailed)	.635	.
	Covariance	-7.563	160.618
	N	6	6

Represented in Figure 1 is a Scatter Plot indicating a normal distribution between the AYP scores and Class Size. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship among the two variables.

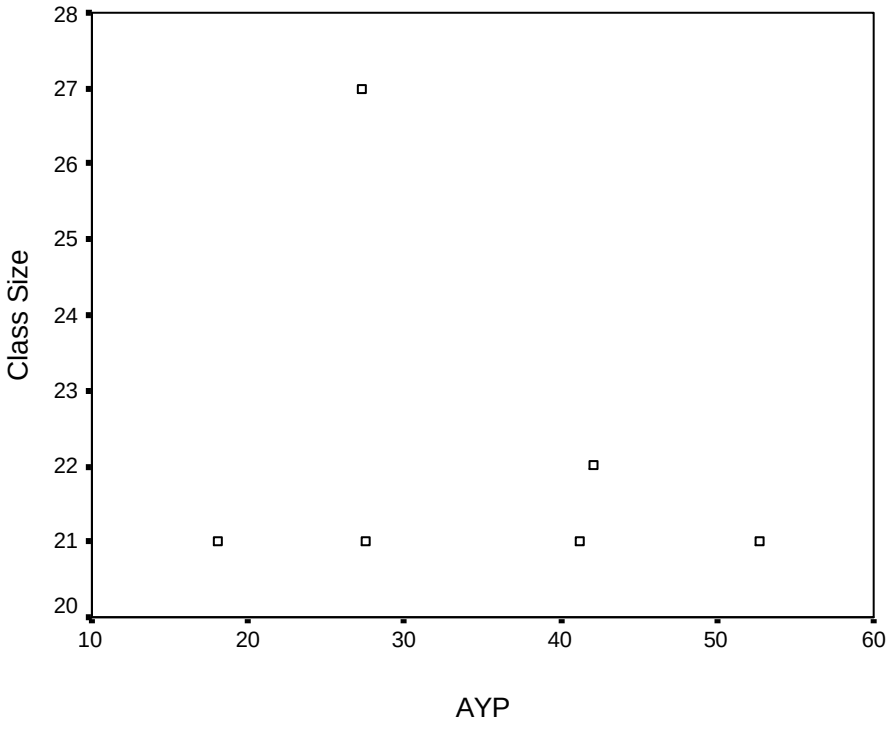

Figure 1

2006 Communication Arts: Class Size (>20) and AYP Scatter Plot

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Table 3 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the 2006 AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above

proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2006. The mean for the independent variable, class size, represents the student/teacher ratio reported by each school district. This data was collected from each district's planning profile as provided by DESE.

Represented in Table 3 is data detailing the relationship between AYP and class size (<20) in Communication Arts for 2006. The mean of the AYP scores is 46.45, and the mean for class size was 15.29. The standard deviation represents how the numbers are spread around the mean. In comparison of the two variables, it is notable that there is a larger variance in the numbers representing the AYP scores (standard deviation 15.336) than that of the Class Size (standard deviation 2.865). The N represents the numbers available for calculation in this study.

Table 3

2006 Descriptive Statistics Communication Arts: Class Size (<20) and AYP

	Mean	Std. Deviation	N
AYP	46.45	15.336	63
Class Size	15.29	2.865	63

Table 4 represents the correlation between AYP and Class Size (<20) in Communication Arts for the 2006 school year. The Pearson *r* correlation, -.238 represented

in Table 4 does not indicate a statistically significant relationship between AYP scores in Communication Arts and Class Size (<20) for 2006.

Table 4

2006 Correlation Communication Arts: Class Size (<20) and AYP

		AYP	Class Size
AYP	Pearson Correlation	1	-.238
	Sig. (2-tailed)	.	.060
	Covariance	235.181	-10.457
	N	63	63
Class Size	Pearson Correlation	-.238	1
	Sig. (2-tailed)	.060	.
	Covariance	-10.457	8.207
	N	63	63

Represented in Figure 2 is a Scatter plot indicating a normal distribution between the AYP scores and SES in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship among the two variables.

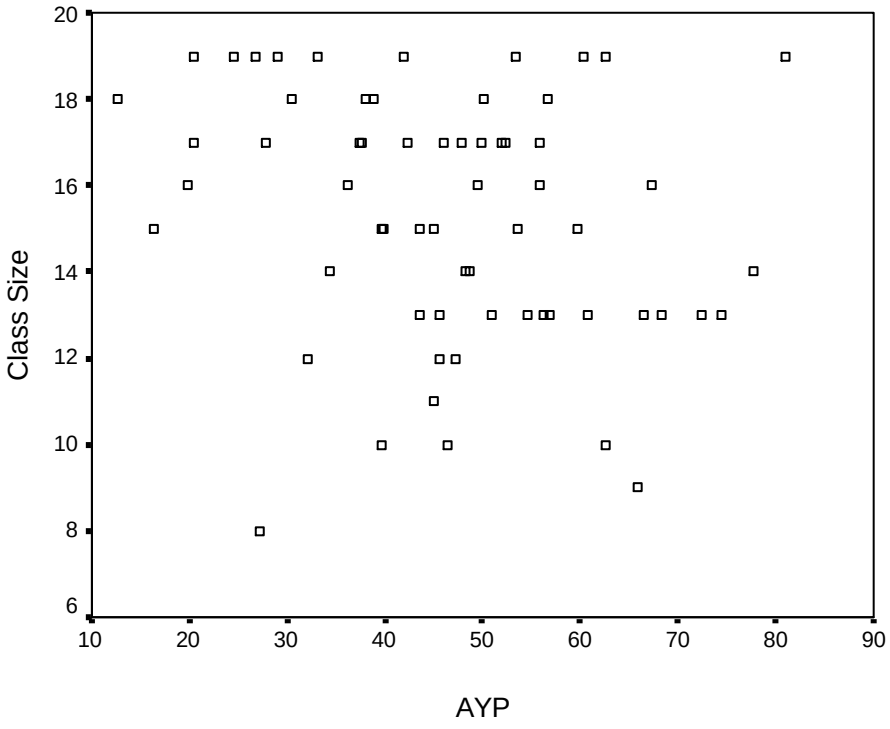

Figure 2

2006 Communication Arts: Class Size (<20) and AYP Scatter Plot

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Table 5 represents data which details the relationship between SES and AYP in Communication Arts. The mean of the AYP scores is 46.45, and the mean for class size was 42.373. The standard deviation represents how the numbers are spread around the mean. In comparison of the two variables it is notable that there is a larger variance in the numbers representing the AYP scores (standard deviation 15.336) than that of the SES (standard deviation 7.9325). The N represents the numbers of districts with less than 20

students per teacher for both the independent and dependent variables for the 2005-2006 school year.

Table 5

2006 Descriptive Statistics Communication Arts: SES and AYP (Class Size <20)

	Mean	Std. Deviation	N
SES	42.373	7.9325	64
AYP	46.45	15.336	63

Table 6 represents the correlation between SES and AYP in Mathematics for the 2005-2006 school year. The Pearson *r* correlation, -.434 represented in Table 8 indicates a statistically significant relationship between SES and AYP scores in Mathematics for the 2005-2006 school year.

Table 6

2006 Correlation Communication Arts: SES and AYP (Class Size <20)

		SES	AYP
SES	Pearson Correlation	1	-.434
	Sig. (2-tailed)	.	.000
	Covariance	62.925	-53.167
	N	64	63
AYP	Pearson Correlation	-.434	1
	Sig. (2-tailed)	.000	.
	Covariance	-53.167	235.181
	N	63	63

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

Figure 3 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

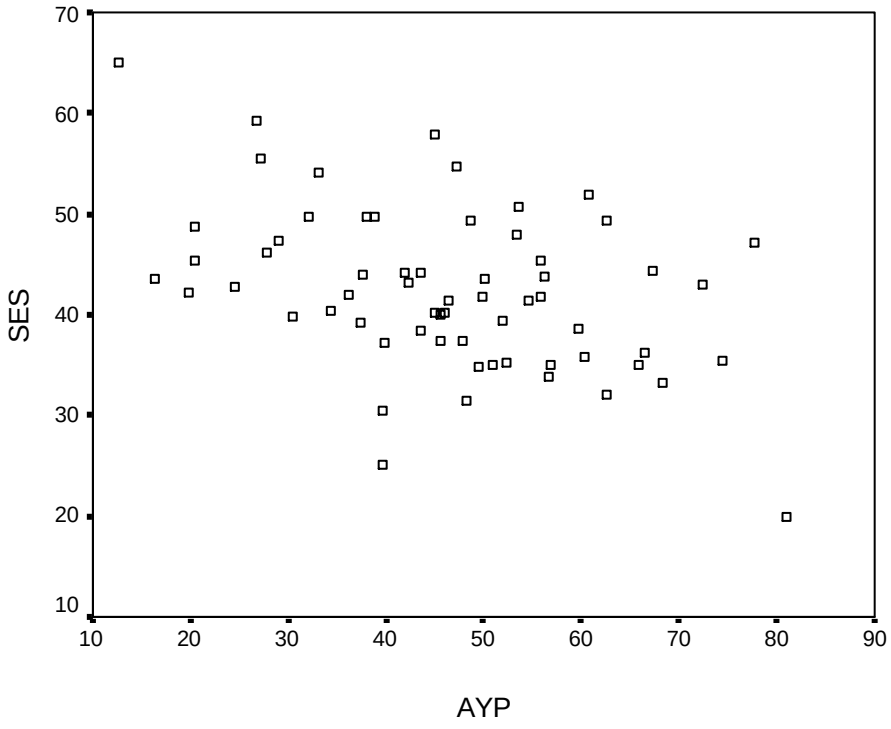

Figure 3

2006 Communication Arts: SES and AYP (Class Size <20) Scatter Plot

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Table 7 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in spring 2006. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 34.82, and the mean for the SES was 48.400. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 12.674 that there was a more significant variance in the numbers than in the SES reported standard deviation of 5.9501.

Table 7

2006 Descriptive Statistics Communication Arts: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
AYP	34.82	12.674	6
SES	48.400	5.9501	6

Table 8 identifies the correlation coefficients in regards to the relationship between the dependent independent variables in Mathematics. This correlation details the correlation between Class Size and AYP in Mathematics for the 2005-2006 school year. The Pearson *r* correlation, -.278 represented in Table 8 indicates no statistically significant relationship between Class Size and AYP scores in Mathematics for the 2005-2006 school year.

Table 8

2006 Correlation Communication Arts: SES and AYP (Class Size >20)

		AYP	SES
AYP	Pearson Correlation	1	-.278
	Sig. (2-tailed)	.	.594
	Covariance	160.618	-20.962
	N	6	6
SES	Pearson Correlation	-.278	1
	Sig. (2-tailed)	.594	.
	Covariance	-20.962	35.404
	N	6	6

Figure 4 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables

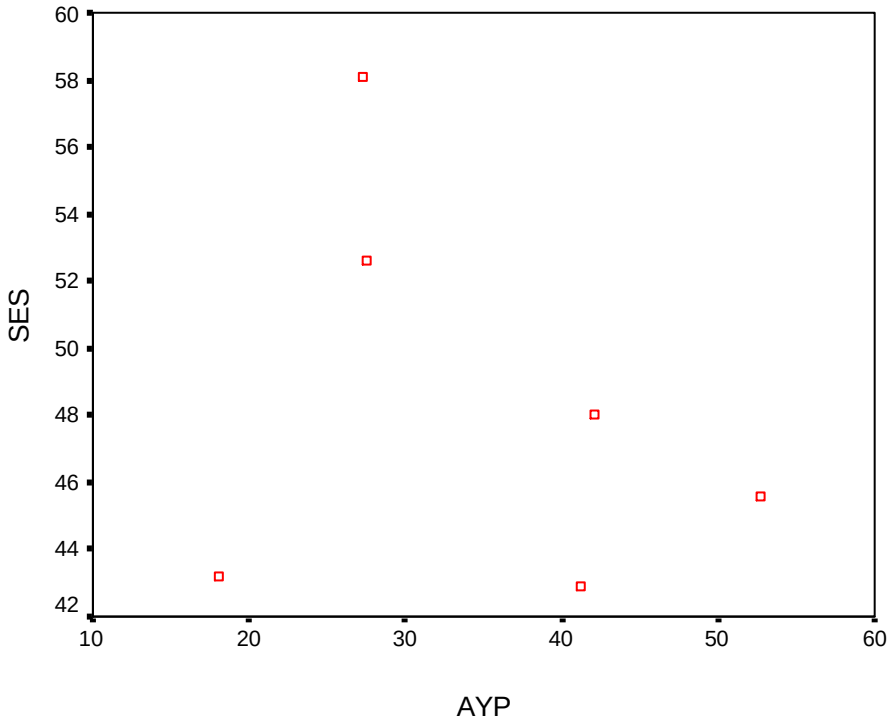

Figure 4

2006 Communication Arts SES and AYP (Class Size >20) Scatter Plot

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Table 9 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 30.73, and the mean for class size was 21.33. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of .577 that there is a less significant variance in numbers than noted in the AYP standard deviation of 12.834.

Table 9

2007 Descriptive Statistics Communication Arts: Class Size (>20) and AYP

	Mean	Std. Deviation	N
Class Size	21.33	.577	3
AYP	30.73	12.834	3

Table 10

Table 10 represents the correlation between Class Size (>20) and AYP in Communication Arts for the 2006-2007 school year. The Pearson *r* correlation, .929 represented in Table 2 does not indicate a statistically significant relationship between 2006 Class Size (>20) and AYP scores in Communication Arts.

2007 Correlation Communication Arts: Class Size (>20) and AYP

		Class Size	AYP
Class Size	Pearson Correlation	1	.929
	Sig. (2-tailed)	.	.241
	Covariance	.333	6.883
	N	3	3
AYP	Pearson Correlation	.929	1
	Sig. (2-tailed)	.241	.
	Covariance	6.883	164.703
	N	3	3

Figure 5 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables

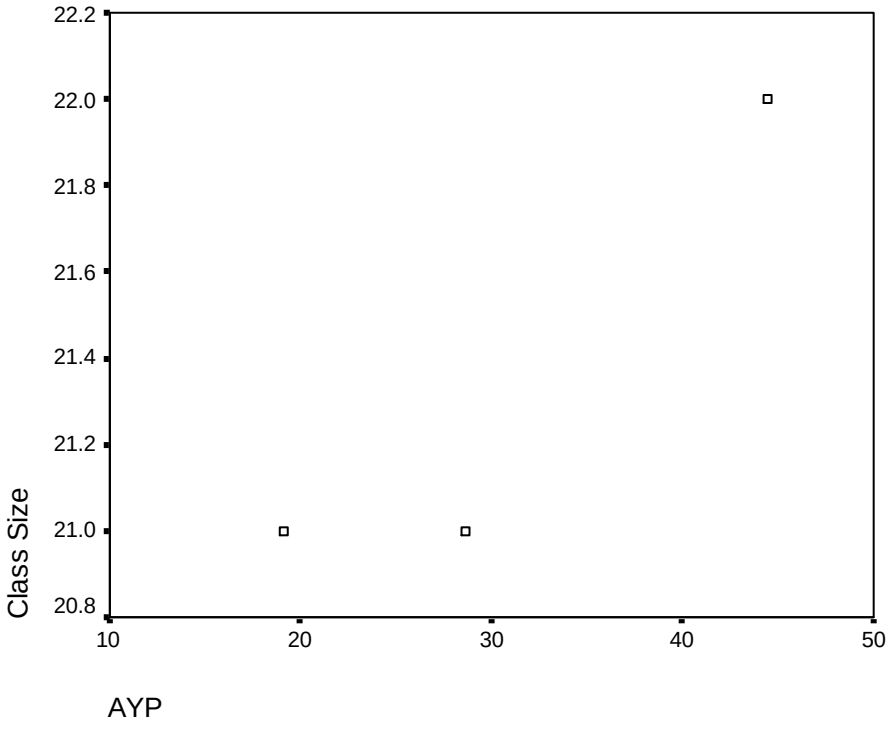

Figure 5

2007 Communication Arts: Class Size (>20) and AYP Scatter Plot

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Table 11 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the

dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 46.18, and the mean for class size was 15.69. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 3.179 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 14.757 standard deviation of the AYP scores.

Table 11

2007 Descriptive Statistics Communication Arts: Class Size (<20) and AYP

	Mean	Std. Deviation	N
AYP	46.18	14.757	74
Class Size	15.69	3.179	74

Table 12

Table 12 represents the correlation between Class Size (<20) and AYP in Communication Arts for the 2006-2007 school year. The Pearson *r* correlation, -.141 represented in Table 2 does not indicate a statistically significant relationship between 2007 Class Size (<20) and AYP scores in Communication Arts.

2007 Correlations Communication Arts: Class Size (<20) and AYP

		AYP	Class Size
AYP	Pearson Correlation	1	-.141
	Sig. (2-tailed)	.	.231
	Covariance	217.773	-6.612
	N	74	74
Class Size	Pearson Correlation	-.141	1
	Sig. (2-tailed)	.231	.
	Covariance	-6.612	10.108
	N	74	74

Figure 6 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

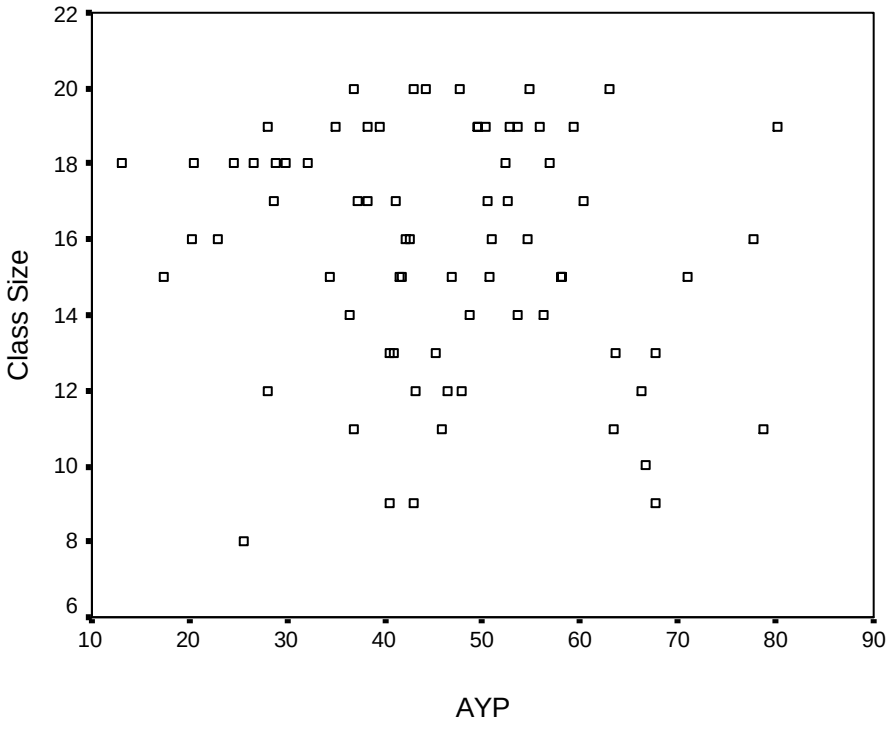

Figure 6

2007 Communication Arts: Class Size (<20) and AYP Scatter Plot

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Table 13 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 46.18, and the mean for the SES was 43.929. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 14.757 that there was a more significant variance in the numbers than in the SES reported standard deviation of 7.5495.

Table 13

2007 Descriptive Statistics Communications Arts: SES and AYP (Class Size <20)

	Mean	Std. Deviation	N
AYP	46.18	14.757	74
SES	43.929	7.5495	75

Table 14

Table 14 represents the correlation between SES and AYP in Communication Arts for the 2006-2007 school year. The Pearson *r* correlation, -.498 represented in Table 14 does indicate a statistically significant relationship between 2007 SES and AYP scores in Communication Arts.

2007 Correlation Communications Arts: SES and AYP (Class Size <20)

		AYP	SES
AYP	Pearson Correlation	1	-.498
	Sig. (2-tailed)	.	.000
	Covariance	217.773	-55.843
	N	74	74
SES	Pearson Correlation	-.498	1
	Sig. (2-tailed)	.000	.
	Covariance	-55.843	56.995
	N	74	75

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

Figure 7 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a positive relationship between the two variables.

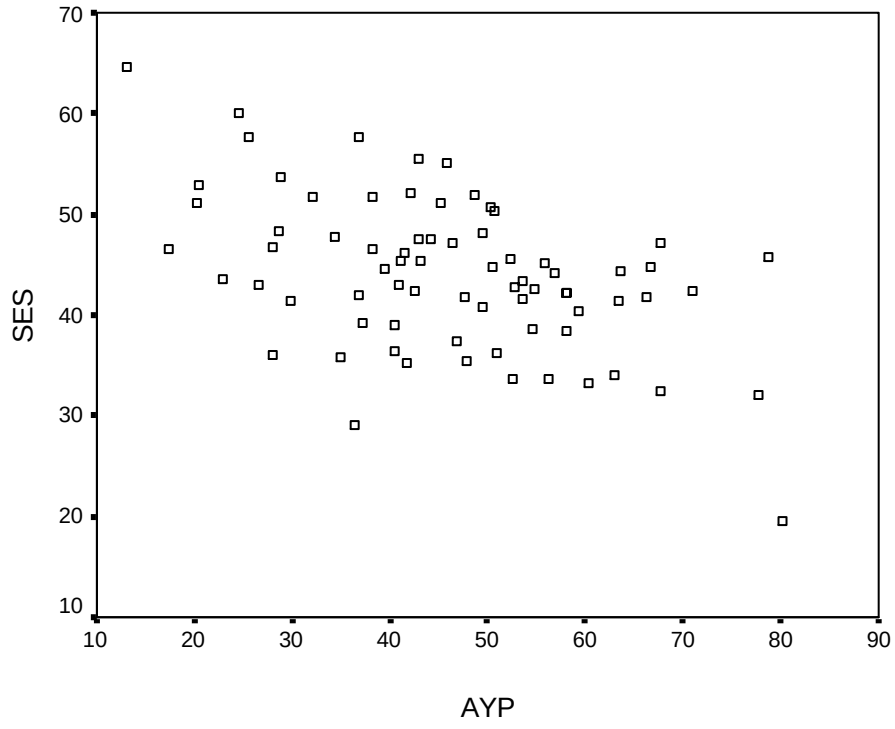

Figure 7

2007 Communications Arts: SES and AYP (Class Size <20) Scatter Plot

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Table 15 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 30.73, and the mean for the SES was 48.833. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 12.834 that there was a more significant variance in the numbers than in the SES reported standard deviation of 5.9341.

Table 15

2007 Descriptive Statistics Communication Arts 2007: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
AYP	30.73	12.834	3
SES	48.833	5.9341	3

Table 16

Table 16 represents the correlation between SES and AYP in classes of >20 students in Communication Arts for the 2006-2007 school year. The Pearson *r* correlation, -.532 represented in Table 16 does not indicate a statistically significant relationship between 2007 SES and AYP scores in Communication Arts in classes >20.

2007 Correlation Communication Arts: SES and AYP (Class Size >20)

		AYP	SES
AYP	Pearson Correlation	1	-.532
	Sig. (2-tailed)	.	.643
	Covariance	164.703	-40.507
	N	3	3
SES	Pearson Correlation	-.532	1
	Sig. (2-tailed)	.643	.
	Covariance	-40.507	35.213
	N	3	3

Figure 8 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

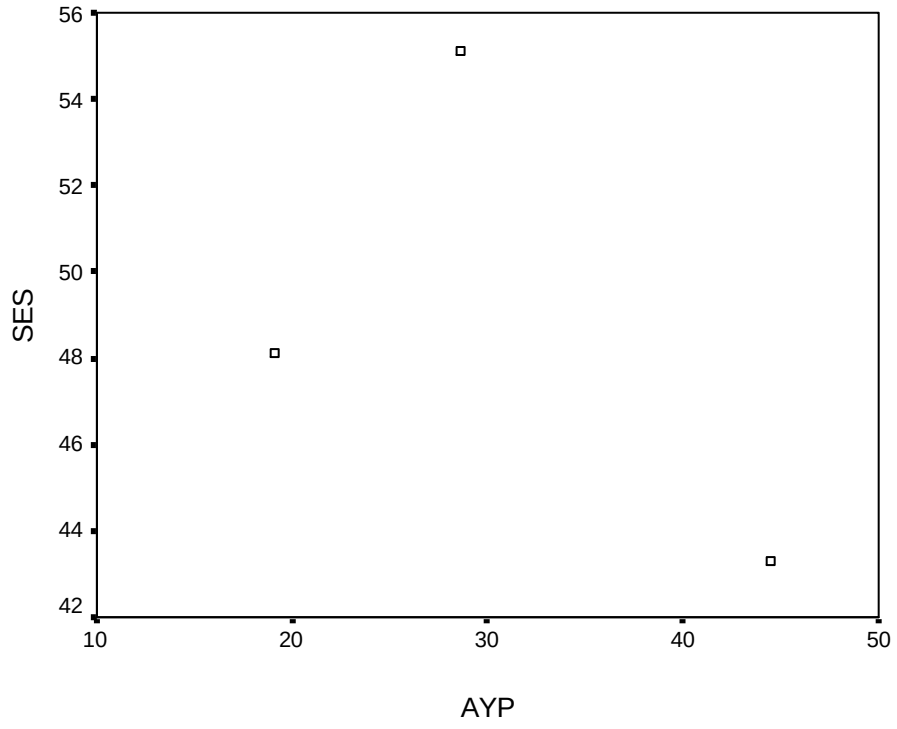

Figure 8: 2007 Communication Arts: SES and AYP (Class Size >20) Scatter Plot

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Table 17 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of

data collected in the spring of 2008. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 40.000, and the mean for class size was 21.50. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of .707 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 6.930 standard deviation of the AYP scores.

Table 17

2008 Descriptive Statistics Communication Arts Class Size (>20) and AYP

	Mean	Std. Deviation	N
AYP	40.00	6.930	2
Class Size	21.50	.707	2

Table 18

Table 18 represents the correlation between Class Size (>20) and AYP in Communication Arts for the 2007-2008 school year. The Pearson *r* correlation, -1.000 represented in Table 18 does not indicate a statistically significant relationship between 2008 Class Size (>20) and AYP scores in Communication Arts.

2008 Correlation Communication Arts: Class Size (>20) and AYP

		AYP	Class Size
AYP	Pearson Correlation	1	-1.000
	Sig. (2-tailed)	.	.
	Covariance	48.020	-4.900
	N	2	2
Class Size	Pearson Correlation	-1.000	1
	Sig. (2-tailed)	.	.
	Covariance	-4.900	.500
	N	2	2

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

Figure 9 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

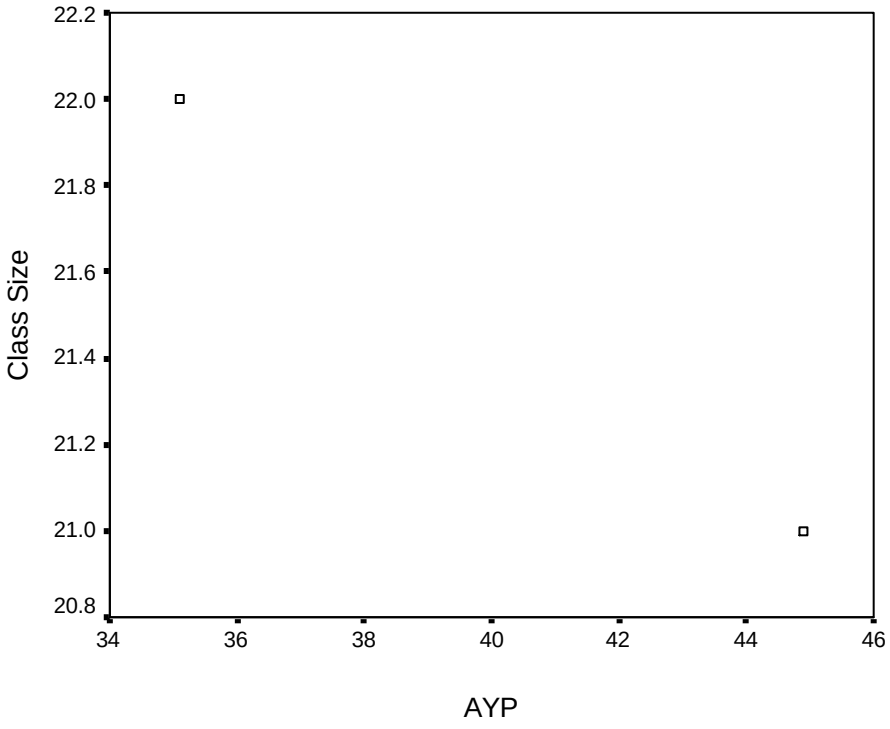

Figure 9

2008 Communication Arts: Class Size (>20) and AYP Scatter Plot

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Table 19 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the

dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 46.10, and the mean for class size was 15.47. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 3.064 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 15.205 standard deviation of the AYP scores.

Table 19

2008 Descriptive Statistics Communication Arts: Class Size (<20) and AYP

	Mean	Std. Deviation	N
AYP	46.10	15.205	75
Class Size	15.47	3.064	75

Table 20

Table 20 represents the correlation between Class Size (<20) and AYP in Communication Arts for the 2007-2008 school year. The Pearson *r* correlation, -.185 represented in Table 20 does not indicate a statistically significant relationship between 2008 Class Size and AYP scores in Communication Arts in classes <20.

2008 Correlation Communication Arts: Class Size (<20) and AYP

		AYP	Class Size
AYP	Pearson Correlation	1	-.185
	Sig. (2-tailed)	.	.112
	Covariance	231.200	-8.629
	N	75	75
Class Size	Pearson Correlation	-.185	1
	Sig. (2-tailed)	.112	.
	Covariance	-8.629	9.387
	N	75	75

Figure 10 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

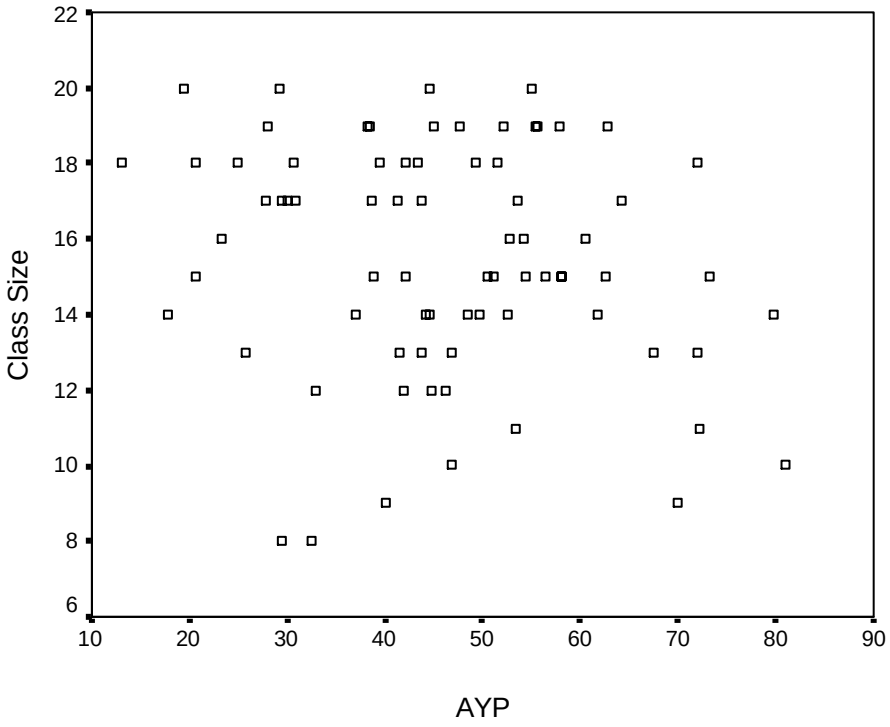

Figure 10

2008 Communication Arts: Class Size (<20) and AYP Scatter Plot

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Table 21 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the

dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores is 46.10, and the mean for the SES was 54.547. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 15.205 that there was a significant variance in the numbers. The SES reported standard deviation of 6.6957 signifies a lesser variance in numbers than reported in the AYP scores.

Table 21

2008 Descriptive Statistics Communication Arts: SES and AYP (Class Size<20)

	Mean	Std. Deviation	N
AYP	46.10	15.205	75
SES	54.547	6.6957	76

Table 22

Table 22 represents the correlation between SES (<20) and AYP in classes with < 20 students in Communication Arts for the 2007-2008 school year. The Pearson *r* correlation, -.418 represented in Table 20 does indicate a statistically significant relationship between 2008 Class Size and AYP scores in Communication Arts in classes <20.

2008 Correlation Communication Arts: SES and AYP (Class Size<20)

		AYP	SES
AYP	Pearson Correlation	1	-.418
	Sig. (2-tailed)	.	.000
	Covariance	231.200	-41.697
	N	75	75
SES	Pearson Correlation	-.418	1
	Sig. (2-tailed)	.000	.
	Covariance	-41.697	44.832
	N	75	76

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

Figure 11 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

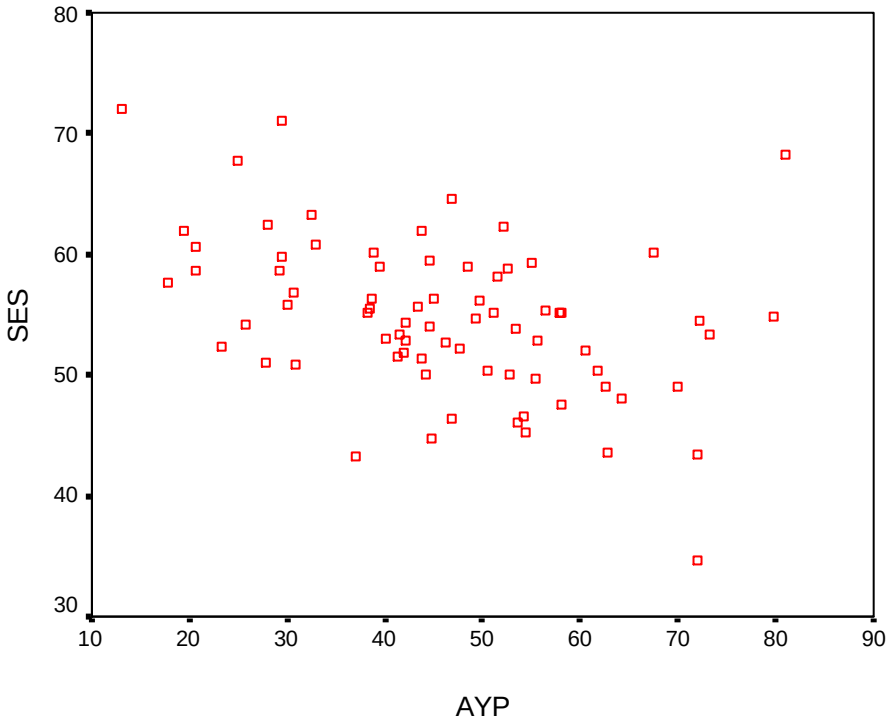

Figure 11

2008 Communication Arts: SES and AYP (Class Size < 20) Scatter Plot

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Table 23 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores is 40.000, and the mean for the SES was 63.250. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 6.930 that there was a less significant variance in the numbers than in the SES reported standard deviation of 7.9903.

Table 23

2008 Descriptive Statistics Communication Arts: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
SES	63.250	7.9903	2
AYP	40.00	6.930	2

Table 24

Table 24 represents the correlation between SES and AYP in classes with >20 students in Communication Arts for the 2007-2008 school year. The Pearson *r* correlation,

-1.000 represented in Table 20 does not indicate a statistically significant relationship between 2008 SES and AYP scores in Communication Arts in classes >20.

2008 Correlation Communication Arts: SES and AYP (Class Size >20)

		SES	AYP
SES	Pearson Correlation	1	-1.000
	Sig. (2-tailed)	.	.
	Covariance	63.845	-55.370
	N	2	2
AYP	Pearson Correlation	-1.000	1
	Sig. (2-tailed)	.	.
	Covariance	-55.370	48.020
	N	2	2

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

Figure 12 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Communication Arts. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

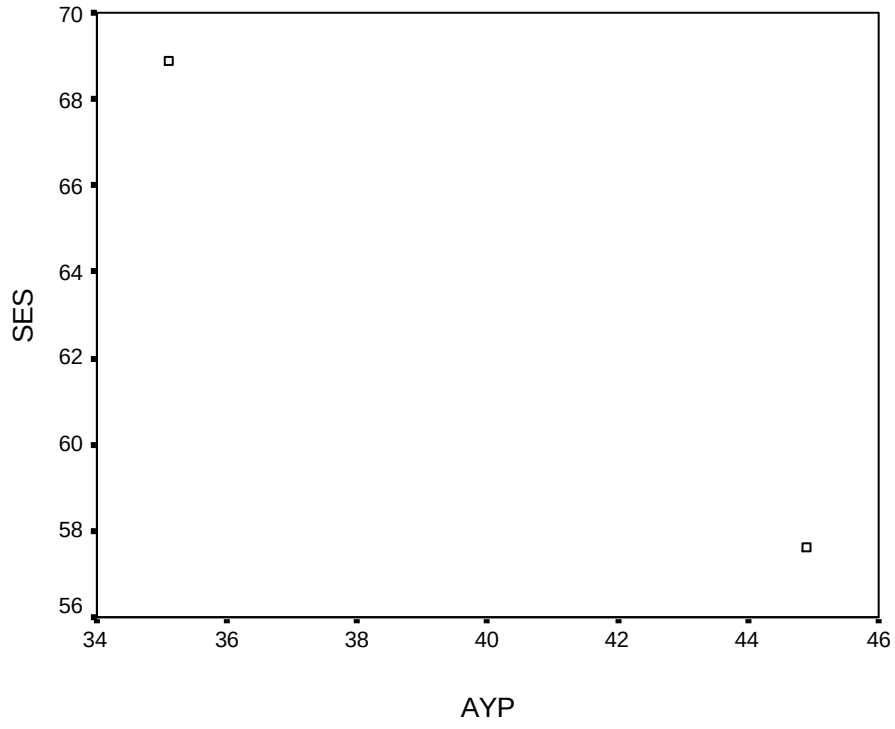

Figure 12

2008 Communication Arts: SES and AYP (Class Size >20) Scatter Plot

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Table 25 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2006. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 50.500, and the mean for class size was 22.17. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 2.401 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 9.1922 standard deviation of the AYP scores.

Table 25

2006 Descriptive Statistics Mathematics: Class Size (>20) and AYP

	Mean	Std. Deviation	N
AYP	50.500	9.1922	6
Class Size	22.17	2.401	6

Table 26

Table 26 represents the correlation between Class Size (>20) and AYP in Mathematics for the 2005-2006 school year. The Pearson *r* correlation, .761 represented in Table 26 does not indicate a statistically significant relationship between 2008 Class Size and AYP scores in Mathematics in classes >20.

2006 Correlation Mathematics: Class Size (>20) and AYP

		AYP	CLSSIZE
AYP	Pearson Correlation	1	.761
	Sig. (2-tailed)	.	.079
	Covariance	84.496	16.800
	N	6	6
CLSSIZE	Pearson Correlation	.761	1
	Sig. (2-tailed)	.079	.
	Covariance	16.800	5.767
	N	6	6

Figure 13 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

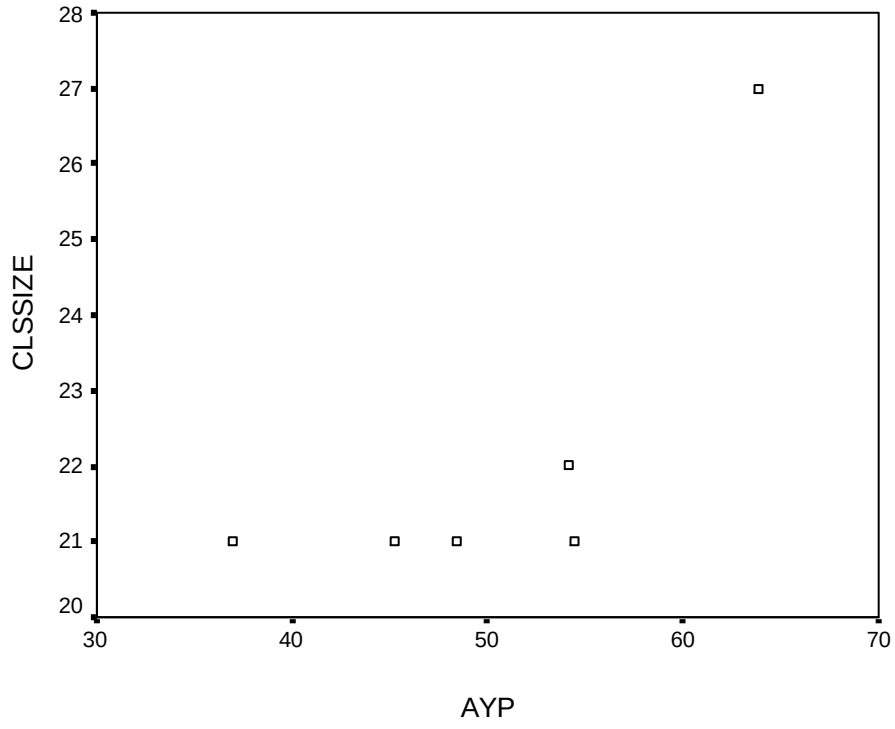

Figure 13

2006 Mathematics: Class Size (>20) and AYP Scatter Plot

Table 27 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2006. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 41.924, and the mean for class size was 15.86. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 3.089 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 8.1560 standard deviation of the AYP scores.

Table 27

2006 Descriptive Statistics Mathematics: Class Size (<20) and AYP

	Mean	Std. Deviation	N
Class Size	15.86	3.089	70
AYP	41.924	8.1560	71

Table 28

Table 28 represents the correlation between Class Size (<20) and AYP in Mathematics for the 2005-2006 school year. The Pearson *r* correlation, -.104 represented in Table 28 does not indicate a statistically significant relationship between 2006 Class Size and AYP scores in Mathematics in classes <20.

2006 Correlation Mathematics: Class Size (<20) and AYP

		CLSSIZE	AYP
CLSSIZE	Pearson Correlation	1	.104
	Sig. (2-tailed)	.	.394
	Covariance	9.545	2.598
	N	70	70
AYP	Pearson Correlation	.104	1
	Sig. (2-tailed)	.394	.
	Covariance	2.598	66.521
	N	70	71

Figure 14 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

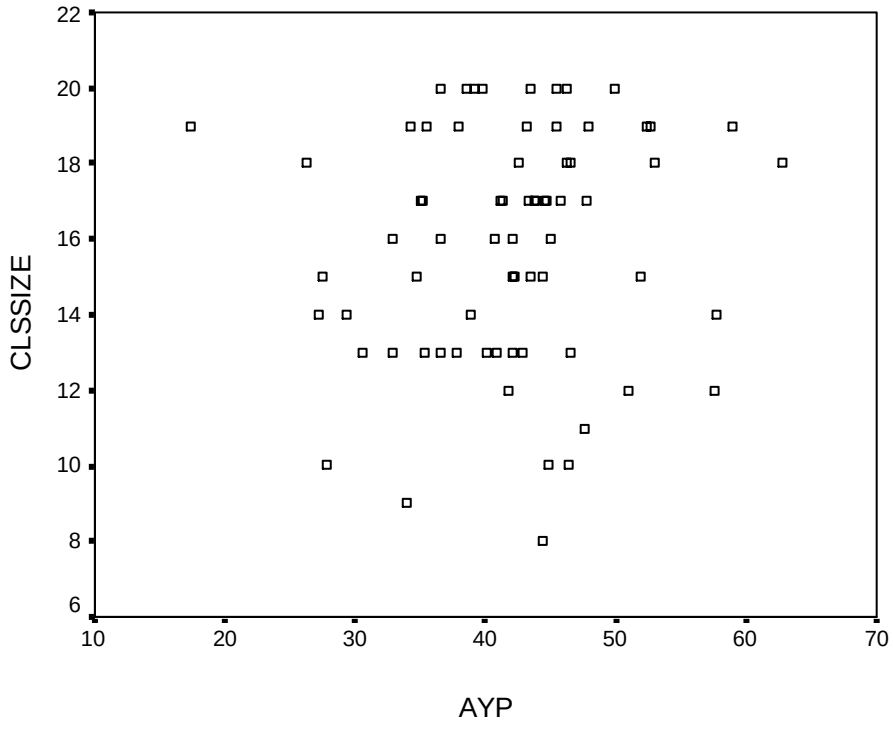

Figure 14

2006 Mathematics: Class Size (<20) and AYP Scatter Plot

Table 29 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2006. The mean of the AYP scores was 41.924, and the mean for class size was 45.98. The standard deviation represents how the numbers are spread around the mean. It is notable in the SES standard deviation of 14.769 that there was a significant variance in the numbers. Note the 8.1560 standard deviation of the AYP scores, signifying less of a variance in reported numbers.

Table 29

2006 Descriptive Statistics Mathematics: SES and AYP (Class Size <20)

	Mean	Std. Deviation	N
AYP	41.924	8.1560	71
SES	45.98	14.769	70

Table 30

Table 30 represents the correlation between SES and AYP in classes <20 in Communication Arts for the 2006-2007 school year. The Pearson *r* correlation, -.403 represented in Table 30 does indicate a statistically significant relationship between 2006 Class Size and AYP scores in Communication Arts in classes <20.

2006 Correlation Mathematics: SES and AYP (Class Size <20)

		AYP	SES
AYP	Pearson Correlation	1	-.403
	Sig. (2-tailed)	.	.001
	Covariance	66.521	-48.355
	N	71	70
SES	Pearson Correlation	-.403	1
	Sig. (2-tailed)	.001	.
	Covariance	-48.355	218.114
	N	70	70

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

Figure 15 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

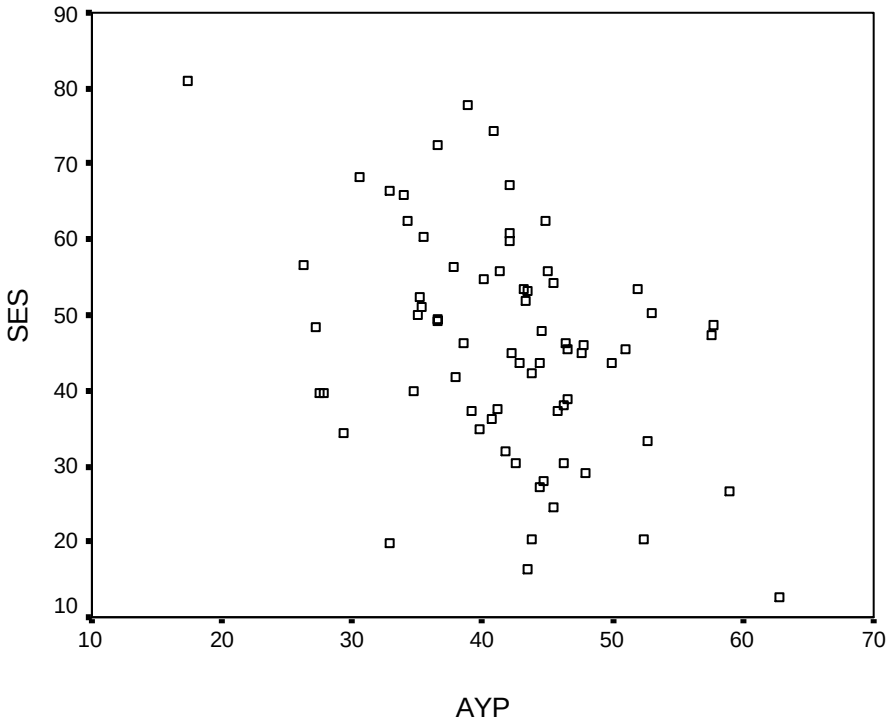

Figure 15

2006 Mathematics SES and AYP (Class Size <20) Scatter Plot

Table 31 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2005-2006 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as measured by the Mathematics MAP Test. This average AYP score is reflective of data

collected in the spring of 2006. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 50.500, and the mean for the SES was 34.82. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 9.1922 that there was a less significant variance in the numbers than in the SES reported standard deviation of 12.674.

Table 31

2006 Descriptive Statistics Mathematics: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
AYP	50.500	9.1922	6
SES	34.82	12.674	6

Table 32 represents the correlation between SES and AYP in classes >20 in Mathematics for the 2005-2006 school year. The Pearson *r* correlation, .025 represented in Table 30 does not indicate a statistically significant relationship between 2006 SES and AYP scores in Communication Arts in classes >20.

2006 Correlation Mathematics: SES and AYP (Class Size >20)

		AYP	SES
AYP	Pearson Correlation	1	.025
	Sig. (2-tailed)	.	.963
	Covariance	84.496	2.890
	N	6	6
SES	Pearson Correlation	.025	1
	Sig. (2-tailed)	.963	.
	Covariance	2.890	160.618
	N	6	6

Figure 16 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

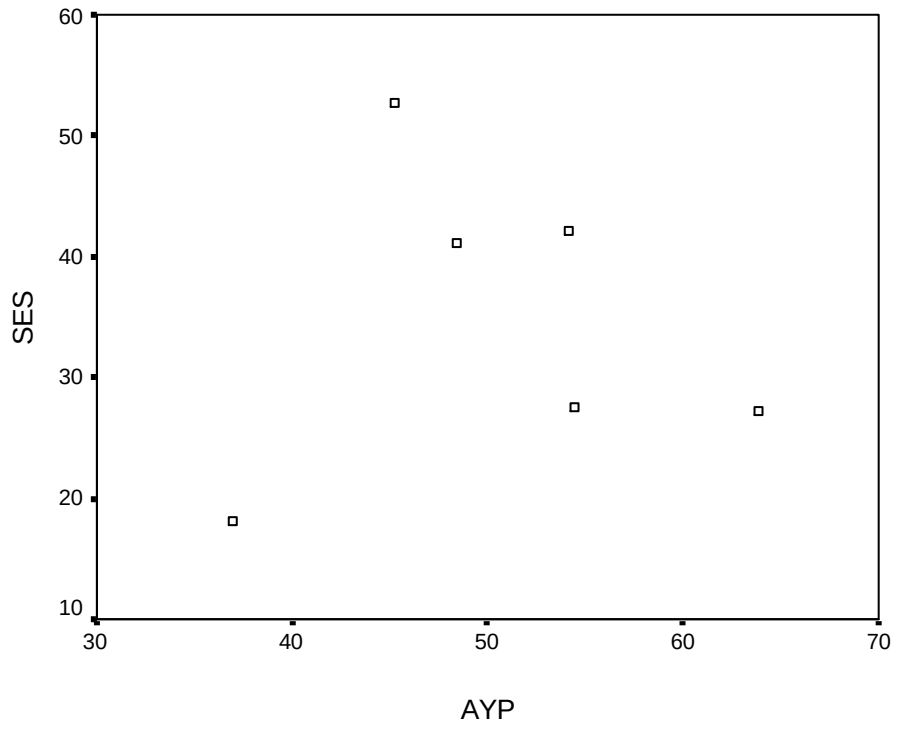

Figure 16

2006 Mathematics: SES and AYP (Class Size >20) Scatter Plot

Table 33 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the

dependent variable, AYP, represents the percent of students at or above proficient as measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 52.000, and the mean for class size was 21.33. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of .577 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 4.1581 standard deviation of the AYP scores.

Table 33

2007 Descriptive Statistics Mathematics: Class Size (>20) and AYP

	Mean	Std. Deviation	N
AYP	52.000	4.1581	3
Class Size	21.33	.577	3

Table 34

Table 34 represents the correlation between Class Size (>20) and AYP in Mathematics for the 2006-2007 school year. The Pearson *r* correlation, -.312 represented in

Table 34 does not indicate a statistically significant relationship between 2007 Class Size and AYP scores in Mathematics in classes >20.

2007 Correlation Mathematics: Class Size (>20) and AYP

		AYP	CLSSIZE
AYP	Pearson Correlation	1	-.312
	Sig. (2-tailed)	.	.798
	Covariance	17.290	-.750
	N	3	3
CLSSIZE	Pearson Correlation	-.312	1
	Sig. (2-tailed)	.798	.
	Covariance	-.750	.333
	N	3	3

Figure 17 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

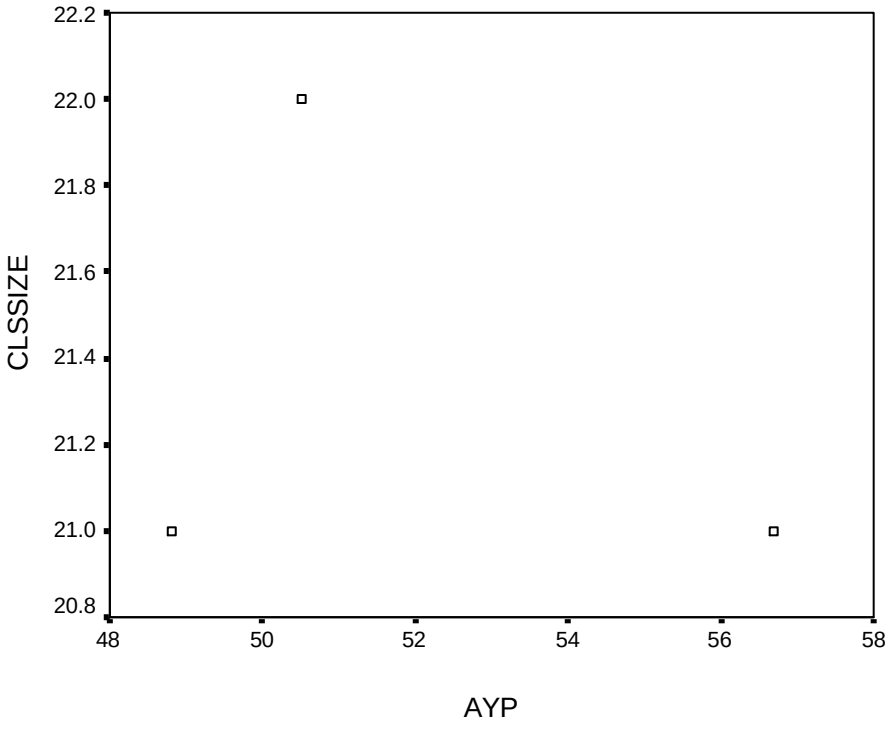

Figure 17

2007 Mathematics: Class Size (>20) and AYP Scatter Plot

Table 35 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 44.875, and the mean for class size was 15.69. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 3.179 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 8.3506 standard deviation of the AYP scores.

Table 35

2007 Descriptive Statistics Mathematics: Class Size (<20) and AYP

	Mean	Std. Deviation	N
AYP	44.875	8.3506	75
Class Size	15.69	3.179	74

Table 36

Table 36 represents the correlation between Class Size (<20) and AYP in Mathematics for the 2006-2007 school year. The Pearson *r* correlation, .031 represented in Table 36 does not indicate a statistically significant relationship between 2007 Class Size and AYP scores in Mathematics in classes <20.

2007 Correlation Mathematics: Class Size (<20) and AYP

		AYP	CLSSIZE
AYP	Pearson Correlation	1	.031
	Sig. (2-tailed)	.	.794
	Covariance	69.733	.823
	N	75	74
CLSSIZE	Pearson Correlation	.031	1
	Sig. (2-tailed)	.794	.
	Covariance	.823	10.108
	N	74	74

Figure 18 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

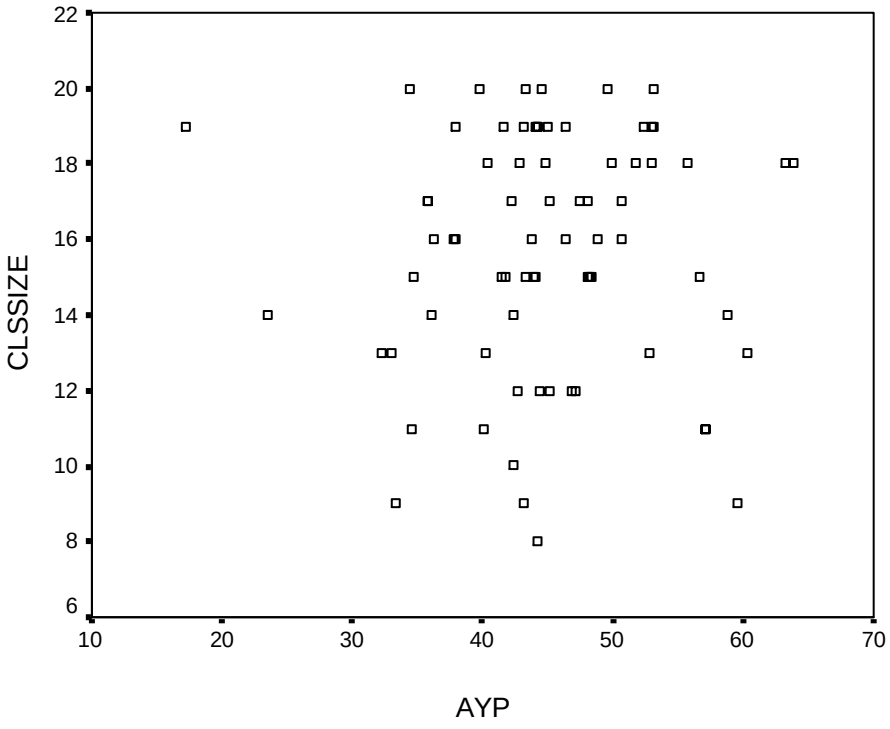

Figure 18

2007 Mathematics: Class Size (<20) and AYP Scatter Plot

Table 37 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher reporting data for both the independent and dependent variables for the 2006-2007 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above

proficient as measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 44.875, and the mean for the SES was 46.16. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 8.3506 that there was a less significant variance in the numbers than in the SES reported standard deviation of 14.753.

Table 37

2007 Descriptive Statistics Mathematics: SES and AYP (Class Size <20)

	Mean	Std. Deviation	N
AYP	44.875	8.3506	75
SES	46.16	14.753	74

Table 38

Table 38 represents the correlation between SES and AYP in classes <20 in Mathematics for the 2006-2007 school year. The Pearson *r* correlation, -.363 represented in Table 38 does indicate a statistically significant relationship between 2007 Class Size and AYP scores in Mathematics in classes <20.

2007 Correlation Mathematics: SES and AYP (Class Size <20)

		AYP	SES
AYP	Pearson Correlation	1	-.363
	Sig. (2-tailed)	.	.001
	Covariance	69.733	-44.891
	N	75	74
SES	Pearson Correlation	-.363	1
	Sig. (2-tailed)	.001	.
	Covariance	-44.891	217.645
	N	74	74

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

Figure 19 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

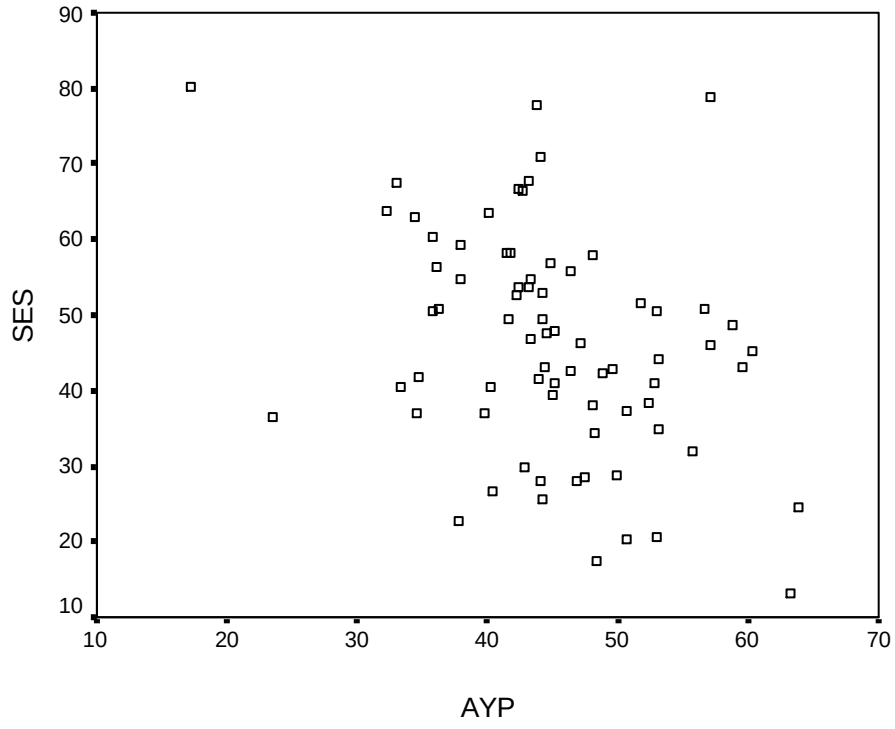

Figure 19

2007 Mathematics: SES and AYP (Class Size <20) Scatter Plot

Table 39 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2006-2007school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2007. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 52.000, and the mean for the SES was 30.73. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 4.1581 that there was a less significant variance in the numbers than in the SES reported standard deviation of 12.834.

Table 39

2007 Descriptive Statistics Mathematics: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
AYP	52.000	4.1581	3
SES	30.73	12.834	3

Table 40

Table 40 represents the correlation between SES and AYP in classes >20 in Mathematics for the 2006-2007 school year. The Pearson *r* correlation, .061 represented in Table 40 does not indicate a statistically significant relationship between 2007 SES and AYP scores in Communication Arts in classes >20.

2007 Correlation Mathematics: SES and AYP (Class Size >20)

		AYP	SES
AYP	Pearson Correlation	1	.061
	Sig. (2-tailed)	.	.961
	Covariance	17.290	3.275
	N	3	3
SES	Pearson Correlation	.061	1
	Sig. (2-tailed)	.961	.
	Covariance	3.275	164.703
	N	3	3

Figure 20 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

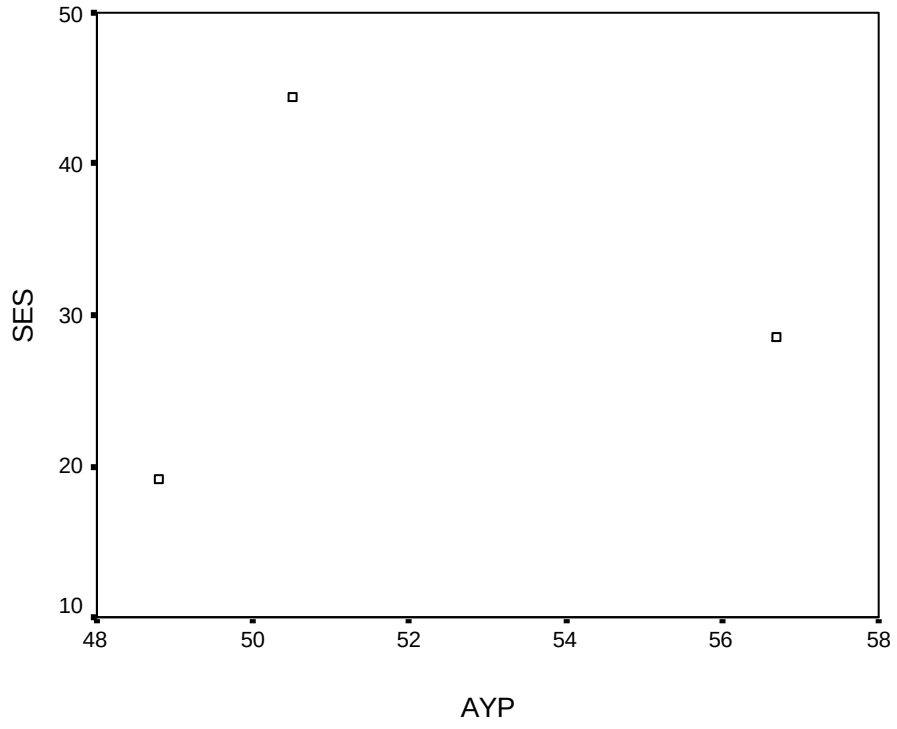

Figure 20

2007 Mathematics: SES and AYP (Class Size >20) Scatter Plot

Table 41 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with less than 20 students per teacher reporting data for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above

proficient as measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores was 53.333, and the mean for class size was 15.47. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of 3.064 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the 8.1683 standard deviation of the AYP scores.

Table 41

2008 Descriptive Statistics Mathematics: Class Size (<20) and AYP

	Mean	Std. Deviation	N
AYP	53.333	8.1683	76
Class Size	15.47	3.064	75

Table 42

Table 42 represents the correlation between Class Size (<20) and AYP in Mathematics for the 2007-2008 school year. The Pearson *r* correlation, -.001 represented in

Table 42 does not indicate a statistically significant relationship between 2008 Class Size and AYP scores in Mathematics in classes <20.

2008 Correlation Mathematics Class Size (<20) and AYP

		AYP	CLSSIZE
AYP	Pearson Correlation	1	-.001
	Sig. (2-tailed)	.	.991
	Covariance	66.721	-.032
	N	76	75
CLSSIZE	Pearson Correlation	-.001	1
	Sig. (2-tailed)	.991	.
	Covariance	-.032	9.387
	N	75	75

Figure 21 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

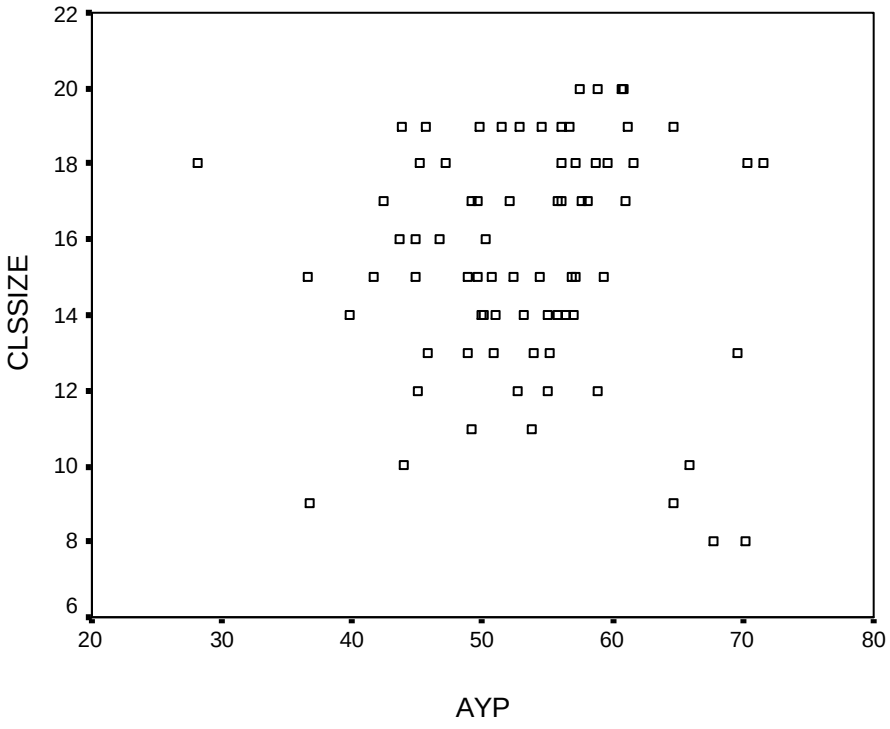

Figure 21

2008 Mathematics Class Size (<20) and AYP Scatter Plot

Table 43 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, Class Size, represents the student to teacher ratio. This average class size is reflective of data collected from each district's planning profile as provided by DESE. The mean of the AYP scores is 60.250, and the mean for class size was 21.50. The standard deviation represents how the numbers are spread around the mean. It is notable in the class size standard deviation of .707 that there is not a significant variance in the numbers. Most of the class size numbers reported by the state of Missouri do not vary to the degree that the AYP scores vary, note the .6364 standard deviation of the AYP scores.

Table 43

2008 Descriptive Statistics Mathematics: Class Size (>20) and AYP

	Mean	Std. Deviation	N
AYP	60.250	.6364	2
Class Size	21.50	.707	2

Table 44

Table 44 represents the correlation between Class Size (>20) and AYP in Mathematics for the 2007-2008 school year. The Pearson *r* correlation, 1.000 represented

in Table 44 does not indicate a statistically significant relationship between 2008 Class Size and AYP scores in Mathematics in classes >20.

2008 Correlation Mathematics: Class Size (>20) and AYP

		AYP	CLSSIZE
AYP	Pearson Correlation	1	1.000
	Sig. (2-tailed)	.	.
	Covariance	.405	.450
	N	2	2
CLSSIZE	Pearson Correlation	1.000	1
	Sig. (2-tailed)	.	.
	Covariance	.450	.500
	N	2	2

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

Figure 22 represents a Scatter plot indicating a normal distribution between the AYP scores and Class Size in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

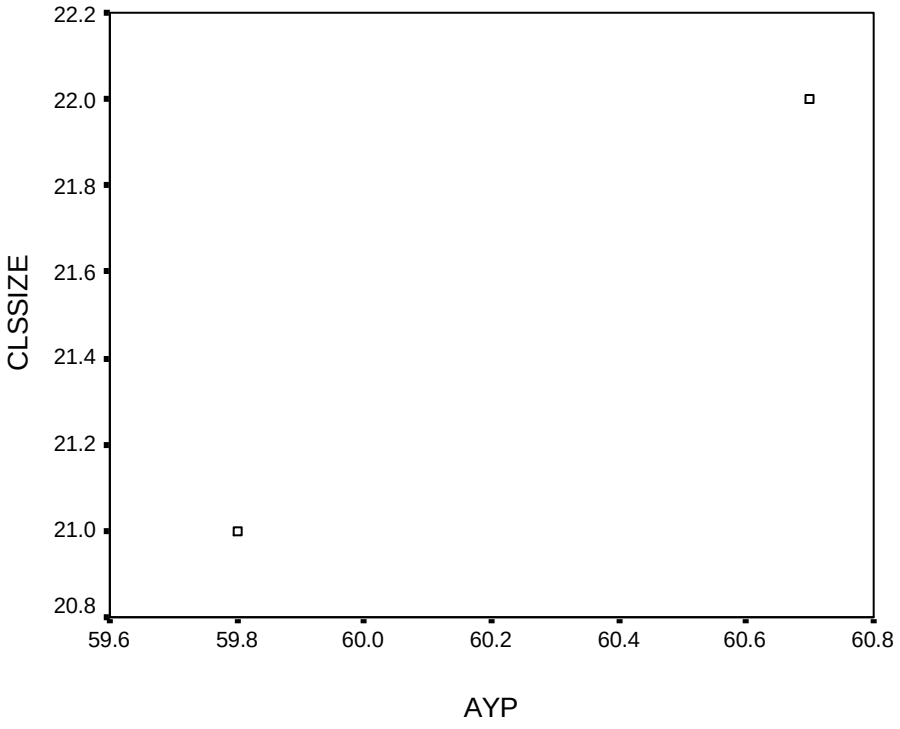

Figure 22

2008 Mathematics: Class Size (>20) and AYP Scatter Plot

Table 45 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this study. N represents the number of districts with greater than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Mathematics MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores was 60.250, and the mean for the SES was 40.00. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of .6364 that there was a less significant variance in the numbers than in the SES reported standard deviation of 6.930.

Table 45

2008 Descriptive Statistics Mathematics: SES and AYP (Class Size >20)

	Mean	Std. Deviation	N
AYP	60.250	.6364	2
SES	40.00	6.930	2

Table 46

Table 46 represents the correlation between SES and AYP in classes >20 in Mathematics for the 2007-2008 school year. The Pearson *r* correlation, -1.000 represented in Table 46 does not indicate a statistically significant relationship between 2008 SES and AYP scores in Mathematics in classes >20.

2008 Correlation Mathematics: SES and AYP (Class Size >20)

		AYP	SES
AYP	Pearson Correlation	1	-1.000
	Sig. (2-tailed)	.	.
	Covariance	.405	-4.410
	N	2	2
SES	Pearson Correlation	-1.000	1
	Sig. (2-tailed)	.	.
	Covariance	-4.410	48.020
	N	2	2

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

Figure 23 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

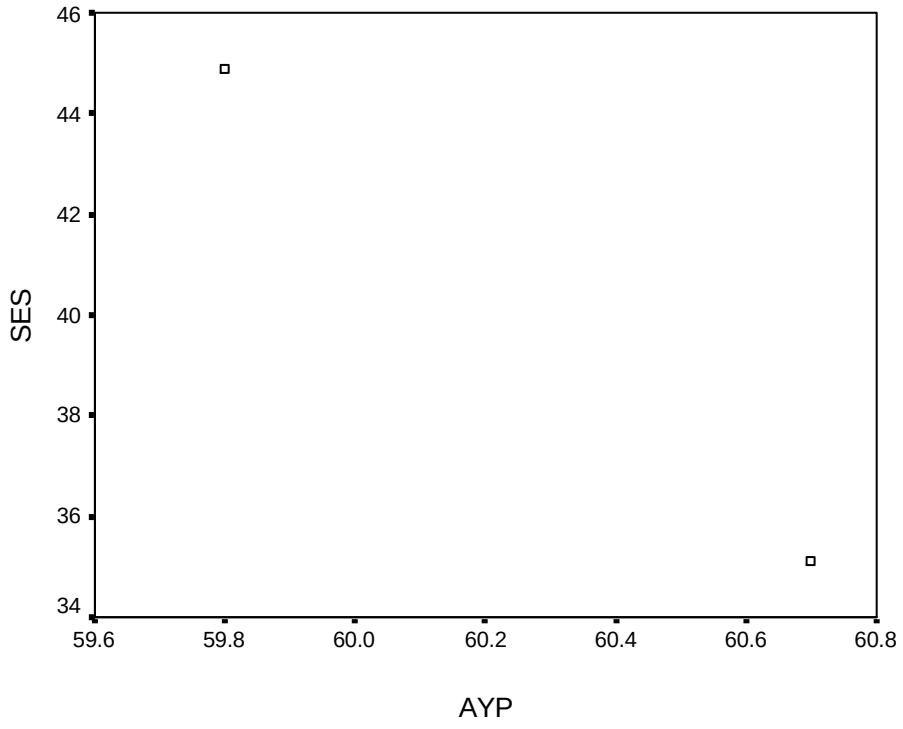

Figure 23

2008 Mathematics: SES and AYP (Class Size >20) Scatter Plot

Table 47 summarizes the population descriptive statistics for the independent and dependent variables analyzed in this correlation. N represents the number of districts with less than 20 students per teacher for both the independent and dependent variables for the 2007-2008 school year. The districts represented in the AYP data reflected in this study were selected through random sampling procedures. A sample size of 80 school districts is representative of the 524 public school districts in the state of Missouri. The mean for the dependent variable, AYP, represents the percent of students at or above proficient as

measured by the Communication Arts MAP Test. This average AYP score is reflective of data collected in the spring of 2008. The mean for the independent variable, SES, represents the free-and-reduced percentage of school districts represented in this study. The mean of the AYP scores is 53.333, and the mean for the SES was 45.97. The standard deviation represents how the numbers are spread around the mean. It is notable in the AYP standard deviation of 8.1683 that there was a less significant variance in the numbers than in the SES reported standard deviation of 15.128.

Table 47

2008 Descriptive Statistics Mathematics: SES and AYP (Class Size <20)

	Mean	Std. Deviation	N
AYP	53.333	8.1683	76
SES	45.97	15.128	75

Table 48

Table 48 represents the correlation between SES and AYP in classes <20 in Mathematics for the 2007-2008 school year. The Pearson *r* correlation, -.587 represented in Table 48 does indicate a statistically significant relationship between 2008 SES and AYP scores in Mathematics in classes <20.

2008 Correlation Mathematics: SES and AYP (Class Size <20)

		AYP	SES
AYP	Pearson Correlation	1	-.587
	Sig. (2-tailed)	.	.000
	Covariance	66.721	-72.842
	N	76	75
SES	Pearson Correlation	-.587	1
	Sig. (2-tailed)	.000	.
	Covariance	-72.842	228.867
	N	75	75

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

Figure 24 represents a Scatter plot indicating a normal distribution between the AYP scores and SES in Mathematics. The normal distribution prompted the use of the Pearson *r* correlation coefficient. A slight linear correlation is evident in the scatter plot, signaling a relationship between the two variables.

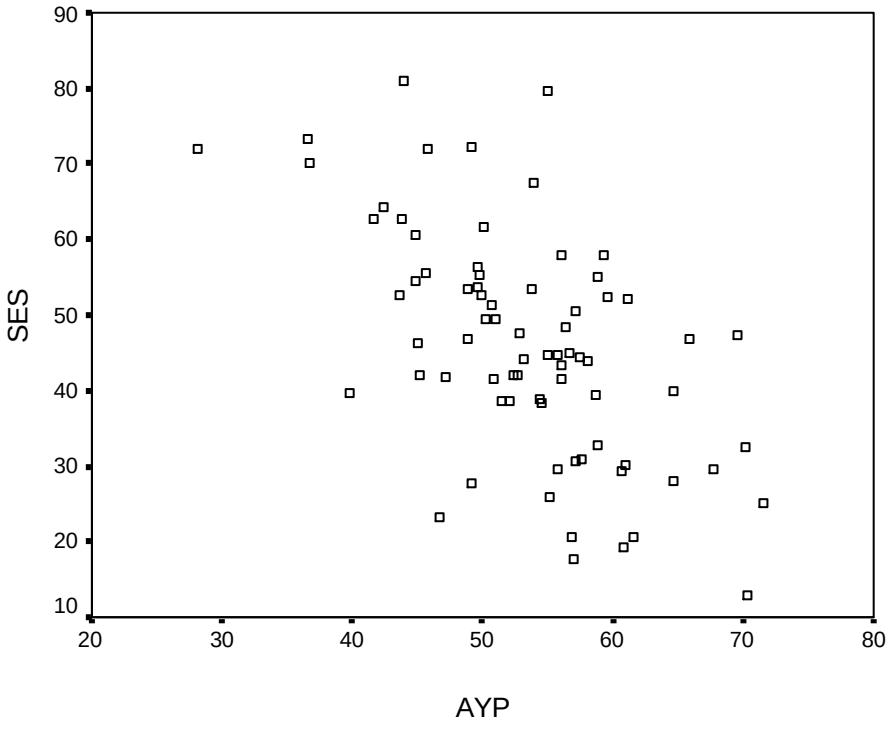

Figure 24

2008 Mathematics: SES and AYP (Class Size <20) Scatter Plot

Table 49

The data sample represented 80 school districts and data collection from 2005-2006, 2006-2007, and 2007-2008 school years. The student achievement data was gathered from the school district's AYP score, SES was representative of each district's free-and-reduced population percentage, and class size was determined by each district's reported student/teacher ratio.

Table 49

2006-2008 Cumulative Correlations Mathematics and Communication Arts: Class Size (</> 20) and AYP, SES and AYP

Communication Arts	2006 r	2007 *r*	2008 *r*
Class Size and AYP <20	-0.238	-0.141	-0.185
Class Size and AYP >20	-0.249	0.929	-1
SES and AYP <20	-0.434	-0.498	-0.418
SES and AYP >20	-0.278	-0.532	-1
Math	2006 r	2007 *r*	2008 *r*
Class Size and AYP <20	0.104	0.031	-0.001
Class Size and AYP >20	0.761	-0.312	-1
SES and AYP <20	-0.403	-0.363	-0.587
SES and AYP >20	0.025	0.061	-1

Summary

The review of literature revealed a connection with the socioeconomic status of students in relation to their achievement scores. An additional correlation was conducted to deduce the conclusions of the literature review. Much of the related literature indicated the effectiveness of reduced class size most effective for the disadvantaged students.

The purpose of this study was to determine the relationship between class size and student achievement, and the impact of socioeconomic status on student achievement. The

data collected reflected the student achievement scores in the areas of Mathematics and Communication Arts. This study did not indicate a relationship between class size and student achievement; however, the findings identified a relationship between the socioeconomic status and student achievement in Communication Arts and Mathematics. A statistically significant relationship was not evident between class size and student achievement scores in Communication Arts and Mathematics.

CHAPTER FIVE - DISCUSSION

Introduction

Educators would tend to believe that by simply reducing class size an immediate increase in student achievement would occur. This study mirrored larger, more complex research designs in that the data collected for this specific research study directly reflected the needs of students enrolled in Missouri public schools. The purpose of this study was to examine the relationship between class size and student achievement. Additionally, the study's design allowed for investigating the impact class size has on student achievement and the relationship that the socioeconomic status of students has on achievement in relation to class size.

Data Procedures

A random sampling from Missouri schools provided district data for this study. Using a random sampling of numbers table, the population size was reduced from 524 school districts to 80.

All data were collected from the Missouri Department of Elementary and Secondary Education (MDESE) public access website which included detailed information related to the school districts' AYP scores in both Communication Arts and Mathematics, pupil/teacher ratio, and the districts' socioeconomic status. Data were collected and analyzed using the Pearson *r* correlation coefficient method to determine if a statistically significant relationship existed between the class size, student achievement, and socioeconomic status.

Summary of Findings

The analysis was based on four research questions. Independent variables represented in this study were class size and socioeconomic status of students. The dependent variable was the AYP scores derived from the Missouri Assessment Program test. Based on the analysis of data and findings of this study, the efforts of reducing class sizes would reflect no effect on student achievement scores. The following conclusions emerged from this study:

1. *What relationship exists between class size and student achievement in Communication Arts?*

The result of the Pearson *r* correlation coefficient for this correlation indicated no significant correlation between the variables for three consecutive years of data. Educational statistical purposes require validation of a p value at or below the .05 level on the Critical Movement Chart. The Pearson *r* correlations represented in this study do not indicate a statistically significant relationship between Class Size and AYP scores in Communication Arts.

- A weak correlation that was not significant was found (r(2) = -.238 , p>.05) between Class Size and AYP in classes with <20 . A Pearson correlation was calculated examining the relationship between Class Size and AYP in classes with <20 students in Communication Arts for the 2006-2007 school year.
- A weak correlation that was not significant was found (r(2) = -.141 , p>.05) between Class Size and AYP in classes < 20 students in Communication Arts for the 2006-2007 school year.
- A weak correlation that was not significant was found (r(2) = -.185 , p>.05) between Class Size and AYP in classes with <20 students in Communication Arts for the 2007-2008 school year.
- A weak correlation that was not significant was found (r(2) = -.249 , p>.05) between Class Size and AYP in classes with >20 students in Communication Arts for the 2005-2006 school year. .
- A weak correlation that was not significant was found (r(2) = -.929 , p>.05) between Class Size and AYP in classes with >20 students in Communication Arts for the 2006-2007 school year.
- A correlation was found (r(2) = -1, p>.05), however this was a skewed correlation with only 2 subjects between Class Size and AYP in classes with >20 students in Communication Arts for the 2007-2008 school year.

Research gleaned from the Tennessee STAR study found that students in smaller classes consistently outperformed their peers in larger classes in all achievement categories (Robelen, 1998). Robelen reported on the results of the meta-analysis conducted by Glass and Smith in 1978, stating that smaller classes lead to higher student achievement

specifically in classes with less than 20 students. The results of this study did not support the a majority of the literature reviewed on this topic. The limitations of the study may have hindered the findings.

2. *What relationship exists between class size and student achievement in Mathematics?*

- A weak correlation that was not significant was found ($r(2) = -.104$, $p>.05$) between Class Size and AYP in classes with <20 students in Mathematics for the 2005-2006 school year.
- A weak correlation that was not significant was found ($r(2) = -.031$, $p>.05$) between Class Size and AYP in classes with <20 students in Mathematics for the 2006-2007 school year.
- A weak correlation that was not significant was found ($r(2) = -.001$, $p>.05$) between Class Size and AYP in classes with <20 students in Mathematics for the 2007-2008 school year.
- A weak correlation that was not significant was found ($r(2) = -.761$, $p>.05$)between Class Size and AYP in classes with >20 students in Mathematics for the 2005-2006 school year.
- A weak correlation that was not significant was found ($r(2) = -.312$, $p>.05$) between Class Size and AYP in classes with >20 students in Mathematics for the 2006-2007 school year.
- A correlation was found ($r(2) = -1$, $p>.05$), however this was a skewed correlation with only 2 subjects between Class Size and AYP in classes with >20 students in Mathematics for the 2007-2008 school year.

Achilles (1999) stated that “establishing appropriately sized classes in the early primary grades benefits the children in the classroom first, foremost, and directly” (p. 18). Furthermore, Achilles (1999) explained, “Several early class-size studies were substantial and their results consistently favored small classes” (p.22).

3. How does the socioeconomic status of students relate to student achievement in terms of class size?

- A significant correlation was found ($r(2) = -.434$, $p>.05$ between SES and AYP in classes with <20 students in Communication Arts for the 2005-2006 school year.
- A significant correlation was found ($r(2) = -.498$, $p>.05$) between SES and AYP in classes with <20 students in Communication Arts for the 2006-2007 school year.
- A significant correlation was found ($r(2) = -.418$, $p>.05$) between SES and AYP in classes with <20 students in Communication Arts for the 2007-2008 school year.
- A slight correlation that was not significant was found ($r(2) = -.278$, $p>.05$) between SES and AYP in classes with >20 students in Communication Arts for the 2005-2006 school year.
- A slight correlation that was not significant was found ($r(2) = -.532$, $p>.05$) between SES and AYP in classes with <20 students in Communication Arts for the 2006-2007 school year.
- A correlation was found ($r(2) = -1$, $p>.05$), however this was a skewed correlation with only 2 subjects between SES and AYP in classes with >20 students in Communication Arts for the 2007-2008 school year.
- A significant correlation was found ($r(2) = -.403$, $p>.05$) between SES and

AYP in classes with <20 students in Mathematics for the 2005-2006 school year.

- A significant correlation was found ($r(2) = -.363$, $p>.05$) between SES and AYP in classes with <20 students in Mathematics for the 2006-2007 school year.
- A significant correlation was found ($r(2) = -.587$, $p>.05$) between SES and AYP in classes with <20 students in Mathematics for the 2007-2008 school year.
- A slight correlation that was not significant was found ($r(2) = -.025$, $p>.05$) between SES and AYP in classes with >20 students in Mathematics for the 2005-2006 school year.
- A slight correlation that was not significant was found ($r(2) = -.061$, $p>.05$) between SES and AYP in classes with >20 students in Mathematics for the 2006-2007 school year.
- A correlation was found ($r(2) = -1$, $p>.05$), however this was a skewed correlation with only 2 subjects between SES and AYP in classes with >20 students in Mathematics for the 2007-2008 school year.

Based on the findings from this study, there is a relationship between socioeconomic status and student achievement in both Communication Arts and Mathematics. The level of confidence signifies that the findings of this correlation are not due to chance. A greater relationship exists between socioeconomic status and student achievement in Communication Arts and Mathematics than between student achievement and class size in Communication Arts and Mathematics. It may be concluded that the socioeconomic status of students may affect their achievement scores more directly than the size of the class. Rusk and Mosely (1994) reported that when groups of students with

similar backgrounds are compared, the students from a high socioeconomic status outperform students representative of a lower socioeconomic status.

A Pearson correlation was calculated examining the relationship between class size and student achievement in Communication Arts for three consecutive school years. A weak correlation that was not significant was determined for each academic reporting year, therefore null hypothesis #1 was failed to be rejected. A Pearson correlation was calculated examining the relationship between class size and student achievement in Mathematics. A weak correlation that was not significant was determined for each academic reporting year, therefore null hypothesis #2 was failed to be rejected. Additionally, a significant negative correlation was identified between the socioeconomic status and AYP scores in both Communication Arts and Mathematics indicating a linear relationship between socioeconomic status of students and student achievement. Based on the findings of this study null hypothesis # 3 was rejected. The null hypothesis was rejected because the correlation coefficients that were determined between the variables were not found to be above the .05 level, as indicated on the p-value table. Further investigation of this study will clarify the effects of class size reduction on student achievement. The limitations of this study restricted the overall findings of this study.

Findings from this study of Missouri students indicated a stronger relationship exists between the socioeconomic status of students and student achievement in both Mathematics and Communication Arts than class size and student achievement in both Communication Arts and Mathematics. Consequently, socioeconomic status affects a student's ability to perform more than the size of the class. Tarter and Hoy (as cited in Maxwell, 2007) reinforced findings that social class and school outcomes were

interconnected and are related to social and economic community resources. The social irregularities occurring at home are brought to school, a place where attempts of maintaining and establishing equities are in effect. Student populations represent diverse and varied backgrounds, and teachers attempt to educate all students in the same manner with the same level of expectations.

Comparative Analysis

This study provided a similar research design, comparable to large-scale, experimental research studies, seeking the relationship between class size, student achievement, and socioeconomic status of Missouri students assessed by the Missouri Assessment Program (MAP) standards. Four large-scale, experimental studies provided the lens for comparing the findings of this quantitative study. Conclusions may be drawn from the four studies detailed in Chapter Two; however, the results of each individual study indicated advantages of reduced class size. Review of the four large-scale studies yielded common themes. Student gains were recognized when adequate funding was provided and appropriate preparation tactics were implemented (Biddle & Berliner, 2002).

When the class size consistently averages less than twenty students, significant gains may be evident (Biddle & Berliner). These gains will occur in both traditional measures of student achievement and other indicators of student success. This study analyzed the relationship between class size and student achievement of Missouri students, and district assessment data were gleaned from students' performance on the MAP test. The findings of the study did not determine a correlational relationship between class size and student achievement.

Research in the literature review of this study indicated there are positive effects on student achievement when class size is reduced; the problem arises in the duration of the effects. Are the positive effects of student achievement long term or short term? Class size effects persist throughout a child's educational experience; therefore, the need is for consistent policy reform that will be continuous from primary grades through high school years. The results of this study did not conclude a relationship exists between class size and student achievement; however, the need for further study is necessary to identify the discrepancies in research findings.

Boozer and Rouse (2001) suggested that the methodology and findings point to several possible culprits when trying to make sense of the current empirical evidence on class size. First, reducing class size by one student does not have an alarming effect, and reductions in classes above twenty students have essentially no impact; however, reductions in classes with twenty or fewer students raise the test scores of some students. Second, the majority of the beneficial impacts of class size reduction arises because of the productivity-enhancing effect it has on other educational factors. The majority of previous studies allow, at most, the impact of class size to vary by race or gender (Boozer & Rouse). The two factors noted by Boozer and Rouse are additional areas requiring further investigation of their effects on student achievement in relation to class size standards.

An anomaly that is present in the research of class size and is absent in the majority of other studies is that research, factual evidence, and traditional wisdom parallel in regard to the impact class size has on student achievement (Achilles, 1999). Teachers know that smaller classes allow them to teach more effectively; therefore, educators promote smaller

class size. Parents recognize the benefits of smaller classes and request their child be assigned to a smaller class setting in order to reap the benefits.

Achilles (1999) noted that a smaller class setting also promotes parental involvement, a cornerstone to overall positive school experiences. The effects of smaller class dynamics are direct and indirect as they relate to a student's overall academic experience. Typically, in a research study the facts uncover the need for change that may or may not coincide with the beliefs of the stakeholders involved. In most cases, school leaders believe that the benefits of reduced class size are worthy of the efforts and that funding is necessary to implement and sustain a class size reduction reform model. The results of this study support research related to the impact of socioeconomic status on student achievement; however the finding this study do not parallel the research related to the effects of class size on student achievement. This study yielded a stronger statistically significant correlation between socioeconomic status and student achievement than between class size and student achievement.

Conclusions

A significant statistical correlation was not evident between class size and student achievement in Communication Arts and Mathematics. This study identified a relationship between a student's socioeconomic status and his or her academic performance. When a teacher focuses on the individual needs of students and manages the classroom setting in a manner that is conducive to learning, academic gains may develop. The gains may be related to class size, socioeconomic status of students, or a variety of other factors affecting learning.

Implications

Although, sustainable research on the relationship of class size, student achievement, and socioeconomic status is limited, the four studies outlined in Chapter Two provided the impetus for further review. In order to effectively apply the research findings, legislative action would be necessary to support the financial burden school districts would face when reducing class sizes. Hess (2008) suggested that policy makers should consider the stockpile of educational policy initiatives that are worthy of resources and place class size at the top of the list. However, small classes are not a quick fix and negative, unintended consequences are possible.

In weighing the pros and cons of a class size reduction policy, Hess (2008) stated that policy makers should consider the following conditions:

1. Early intervention is important. Start in kindergarten or first grade.
2. The number of students in a class should range from 13 to 17.
3. If resources are scarce, target implementation by focusing on at-risk students.
4. Maintain intensity by ensuring that students experience small classes everyday, all day.
5. Small classes should last at least two years for initial benefits and three to four for longest-lasting benefits after the small classes are over (Hess, 2008).

School reform would be necessary to facilitate the need for hiring quality educators to reduce class size in an attempt to improve student achievement scores. Many educators would agree that by reducing class size they would be better able to meet the growing demands of their student's needs. This state of educational reform will not be possible without financial support. The studies outlined in Chapter Two determined a statistically

significant relationship between class size and student achievement; however, the all-encompassing obstacle was consistently, sustainability of the funding source.

Researchers caution policy makers to be aware of the one-size fits all approach to class size reform. Different student populations require different needs; therefore, it is not recommended to standardize reform (Robelen, 1998). Lessons gleaned from the California CSR study, suggested being flexible by establishing a class size average in a school or district. Strict ceilings on student-to-teacher ratios do not allow for transient population fluctuations (Robelen).

The anticipated outcome of this study was to gather data to aide in the decision-making process both at the state and district levels. When school leaders and state officials are repeatedly exposed to data that supports reducing class size, perhaps effective change can occur. The data detailed in Chapter Four, while specific to Missouri schools, may be generalized to other public schools, nationwide. The recommendations for further study will include means for gathering data that will specifically detail the needs of students in the state of Missouri.

R*ecommendations f*or *Furthe*r *Study*

Further investigative study regarding this topic is necessary to determine the depths at which reduced class size can affect student achievement. It is the challenge of all educational leaders to facilitate the most appropriate learning environments for all students. In order to accomplish the task of enabling all learners the opportunity to succeed and experience academic and personal growth, it is necessary for school leaders to remain abreast of current educational research. The research needed to assist in the daily decisions necessary to guarantee quality services for students is easily accessible and available to all

educational leaders. Based on the findings of this study, the following are recommendations for further research

and practice:

1. Conduct a follow-up study in other states to investigate the effectiveness of class size reduction.
2. Conduct a comparison study that includes both elementary level data analysis as well as secondary to assess at which level smaller classes are most effective.
3. Conduct a study to determine if teacher experience in relation to class size is a predictor of overall instructional effectiveness.
4. Investigate the link between the effectiveness in class size reduction and minority groups.
5. Strengthen the research presented in this study with more specific cost analysis of a statewide class size, reduction reform model.
6. A longitudinal study would enable researchers to track student progress: when the student was exposed to reduced class sizes and at what point in his or her educational career.
7. A qualitative study would gain insight regarding educators, parents, and school leaders opinions and perceptions regarding class size and student achievement.
8. Replicate this study using data from K-8 and K-12 schools.

The nature of exploratory research involves the discovery of unexpected relationships, which might provide insight for additional research. Further studies are necessary to validate and expand upon the findings presented in this study. The recommendations offered in this study are based on the hope that change will occur to

provide quality instructional practices that may improve the educational experiences offered in our nation's educational system.

Summary

The purpose of this study was to evaluate the nature of the relationship between class size and student achievement, while enhancing the research with statistical findings related to student achievement and socioeconomic status. Data from 80 Missouri schools were analyzed to determine if a correlation existed between the variables: class size, student achievement, and socioeconomic status. Student achievement scores were analyzed based on the school districts' cumulative AYP score for three consecutive years. Class size data were representative of the student/teacher ratio as reported by each individual school district. The socioeconomic status data were generated from the reported free-and-reduced percentage of each participating school district.

The review of literature provided a comparative analysis of four, large-scale, class size studies and the results derived from those studies. The quantitative data were analyzed through a Pearson *r* correlation coefficient method. As a result of this study, class size and socioeconomic status of students appear to effect student achievement negatively. Additionally, a statistically significant correlation was yielded from the analysis of data, signifying a relationship between class size and student achievement in both Mathematics and Communication Arts. This study concurred with the research available on the topic of class size. The rejection of the hypothesis of this study signifies the need for further research on the effects of class size on student achievement.

Many of the challenges school leaders face, can be answered with quality research

studies, specifically seeking the answers that will continue to allow our schools to meet the growing needs of students. Smaller classes are associated with greater attempts to individualize instruction and better classroom climate therefore impacting student achievement gains. The results of this study complement those of a previous meta-analysis that showed positive effects of class size on achievement. Class-size reduction is both a programmatic and instructional reform, and as such, it requires thorough research and data analysis to promote change. The challenge of this study is not to answer questions, but to raise new questions that start people thinking and behaving differently about education.

REFERENCES

Achilles, C. (1999). *Let's put kids first, finally: Getting class size right*. Thousand Oaks, CA: Corwin Press.

Achilles, C. M., Finn, J. D., & Pate-Bain, H. (2002). Measuring class size: Let me count the ways. *Educational Leadership*, 24.

Achilles, C. M., & Lintz, M. N. (1991). State government influences on public education: Tennessee's project STAR, *Journal of School Leadership, 1*, 59-64.

American Educational Research Association. (2003). Class size: Counting students can count. R*esearch Points, 1*(2), 1-4.

American Federation of Teachers (AFT). (n.d.a). *Benefits of small class size*. Retrieved June 6, 2008, from http://www.aft.org/topics/classsize/index.htm

American Federation of Teachers (AFT). (n.d.b). *Class size counts: The research shows us why.* Retrieved June 6, 2008, from http://aft.org/topics/classsize/at98-sizecounts.htm

American Federation of Teachers (AFT). (n.d.c). *Class size resolutions*. Washington, DC: Author.

American Federation of Teachers (AFT). (n.d.e). *Supporting research*. Retrieved June 6, 2008, from http://www.aft.org/topics/classsize/research.htm

American Federation of Teachers (AFT). (2001, January). *Smaller class size: It's worth the effort.* Retrieved June 6, 2008, from http://www.aft.org/pubs-reports/american_teacher/dec00_jan01/classnotes.html

American Federation of Teachers (AFT). (2001, March). *Study confirms value of small class size*. Retrieved June 6, 2008, from http://www.aft.org/pubs-reports/american_teacher/mar01/classnotes.html

American Federation of Teachers (AFT). (2005, February). *Class notes: Putting a stop in the revolving door*. Retrieved June 6, 2008, from http://www.aft.org/pubs-reports/american_teacher/feb05/classnotes.htm

American Federation of Teachers (AFT). (2008, January). *Small class-size benefits extend beyond school: New study links smaller class sizes with better health and wealth.* Retrieved June 6, 2008, from http://www.aft.org/pubs-reports/american_teacher/dec07jan08/classnotes.htm

American Psychological Association. (2000). R*esolution on poverty and socioeconomic status*.

Retrieved August 19, 2008, from http://www.apa.org/pi/urban/povres.html

Bass, J. (2004). New Bush FY 2005 budget for not child left behind act comes up short: AFT chart shows what each state could have bought with promised money. Washington, DC: American Federation of Teachers (AFT).

Biddle, B. J., & Berliner, D. C. (2002). *What research says about small classes & their effects*. San Francisco:WestED.

Biddle, B. J., & Berliner, D. C. (2002). Small class size and its effects. *Educational Leadership, vv*, 12-23.

Blatchford, P. & Mortimore, P. (1994). The issue of class size for young children in schools: What can we learn from the research? *Oxford Review of Education*, 20, (4),

411-428.

Boozer, M. A. and C. Rouse (2001), Intraschool Variation in Class Size: Patterns and Implications,"Journal of Urban Economics, 50, 163-189.

Borman, G. D., & Overman, L. T. (2004). Academic resilience in mathematics among poor and minority students. *Elementary School journal, 104,* 177-196.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual* R*eview of Psychology, 53,* 371-389.

Cahen, L. S., Filby, N., McCutcheon, G., & Kyle, D. W. (1983). *Class size and instruction.* New York, NY: Longman.

Cavenaugh, R.(1994, March), Class size and best practice. *Education Alternatives.*

Cromwell, S. (1998, December). *Are smaller classes the answer?* Retrieved November 23, 2008, from http://www.education-world.com/a_issues/issues044.shtml

Duncan, G & Magnuson, K. (2005). Can Family Socioeconomic Resources Account for Racial and Ethnic Test Score Gaps? *The Future of Children 15(1), 35-54.*

Ehrenberg, R. G., Brewer, D. J., Gamoran, A., & Willms, J.D. (2001). Class size and student achievement. *Psychological Science in the Public Interest, 2*(1), 1-30.

Entwisle, D. R., Alexander, K. L., & Olson, L.S. (2005). First grade and educational attainment by age 22: A news story1. *American Journal of Sociology, 110,* 1458.

Gilman, D. A., & Kiger, S. (2003). Should we try to keep class sizes small? *Educational Leadership, vv,* 80-85.

Glass, G. V., Cahen L. S., Smith M. L., & Filby N. N. 1982. *School Class Size:* R*esearch and Policy.* Beverly Hills, CA: Sage Publications.

Glass, G. V. & Smith, M. L. (1979). Meta-anlysis of research on Class size and achievement. *Educational Evaluation and Policy Analysis, 1*, 2-16.

Gursky, D. (1998). Class size does matter. *The Education Digest, vv*, 15-18.

Hanushek, E. A. (1999). Some findings from an independent investigation of the Tenessee STAR experiment and from other investigations of class size effects. *Educational Evaluation and Policy Analysis*, 21, 143-164.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (1998). Teacher, schools and academic achievement. National Bureau of Economic Research. Working Paper6691.

Hess, F. M., & Squire, J. (2008). From research to policy. *American School Board Journal.*

Hill, P. T. (2008). Spending money when it is not clear what words. *Peabody Journal of Education, 83*(2), 238-258.

Hopkins, G. (1998a, February). *The debate over class size part 1: Class size does matter!* Retrieved November 23, 2008, from http://www.educationworld.com?a_admin/admin/admin049.shtml

Hopkins, G. (1998b, February). *The debate over class size part 2: The critics have their say.* Retrieved November 23, 2008, from http://www.educationworld.com/a_admin/admin/admin051.shtml

Hoxby, C. M. (2000), "The Effects of Class Size on Student Achievement: New Evidanece from Population Variation, " Quarterly Journal of Economics, 90, 1239-1285.

Hunt, N. (2005). Simple Random Sampling. Retrieved September 6, 2008, from http://www.coventry.ac.uk/ec/~nhunt/meths/random.html

Kahlenberg, R. D. (2001). *Learning from James Coleman*. The Gale Group. Retrieved October 10, 2008, from www.findarticles.com/p/articles/mi_m0377/is_2001_Summer/ai_7681225/print

Krueger, A., & Whitmore, D. (2002). *Would smaller classes help close the black-white achievements gap?* Washington, DC: Brookings Institute Press.

Leithwood, K., & Jantzi, D., (2009). A Review of Empirical Evidence About School Size Effects: A Policy Perspective, Review of Educational Research, March, 2009; 79(1):464-490.

Levin, J. (2001), " For Whom the Reductions Count: A Quantile Regression Analysis of Class Size and Peer Effects on Scholastic Achievement," Empirical Economics, 26, 221-246.

Lindbloom D. H. (1970). *Class Size as It Affects Instructional Procedures and Educational Outcomes*. Minneapolis, MN: Educational Research and Development Council of the Twin Cities Metropolitan Area. ERIC document no. ED 059 532.

Locke, M. (2001). *A descriptive study of how schools in southwest Missouri are addressing Senate bill 319*. Unpublished manuscript.

Maxwell, L. E. (2007). *Noise*. Safe and Healthy School Environments (pp. 34-45). Oxford, UK: Oxford University Press.

Merriam Webster Online. (2008). Answers.com. Retrieved December 30, 2008, from http://www.answers.com/merriam%20webster

Missouri Department of Elementary and Secondary Education (MO DESE). (2008). School data and statistics. Retrieved November 16, 2008, from http://dese.mo.gov/schooldata/school_data.html

Missouri Department of Elementary and Secondary Education (MO DESE). (2008). School data and statistics. Retrieved November 16, 2008, from http://dese.mo.gov/directory/

Missouri Department of Elementary and Secondary Education (MO DESE). (2008). School data and statistics. Retrieved November 16, 2008, from http://dese.mo.gov/schooldata/four/000000/disanone.html

Molnar, A., Smith, P., Zahorik, J., Palmer, A., Halbach, A., & Ehrle, K.(1999).Evaluating the SAGE Program: A Pilot Program in Targeted Pupil-Teacher Reduction in Wisconsin., *Educational Evaluation and Policy Analysis***,** 21(2): pp. 165-178.

Mosteller, F. (1995). The Tennessee study of class size in the early school grades. Critical Issues for Children and Youths, 5(2), 113-127.

Nye, B., Hedges, L. V., & Konstantopoulos, S. (2001). The long-term effects of small classes in early grades: Lasting benefits in mathematics achievement at grade nine. *Journal of Experimental Education, 69,* 19-30.

Okpala, C. O., Okpala, A. O., & Smith, F. E. (2001). Parental involvement, instructional expenditures, family socioeconomic attributes, and student achievement. *Journal of Educational* R*esearch, 95*, 110.

Olson, M. R. (1971). Ways to achieve quality in small classrooms: Some definitive answers. Phi Delta Kappan, 53, (1), 63-65.

Perkins-Gough, D. (2006). Accelerating the Learning of Low Achievers. *Educational Leadership*, 63(5), 88-89.

Patten, M. L., (2002). *Understanding* r*esearch methods*, Los Angeles, CA: Pyrczak Publishing. 2002.

Persell, C. (2000). R*acial and Ethnic Educational Inequality in Global Perspective*, p. 261-280 in the *Handbook of Social Problems: A Comparative International Perspective*, Thousand Oaks, CA: Sage Publications. 2004.

Pool, C. R. (2002). Web wonders: Class size, school size. *Educational Leadership*, 104. R*educing class size, what do we know?* (1999, March). Retrieved November 23, 2008, Pool, C. (2002). Class size, school size. *Educational Leadership, vv*, 104.

Robelen, E. (1998). When politics meets practice. Retrieved April 4, 2009, from http://ascd.org/publications/newsletters/infobrief/sept98/num14/toc.aspx

Rusk, D., & Mosley, J. (1994). The academic performance of public housing children: Does living in middle class neighborhoods and attending middle class schools make a difference? Albuquerque, NM: The Urban Institute.

Shapson, S. M., Wright, E. N., Eason, G., & Fitzgeral, J. (1978, March). R*esults of an experimental study of the effects of class size*. (ERIC Document Reproduction No. 151985).

Small classes will attract and retain teachers. (2002, Month DD). *Contra Costa Times.* Retrieved June 18, 2007, from http://www.reduceclassnow.org/answers_to_critics.htm

Tarter, C. J., & Hoy, W. K. (2004). A systems approach to quality in elementary schools: A theoretical and empirical analysis. *Journal of Educational Administration, 42,* 539.

Tung, R., Quimette, M., & Feldman, J. (2004). *How are Boston pilot schools faring? Student Demographics, engagement, and performance: 1998-2003*. Paper presented at AERA, San Diego, CA. Retrieved November 17, 2008, from http://www.ccebos.org/pilots.faring.2004.pdf

U.S. Department of Education. (2001). *Fact Sheet on the Major Provisions of the Conference Report to H.R. 1, the No Child Left Behind Act.* Retrieved July 9, 2007, from http://www.ed.gov/nclb/overview/intro/factsheet.html.

Viadero, D. (2008). Smaller classes seen as no silver bullet. *Education Week, 27*(32), 5.

Winters, L. (2002). The Class Size Debate. *Classroom Leadership*, 5(5), 1-3.

Appendix A

2005 Funding Chart

State	Title I funding in Bush '05 budget vs. amount promised	Funding Gap	Students who could have had smaller class sizes	Students who could have had prekindergarten	Students who could have had Kindergarten-Plus	Teachers who could become certified
Alabama	$202.6 million vs. $309.3 million	$106.7 million	116,269	14,732	56,176	14,321
Alaska	$34.9 million vs. $56.2 million	$ 21.3 million	23,270	2,949	11,243	2,866
Arizona	$208.8 million vs. $315.2 million	$106.3 million	115,875	14,682	55,986	14,273
Arkansas	$117.1 million vs. $176.3 million	$ 59.1 million	64,430	8,164	31,130	7,936
California	$1.9 billion vs. $2.9 billion	$1.028 billion	1.1 million	141,913	541,137	137,953
Colorado	$116.7 million vs. $176.8 million	$ 60 million	65,441	8,292	31,618	8,061
Connecticut	$114.8 million vs. $169.9 million	$ 55.1 million	60,071	7,611	29,024	7,399
Delaware	$35.7 million vs. $58.7 million	$ 23 million	25,106	3,181	12,130	3,092
Florida	$616.1 million vs. $965.1 million	$348.9 million	380,157	48,169	183,676	46,825
Georgia	$390.5 million vs. $594.1 million	$203.6 million	221,849	28,110	107,188	27,326
Hawaii	$42.3 million vs. $67.2 million	$ 24.8 million	27,039	3,426	13,064	3,330
Idaho	$45.9 million vs. $71.2 million	$ 25.2 million	27,491	3,483	13,283	3,386
Illinois	$551.5 million vs. $842.3 million	$290.8 million	316,822	40,144	153,075	39,024
Indiana	$169.2 million vs. $258.6 million	$ 89.4 million	97,390	12,340	47,055	11,996
Iowa	$64.4 million vs. $98 million	$ 33.5 million	36,521	4,627	17,645	4,498
Kansas	$98.1 million vs. $149.5 million	$ 51.4 million	56,054	7,103	27,083	6,904
Kentucky	$182.6 million vs. $278.8 million	$ 96.2 million	104,805	13,280	50,637	12,909

State	Title I funding in Bush '05 budget vs. amount promised	Funding Gap	Students who could have had smaller class sizes	Students who could have had prekindergarten	Students who could have had Kindergarten-Plus	Teachers who could become certified
Louisiana	$296.6 million vs. $461.1 million	$164.4 million	179,155	22,700	86,560	22,067
Maine	$54.2 million vs. $83.1 million	$ 28.9 million	31,536	3,996	15,237	3,884
Maryland	$171.2 million vs. $264.178 million	$ 92.9 million	101,260	12,831	48,925	12,472
Massachusetts	$294 million vs. $444.6 million	$150.6 million	164,064	20,788	79,269	20,208
Michigan	$449.2 million vs. $680.1 million	$230.9 million	251,573	31,876	121,549	30,987
Minnesota	$128.9 million vs. $193.5 million	$ 64.6 million	70,400	8,920	34,014	8,671
Mississippi	$176.7 million vs. $267.3 million	$ 90.5 million	98,607	12,494	47,643	12,146
Missouri	$220.2 million vs. $331.1 million	$110.8 million	120,790	15,305	58,361	14,878
Montana	$46.1 million vs. $70.9 million	$ 24.7 million	26,963	3,416	13,027	3,321
Nebraska	$53.1 million vs. $82.1 million	$ 28.9 million	31,499	3,991	15,219	3,880
Nevada	$63 million vs. $98.4 million	$ 35.3 million	38,551	4,885	18,626	4,748
New Hampshire	$34.5 million vs. $56.7 million	$ 22.2 million	24,203	3,067	11,694	2,981
New Jersey	$297.2 million vs. $447.7 million	$150.4 million	163,935	20,772	79,206	20,192
New Mexico	$119.9 million vs. $186.5 million	$ 66.6 million	72,622	9,202	35,088	8,945
New York	$1.3 billion vs. $2.1 billion	$765.7 million	834,117	105,689	403,010	102,740
North Carolina	$302.8 million vs. $463.1 million	$160.3 million	174,678	22,133	84,397	21,515
North Dakota	$35.3 million vs. $57.3 million	$ 22 million	23,971	3,037	11,582	2,953
Ohio	$455.3 million vs. $697.7 million	$242.4 million	264,062	33,459	127,584	32,525

State	Title I funding in Bush '05 budget vs. amount promised	Funding gap	Students who could have had smaller class sizes	Students who could have had pre-kindergarten	Students who could have had Kindergarten-Plus	Teachers who could become certified
Oklahoma	$141.8 million vs. $214.1 million	$ 72.2 million	78,687	9, 970	38,018	9,692
Oregon	$129.7 million vs. $199.6 million	$ 69.8 million	76,059	9,637	36,748	9,368
Pennsylvania	$494.5 million vs. $758.5 million	$263.9 million	287,538	36,433	138,926	35,417
Rhode Island	$49.9 million vs. $77.4 million	$ 27.4 million	29,867	3,784	14,431	3,679
South Carolina	$179.1 million vs. $274.8 million	$ 95.7 million	104,290	13,214	50,388	12,846
South Dakota	$37.6 million vs. $62.3 million	$ 24.6 million	26,870	3,405	12,983	3,310
Tennessee	$213.5 million vs. $327.1 million	$113.5 million	123,727	15,677	59,779	15,240
Texas	$1.17 billion vs. $1.79 billion	$619.5 million	674,916	85,517	326,091	83,131
Utah	$50.8 million vs. $78.3 million	$ 27.4 million	29,932	3,793	14,462	3,687
Vermont	$31.4 million vs. $50.8 million	$ 19.3 million	21,123	2,676	10,206	2,602
Virginia	$205.8 million vs. $310.1 million	$104.2 million	113,574	14,391	54,874	13,989
Washington	$174 million vs. $263.7 million	$ 89.6 million	97,644	12,372	47,177	12,027
West Va.	$106.8 million vs. $163.1 million	$ 56.2 million	61,327	7,771	29,631	7,554
Wisconsin	$164 million vs. $252.2 million	$ 88.2 million	96,179	12,187	46,469	11,847
Wyoming	$33.7 million vs. $54.2 million	$ 20.5 million	22,362	2,833	10,804	2,754

VITA

Michelle D. Collins was born August 19, 1975, in Centralia, Illinois. He graduated from Centralia High School in 1993. Next, she earned an Associate in Arts Degree from Kaskaskia College (1995), a bachelor's degree in Elementary Education from College of the Ozarks (1998), a master's degree in Education Administration from Southwest Baptist University (2003), a specialist's degree in Education Administration from Lindenwood University (2007), and a doctorate degree in Education from Lindenwood University (2009).

Michelle served as a classroom teacher in Forsyth, Missouri, for five years and as a principal for five years. Since then she has served as the principal for Branson Primary in Branson, Missouri.

Michelle is married to Donald R. Collins III and is the mother of two children, daughter Lillian Michelle Owings and son, Brody Raymond Collins.