THE RELATIONSHIP BETWEEN CLASS SIZE, SCHOOL SIZE, AND STUDENT ACHIEVEMENT IN PRIVATE, INDEPENDENT HIGH SCHOOLS

by

MARK JAMES JONES

(Under the Direction of C. Kenneth Tanner)

ABSTRACT

The purpose of this study was to determine any possible relationships between class size, school size, and student achievement among private, independent high school students. The sample of the study included 61 private, independent high schools in the southeast region of the United States. Bivariate and partial correlations were conducted on the initial data set and the data set with removed outliers. Control variables used in this study included the ethnicity of the students, the experience of the faculty, and the percentage of teachers with advanced education. The control variable used as a measure of socioeconomic status was the percentage of students receiving financial aid. The initial data set reported levels of significance among all of the dependent variables, but consisted of strong positive correlations. The data set with removed outliers revealed three levels of significance, consisting of negative correlations:

- Language Arts average class size with Combined SAT scores (r=-.3541, p=.032);
- Language Arts and mathematics average class size with Mathematics SAT scores (r=-.3397, p=.040); and
- Language Arts and mathematics average class size with Combined SAT scores (r=-.3275, p=.048).

A review of literature revealed that in order for positive gains in student achievement to occur, class sizes must be between 15 and 20 students and school sizes must be between 300 and 600. This study reported findings from a sample having a mean average class size in the core subjects of 15.57, and a mean school size of 348.46. These variables supported positive correlations with student achievement and class size, accounting for the three negligible, negative correlation groups.

INDEX WORDS: Student achievement, Private schools, Independent schools, Class size, School size

THE RELATIONSHIP BETWEEN CLASS SIZE, SCHOOL SIZE, AND STUDENT ACHIEVEMENT IN PRIVATE, INDEPENDENT HIGH SCHOOLS

by

MARK JAMES JONES

B.S., The United College of Gordon and Barrington, 1989

M.Ed., The University of Southern Missisippi, 1996

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATION

ATHENS, GEORGIA

2003

THE RELATIONSHIP BETWEEN CLASS SIZE, SCHOOL SIZE, AND STUDENT ACHIEVEMENT IN PRIVATE, INDEPENDENT HIGH SCHOOLS

by

MARK JAMES JONES

Major Professor: C. Kenneth Tanner

Committee: John Dayton
Sally J. Zepeda

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
December 2003

DEDICATION

I want to dedicate this work to the one true and living God, Creator of the universe, His Son, Jesus the Christ, and the Holy Spirit. Without the wisdom and strength from Him, I would never have finished this project.

I also want to dedicate this work to my friends at Providence Christian Academy (especially Jim Vaught, Chris Cleveland, Ken Hunsberger, and Sean Chapman), my Church family (especially Joe McReynolds, Dana Davis, and Rob Browne), my family, and most especially to my wife, Nadya, and our son, Elijah Mark. Without your prayers, words of encouragement, and love, I could not have finished.

Lastly, I dedicate this dissertation to my late father, James Arthur Jones, who passed suddenly into heaven on July 2, 1995. I wish you were here to see your son complete this work and graduate with this degree. I know, though, you are enjoying the view from where you are.

ACKNOWLEDGEMENTS

I want to first say thank you to my committee members: Dr. Ken Tanner, Dr. Sally Zepeda, and Dr. John Dayton. Dr. Tanner, you have been a great major professor to work with; you have been a friend. I am thankful to God that you are doing so well. Dr. Zepeda, you have been such an encourager to finish the marathon: from the first day of class (at the start of this program), advising me to work with Dr. Tanner, and through the writing stages of this work. Dr. Dayton, thank you for being to me who you are to everyone that meets you and gets to know you—a humble and meek professional. I am blessed to have the three of you as my committee members.

I want to thank Jim Vaught, Chris Cleveland, Sean Chapman, Ken Hunsberger, Jeanette Shamis, Teresa McHugh, Dezra Marcel, and many others at Providence Christian Academy for all of the encouragement, guidance, advice, and prayers to start and complete this program. I want to thank my church family, especially Joe McReynolds and Dana Davis, for the weekly challenges to persevere through this great process. I want to thank my mom, my brothers and their wives, and my wife's family for all of the support to stay strong and complete this season of my professional journey. I want to thank David Phillips for being a faithful friend to me for the last two plus years, and for being the person God used to help steer me in a clearer direction through this program.

Lastly, I want to especially thank my wife and son. You both have been my inspiration to start and complete this program. We are "the family" always. My love and my heart are yours.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION TO THE PROBLEM

The relationship between class size, school size, and academic performance has been a perplexing one for educators since the end of World War II (Lee & Smith, 1996; Ramirez, 1989). Studies have found that the physical environment, race, socioeconomics, overcrowding, and teaching methods are all variables that affect student achievement (Ayers, 1999; Cotton, 1997; Kiesling, 1967; Molnar, et al., 1999 & 2000; Wendling & Cohen, 1981). Other factors that affect student achievement are school size and class size (Finn, 1998; Gentry, 2000; Nye, 1995; Stevenson, 1996; Swift, 2000).

Private schools have sought to affect student learning positively, although the overall makeup of private schools has greatly changed over the last few decades (Cooper, 1988). Griffeth (1990) conducted a study on reasons why parents enrolled their students in private, independent schools and found that parents who enrolled their children in private, independent schools were satisfied for many reasons. Parents generally reported the schools had a strong academic emphasis, including college preparation, a strong curriculum, and capable and caring teachers. Private schools provide a strong academic program through smaller class sizes and smaller pupil-teacher ratios (Choy, 1997; Choy, 1998; Johnson & Schneider, 1985).

Significance of the Study

While there have been many research studies on the relationship between class size, school size, and student achievement in public schools, no studies on this topic relative to private schools have been conducted. Griffeth (1990) studied parents' perceptions of private schools; he studied their reasons for enrolling their children in private, independent schools. Griffeth

surveyed 612 parents in 20 private, independent schools throughout the Southeastern United States, and 312 parents responded to the survey. Griffeth asserted:

> While the global concept of a "better education" ranks at the top of the list, several specific attributes that support that notion are also in the top group of reasons. The high ratings of a strong academic program, small classes, greater expectations of students, individual attention, and appropriate curriculum give credence to the observation that the quality of the education is the primary concern of the parents of these students. (p. 94)
>
> In college preparatory independent schools, the primary reasons for enrollment are clearly academic. A strong curriculum, taught in small classes, with high expectations of students are among the leading attractions for parents.
>
> Personal attention is of great importance to those who choose the independent school. School leaders should see to it that students and parents are recognized as important individuals. The time and attention given personal as well as academic problems, concerns, and interests are desired by parents. (p. 113)

The present study sought to answer the following question: Are private, independent schools positively affecting student achievement? The study was designed to investigate the relationship between class size, school size, and academic achievement of private, independent high school students in the Southeastern United States.

Statement of the Problem

This study was guided by the following two questions. One, what is the relationship between class size and the academic achievement of private, independent high school students? Two, what is the relationship between school size and the academic achievement of private, independent high school students? The achievement of private, independent high school

students in the southeast region of the United States was compared to various factors of class size. Achievement was measured from scores on the Scholastic Aptitude Test (SAT). The factor of class size was determined from the average class size in core subjects. The factor of school size was determined from the high school total enrollment.

Purpose of the Study

The purpose of this study was to determine the relationship between class size, school size, and student achievement as measured by nationally normed test scores. High school student scores on the Scholastic Aptitude Test (SAT) as reported from individual private, independent schools in the southeast region of the United States were used as a predictor of student achievement.

Hypotheses

The hypotheses that guided the study were:

H_0: There is no statistically significant relationship between class size and the academic achievement of private, independent high school students as measured by the SAT.

H_0: There is no statistically significant relationship between school size and the academic achievement of private, independent high school students as measured by the SAT.

Definition of Terms

Academic Achievement – Knowledge attained or skills developed in school subjects by test scores. The SAT was used as a predictor of academic achievement. In this study, the average SAT scores were collected from the individual members of the Southern Association of Independent Schools (SAIS).

Core Subject – One of the following subjects: language arts, mathematics, science, or social studies.

Private, Independent School – A school that is either sectarian or non-sectarian, but is not a charter or privately funded public school. In this study, these are members of the Southern Association of Independent Schools (SAIS).

Limitations of the Study

The following were limitations for the study:

1. The sample included only private, independent schools.
2. The sample included only schools in the Southeastern United States.

Organization of the Study

This study is organized into five chapters. Chapter I includes the introduction to the study, the statement of the problem, the purpose of the study, the research hypotheses, the definition of terms, the significance of the study, and the limitations of the study.

Chapter II presents a review of the related literature including private schools, effective schools, as well as research on school size and class size. Chapter III provides a detailed description of the methodology of the study. An introduction, description of the population and the procedures and criteria used in selecting the sample, a description of the data collection procedures, the hypotheses, and the statistical techniques used to analyze the data are included in this chapter.

Chapter IV reports on the findings related to the tested hypotheses. Chapter V provides a summary of the research. Conclusions that can be supported by the findings, as well as recommendations for further research, are presented.

CHAPTER II

REVIEW OF RELATED LITERATURE

Private Schools

Private education, both sectarian and nonsectarian, has provided learning opportunities for children in the United States since the colonial time period. Public, government-sponsored education did not start to be commonplace until the late 1800s. Only after the Civil War did the concept of the government being responsible for providing a free education for every child gain popular acceptance (Kraushaar, 1976). The education of children as an extension of church and family gradually changed into a function of government and society (Kraushaar, 1976).

Confrontation between the private and public sectors has existed since the colonial time period. Colonies in New England believed education was the function of government while most colonists outside of New England felt education was the responsibility of the church (Edwards & Richey, 1963). This confrontation has continued over other issues such as race, anti-parochialism, and the separation of church and state. Public education is still influenced by Protestant values, although it has diminished. Both public and private education is still desperately needed for the youth of America to become the leaders of peace and mutual respect for the world (Fuller, 1971; Lines, 1986; Randall, 1994).

Beadie and Tolley (2002), Seybolt (1971), Sizer (1964), and Tolley (2002a) provide very important definitions which are a foundation for examining the history of private education in America. Terms like "venture school," "dame school," "church school," "town school," "Latin grammar school," "English grammar school," and "academy," are often used interchangeably in current literature, but it is important to know the original meanings of these terms.

"Venture school" is an institution supported solely from tuition. Venture schools in the 1700s and 1800s were forced to be entrepreneurial because of the local markets. Today these are known solely as "private schools."

"Dame school" was a specific type of venture school, where women, mostly in their own homes, instructed students. Dame schools taught students a basic literacy that enabled them to read Bible passages, to perform simple mathematical computations, and to acquire training in sewing. These schools evolved into girls' schools, girls' academies, and into mostly coeducational academies.

"Church schools" provided a basic education in religion, reading, writing, and mathematics. These schools were sponsored by religious groups, and included church-sponsored grammar schools, parson's schools, charity schools, and Sunday schools.

"Town schools" appeared in northern and southern localities during the 1700s. Town schools were governed by an elected group and received some financial compensation from local and state funds. Like church schools, such institutions provided a basic education in reading, writing, and mathematics. These are the local, public schools of today.

"Latin grammar schools" provided instruction exclusively in the classics, as well as many other subjects, including English composition and literature, mathematics, philosophy, Greek, and science. Boys were instructed through reading Latin texts for six to seven years. "English grammar schools" evolved from a desire for the common man to receive instruction in basic subjects such as reading, writing, spelling, and mathematics. "'Academy' is defined as an institution providing a relatively advanced form of schooling that was legally incorporated to ensure financial support beyond that available through tuition alone" (Tolley, 2002a, p. 21).

During colonial times, the future of children, especially their educational training, was of great concern to the settlers. It did not matter whether the settlers were Anglicans in Virginia and in the Carolinas, Catholics in Maryland, Puritans in New England, Dutch Calvinists in New Netherlands, or Quakers, Swedish and German Lutherans, Moravians, Dunkards and Mennonites in Pennsylvania. The new settlers were determined that their children would be brought up "in the piety and civility they had known in their homeland" (Kraushaar, 1976, p. 7).

Kraushaar (1976) reported several distinguishing characteristics of the colonial American schools that came as a result of the settlers' great concern for their children's educational training. The schools were to be an extension of the home, the church, and the apprenticeship system. The schools were to extend the religious education by having children read the Bible, the catechism, and other religious literature. Lastly, the schools improvised by taking advantage of whatever resources they had on hand, such as books, talents, and funds to pay the schoolmasters.

Seybolt (1971) found there to be great significance for private schools in colonial America. The private schoolmasters sought to have modern curriculum and methods of instruction. Masters in "town schools" possessed the freedom to use creative curriculum and methods of instruction. Private schools arranged their hours of instruction around the schedules of students. Private schools were open to all types of students who could afford the tuition. Adult students were given the opportunity to learn basic skills. Students were allowed to pursue all subjects they desired. Town "grammar schools" and colleges did not allow for this type of choice. There was a lack of supervision by a central or public authority in private schools, which was viewed as an advantage. Frequently parents were invited to examinations to observe their

child's progress. Curriculum in private schools was designed to both meet the needs of individual students as well as to prepare students for the entrance requirements of colleges.

As private schools were commercial ventures, they were forced to meet the changing demands of their clientele. While these demands meant constantly improving instructional techniques and methods in private schools, town schools continued in their conservative and traditional curricula and methods of instruction. Private schools were "pioneers in the making of the liberal secondary curriculum of the present day" as well as being the "first to recognize, and first to respond to the educational needs of the people" (Seynolt, 1971, p. 102).

In the mid-18th Century, the Moravian people started what is today equivalent to boarding schools. Moravian people began educating people who had adopted the same view of Christianity, but Moravian schools were expanded to include non-Moravian people. The Moravian people were a vast group on the frontier plane, who sought to educate the Native American children along with European children. In the 18th Century, educating Native American children was a radical experiment. Like boarding schools of today, Moravian schools had a common purpose: to glorify Christ in all things. Moravian communities, both in whole and in part, were unified by this common purpose (Schutt, 2002).

After the Revolutionary War, Moravian people were in greater need of funds, and there was a significantly higher demand for boarding education. These two facts led Moravian people to expand their *Anstalts* (boarding schools) to include non-Moravians. By the start of the 19th Century, Moravian education had mainstreamed itself with other academies. Moravian academies had a diverse offering of courses. Languages studied included German, English, and French, as well as Latin and Greek. Mathematics, reading, writing, drawing, and music were offered to both males and females. Females were also offered courses that included botany,

geography, astronomy, natural philosophy, bookkeeping, painting, knitting, and embroidery. Religious and Christian doctrinal courses were also offered. As the 19th Century continued, Moravian schools started promoting a generalized nonsectarian, Protestant belief system. *Anstalts* sought, as other academies of that era did, to educate children from more prestigious and prosperous white families (Schutt, 2002).

In the late 18th Century, academies had begun to educate both males and females. Although there were differences in the subjects offered between the two sexes, most academies offered the same subjects: English, geography, and arithmetic were standard. Latin and Greek were more commonplace in boys' academies. By the beginning of the 19th Century, though, these courses were frequently offered at both academies. Many boys' academies offered courses such as navigation and surveying, while girls' academies offered courses such as needlework. These courses could lead to wage earning professions. Along with the basic subjects, other subjects such as music and drawing, could lead to teaching jobs (Nash, 2002). In both male and female academies, students "were to conquer the summit of knowledge. The purposes of education, those of teaching mental discipline and powers of discernment, were goals that educators had for girls as well as boys" (p. 80).

Catholic parochial schools evolved and grew in America from the 1700s to the present for two main reasons: religious conflict, and conflict stemming from culture and language. Parish schools desired to educate people into a specific value system, which at its core was the faith and teaching of the Catholic Church. Thus, religious conflict arose with Protestants. The schools began in mostly poor areas of major cities and other communities. In the 1700s, poor people could not read nor write. In the 1800s, many Irish Catholic immigrants struggled with the English language and the developing American culture. There were five motivating reasons for

these academies: to provide religious training, to save souls, to retain youth in the Church, to educate a Catholic middle class, and to raise funds for benevolent works (Tolley, 2002b).

Coleman and Hoffer (1987) stated two "orientations to schooling." The first orientation to schooling "sees schools as society's instrument for releasing a child from the blinders imposed by accident of birth into this family or that family" (p. 3). The second orientation "sees a school as an extension of the family, reinforcing the family's values" (p. 3). The first orientation has been the foundation for public schools, while the second orientation has been the foundation for private schools.

In November of 1922, the public school orientation tried to eradicate the private school orientation. The State of Oregon passed the Compulsory Education Act. This Act required children between the ages of 8 and 16 to attend public school; failure to do so would be declared a misdemeanor. This relatively unique law in America was greatly influenced by efforts of the Ku Klux Klan and the Oregon Scottish Rite Masons (Ravitch, 1992). The Society of Sisters, an Oregon corporation organized in 1880, dedicated in part to private education, challenged that the law:

> …conflicts with the right of parents to choose schools where their children will receive appropriate mental and religious training, the right of the child to influence the parents' choice of a school, the right of schools and teachers therein to engage in a useful business or profession, and is accordingly repugnant to the Constitution and void. (*Pierce* v. *Society of Sisters of the Holy Names of Jesus and Mary*, 268 U.S. 510, 1925, p. 2)

The United States Supreme Court ruled on June 1, 1925 against the state of Oregon and in favor of parents in this case, stating the law violated the Due Process Clause of the Fourteenth Amendment.

> …the Act of 1922 unreasonably interferes with the liberty of parents and guardians to direct the upbringing and education of children under their control. As often heretofore pointed out, rights guaranteed by the Constitution may not be abridged by legislation which has no reasonable relation to some purpose within the competency of the state. The fundamental theory of liberty upon which all governments in this Union repose excludes an general power of the state to standardize its children by forcing them to accept instruction from public teachers only. (*Pierce* v. *Society of Sisters of the Holy Names of Jesus and Mary*, 268 U.S. 510, 1925, p. 3)

The Court did indicate two things, though. First, the state does have the power to require that children attend school. Second, the state has the power to regulate schools to ensure that they are, in fact, doing a good job. By indicating these two things, the Court was supporting the interest the state had in socializing the youth to citizenship, but denying the state having the sole authority in doing this (Ravitch, 1992).

Pierce v. *Society of Sisters* has shaped the modern day difference in public and private education. *Pierce* v. *Society of Sisters* upheld the free choice parents have in the United States to choose where their students will be educated. *Pierce* v. *Society of Sisters* also instilled the great need in our country for the education of all children. From that time to the present, private education has seen other transitions.

In the mid-1900s, there was a great immigration of German people to the United States. This group of new people resulted in the development of numerous rural communities in parts of Ohio, Illinois, Kansas, Nebraska, Wisconsin, and other Midwestern states looking and sounding German. Cultural, linguistic, and religious differences were resolved in various ways. In some communities, immigrant children participated in public schools where the ideals of the school

community were unknown to the immigrant parents. In other communities, Lutheran schools were established as an educational alternative to instruct the immigrant children with the religious values of their parents, as well as the "foreign" academic rigors. And in other communities, the public school education matched the expectations of the immigrant parents because of the teaching of German language and culture that was commonplace (Coleman & Hoffer, 1987).

Following World War II, more changes occurred in the American educational system. In 1954, *Brown* v. *Board of Education* brought into focus the conflict of races in our nation, especially the segregation of races in educational settings. Throughout the civil rights movement of the 1960s and the continual integration of schools into the 1970s, many white families, predominantly in the south, created segregationist academies (Beadie & Tolley, 2002; Palmer, 1974).

In the late 1960s, conflict and unrest were in every part of life in the United States. Generations had differing opinions regarding world events of this time, such as: the shootings of Martin Luther Kind, Jr. and Robert Kennedy, the Vietnam conflict, the social revolution, the landing on the moon, etc. Blackmer (1970) reported seven areas of student unrest in private schools during this time period: lack of student influence on the shaping of school rules and policies; poor communication between students and faculty; school life too structured; too little free time; overly strict regulations of dress codes and hair styles; too much pressure for top grades; and boredom. Baird (1977) summarized student unrest in private schools of this time with the following statement: “Even when the content of courses bears on social issues, it usually neglects discussions of ways to translate classroom knowledge into community and social action” (p. 135). This conflict and unrest led many groups of parents and teachers to establish

private schools that were different from both public schools and “elite” private schools (Coleman & Hoffer, 1987).

Post World War II also brought an emergence of more independent, private schools throughout America. Kane (1992) reported that independent schools were:

> highly traditional, others are progressive in outlook; some are boarding schools, some are day schools, some a combination of the two; some are single-sex, some coeducational; some are highly academic and selective, others are "second chance" schools for students who failed elsewhere; some are free or inexpensive, some have sliding scales of tuition depending on the income of applying families, some have extensive scholarship programs, and some are prohibitively costly, accessible only to the affluent; some have the stability of generations of graduates, others have graduated only a few classes; some have impressive financial endowments and extensive resources in buildings and grounds, others have recourse only to income from tuition and annual fund raising and operate in modest or even makeshift spaces (pp. 6-7).

In spite of the variation in organization, philosophy, and style, all independent schools shared the following six characteristics: self-governance; self-support; self-defined curriculum; self-selected students; self-selected faculty; and small size (Kane, 1992).

Since the 1970s, there has been a resurgence of "Church schools" in America, along with the establishment of numerous independent, evangelical Christian schools (Coleman & Hoffer, 1987). These independent, evangelical Christian schools are mostly parented established and governed by parent-selected boards. These schools are growing in great numbers throughout the nation and world (Association of Christian Schools International, 2003; Coleman & Hoffer, 1987; National Center for Educational Statistics, 1997). The National Center for Educational

Statistics (2002) reported that in 1965 there were 17,849 private schools, in 1980 there were 20,764 private schools, and in 2001 there were 27,223 private schools. The National Center for Educational Statistics (2002) reported that of the 27,223 private schools in 1995, 8,102 were Catholic, 13,232 were of other religious affiliation, and 5,889 were non-sectarian. According to the Association of Christian Schools International (ACSI) (2003), there are "5,544 Christian schools in 101 countries impacting the lives of 1,178,271 students." (ACSI, 2003, p. 1)

This review of literature on the history of private schools is in no way exhaustive, but sought to provide a sketch of the evolution of private education, along with glimpses of public education. This sketch revealed four important pieces of information. First, there has been an intertwining of private and public education from before the beginning of the United States to the present. Second, there has been a positive progression in the education of both male and female, of people from all levels of economic status, and of all types of race and ethnicity. Third, the inalienable rights of American people, including where, why, and how they and their children can be educated, have not wavered. And, fourth, because of the values, belief systems, community structures, and court rulings, there are currently many types of private schools.

Effective Schools

Fueled by James Coleman's *On Equality of Educational Opportunity* (1966), Edmonds and other researchers sought to prove that a child's family background and the school's socioeconomic makeup were not the best predictors of academic success (Edmonds, 1979; Levine & Lezotte, 1990; Levine, 1992; Myers, 1996; Reynolds, Creemers, Nesselrodt, Schaffer, Stringfield, & Teddlie, 1994). Edmonds sought to disprove Coleman's report, and in so doing, started the "Effective Schools Movement" that is still going on today (Chrispeels, 2002; Levine, Cooper, & Hilliard, 2000; March & Peters, 2002; Myers, 1996; Taylor, 2002). Edmonds (1979)

found five correlates of effective schools: (a) safe and orderly environment; (b) instructional leadership; (c) climate of high expectations for success; (d) frequent monitoring of student progress; and (e) pupil acquisition of basic skills.

Taylor, Valentine, and Jones (1985) characterized effective schools in three different categories: effective principals, effective classroom, and effective teachers. Effective principals were found to "promote student cognitive growth, support improvement in teaching and learning, and provide a favorable climate for learning" (pp. 2-3). Effective classrooms were characterized in the following three areas: positive student behaviors and high student expectations; strong student cognitive processing; and a positive climate and atmosphere. Effective teachers had strong classroom management skills and an ability to engage students in learning on a consistent basis (Taylor, Valentine, & Jones, 1985).

Fried (1982) conducted research in rural, New Hampshire schools and identified several characteristics and practices inherent in effective schools. These schools were characterized by: an attractive, orderly, safe and serious school climate; a consensus on goals and a clearly stated school mission; a consensus on teacher expectations with assigned priorities; strong leadership, focused on instruction, by the principal; and high expectations for learning that are clearly communicated to students. The school day is spent on activities that demonstrate learning occurring. There is also an effective evaluation system in place, which includes student progress, the faculty and staff, and the school, as well as, a supportive home-school relationship.

Robinson (1985) prepared a guide for school improvement by reviewing a vast amount of research conducted on effective and ineffective schools. Robinson found three common fundamental factors in effective schools:

- a belief in and commitment to student learning,

- the professional staff is empowered to lead, and
- very clear and specific action plans.

Robinson (1985) found specific elements inherent in four areas of effective schools where student achievement went beyond expected levels:

- Principals were characterized as being well organized, communicating high expectations for students and staff, and visit classrooms frequently.
- Teachers were characterized as being highly qualified communicators, concerned in growing professionally, and spending more time in actively teaching.
- Schools had an orderly climate; clear, firm, and consistent discipline; and parental involvement in student learning.
- School programs were in place to assess and evaluate faculty, staff, and programs, and they were goal-oriented with immediate feedback.

Townsend (1994) collected data from a survey of the principal, three teachers, three parents, and three students distributed in 81 secondary schools in Victoria, Australia, and in 64 schools from 7 states in the United States. There were 1000 total respondents—427 from Australians and 573 from Americans. The American respondents, mainly principals and teachers, stated higher levels of concern with the output of education, while the Australian respondents reported more concern with the components involved in the process of shaping education. Both groups identified similar conditions that lead to school effectiveness. The conditions were: 1) good leadership and staff; 2) sound policies; and 3) a safe and supportive environment in which staff, parents, and teachers are encouraged to work as a team toward common goals.

Thomas and Smees (2000) conducted a study of school effectiveness from six extensive and detailed regional data sets from two sections of Lancashire, London, Jersey, Scotland, the Netherlands, and the whole of England. Thomas and Smees had three objectives, which included to: (a) study the optimal models for measuring secondary school effectiveness across a range of outcomes in the United Kingdom and abroad; (b) examine the extent of the regional differences in school effectiveness results; and (c) find the underlying dimensions of school effectiveness across different regional and policy contexts. As a result, Thomas and Smees found that at least four dimensions of secondary school effectiveness can be defined in terms of: 1) different outcomes, 2) different student groups, 3) different pupil cohorts, and 4) different curriculum stages. The study also found effectiveness at different levels of the education system and interactions between levels need to continually be monitored to inform policy decisions and map out the boundaries of school effectiveness.

Taylor, Pearson, Clark, and Walpole (2000) conducted research in fourteen schools in Virginia, Minnesota, Colorado and California. The research examined school and teacher factors that contributed to primary grade students' reading growth and reading achievement. It investigated both school and classroom variables in effective schools compared to moderately and less effective schools. It also looked at the classroom practices of experienced teachers compared to less-experienced teachers. The schools that participated ranged from 28% to 92% of its students qualifying for subsidized lunch.

The research conducted in schools consisted of the following subjects: two teachers in kindergarten, first grade, second grade, and third grade; and each teacher was assigned two low and average readers. Teachers were observed for an hour of reading five times between December and April. They completed two weekly time logs of instructional activities in

reading/language arts and a questionnaire of school and classroom practices related to reading. A subset of the teachers was interviewed. Principals participated by asking teachers to participate that they judged to be average or better, completing a questionnaire on school reading practices, and by being interviewed. A case study was written for each school according to a common template.

School effectiveness was significantly related to strong links with parents, systematic assessment of pupil progress, and strong building communication and collaboration. There were four schools found to be most effective in this study. In these four schools, teachers stated that reading was a priority in their building as a contributor to their success. Teachers in the most effective schools spent 134 minutes per day on reading instruction, while the moderately and least effective schools only averaged 113 minutes per day on reading instruction.

Lezotte and Pepperl (1999) looked at effective schools as a process of constant improvement, and they stated this process ensures the likelihood for more learning for all. Lezotte and Pepperl believe this process of constant improvement has a foundation of 11 basic beliefs.

1. All children can learn and come to school motivated to do so.
2. The individual school controls enough variables to assure that all children do learn.
3. A school's stakeholders are the most qualified people to implement the needed changes.
4. You and your colleagues are already doing the best you know to do, given the conditions in which you find yourselves.
5. School by school change is the best hope for reforming the schools.

6. There are only two kinds of schools in the United States--improving schools and declining schools.
7. Every school can improve.
8. The needed capacity to improve your school resides in your school right now.
9. All of the adults in the school are important.
10. Change is a process, not an event.
11. Existing people are the best change agents. (pp. 19-32)

With these basic beliefs as a foundation of the ongoing school improvement process, Lezotte and Pepperl noted four characteristics that were inherent in schools where positive change occurs. There was trust and trustworthiness, empowerment, a sense of stewardship, and finally, collaboration based on civility among the stakeholders. Given these core basic beliefs and the inherent characteristics of positively changing schools as a foundation, Lezotte and Pepperl found the school improvement process involves the following components: "preparation; focus; diagnosis and interpreting data; plan development; and implementation, monitoring, evaluation, and renewal" (p. 74).

Robinson (1985) reported that it is imperative to study the research of effective schools as a map to school improvement, and Robinson believed that Edmonds' correlates were the goal for reaching school effectiveness. The journey to become effective is found in continual school improvement, and Robinson found the following 13 effects of research on school improvement that make the journey less difficult.

1. Restoring confidence and raising expectations
2. Providing research base for assessing and changing learning climates
3. Focusing attention on the individual school as the unit for effecting change

4. Emphasizing leadership role of the school principal
5. Focusing efforts on goals-and-results oriented instruction
6. Concentrating attention on instructional behavior and classroom management of teachers
7. Stimulating development and revision of student assessment and testing
8. Promoting cooperative school, parent, and community efforts
9. Altering the evaluation of teacher and administrator performance
10. Influencing compensation programs for teachers and administrators
11. Targeting professional development programs to specific skills needed
12. Revitalizing preparation programs for teachers and administrators
13. Providing direction for further research and experimentation. (p. 26)

Research started by Ron Edmonds almost 40 years ago, and subsequent research by an almost infinite amount of others, has provided extremely practical elements that are inherent in schools considered to be effective. Table 1 summarizes some of the major findings from the literature on "effective schools."

Table 1. Findings from the literature on "effective schools"

Findings	Source
Five Correlates of Effective Schools 1. Safe and orderly environment 2. Strong instructional leadership 3. Climate of high expectations for success 4. Frequent monitoring of student progress 5. Pupil acquisition of basic skills	Edmonds (1979)
Effective schools were characterized by effective principals, effective classrooms, and effective teachers.	Taylor, Valentine, and Jones (1985)

Table 1 (continued)

Research in rural, New Hampshire schools found five characteristics and practices inherent in effective schools. 1. Attractive, orderly, safe, and serious school climate. 2. Consensus on goals and a clearly stated school mission. 3. Consensus on teacher expectations with assigned priorities. 4. Strong leadership that is focused on instruction. 5. High expectations for learning that are clearly communicated to students.	Fried (1982)
Research conducted on effective and ineffective schools found: • Three common fundamental factors in effective schools 1. Belief and commitment to student learning. 2. Sense of control among the professional staff. 3. Clear and specific action plans. • Thirteen effects of school improvement	Robinson (1985)
Research in the United States stated higher levels of concern with the output of education, such as standardized testing. Research in Australia reported more concern with the components involved in the process of shaping education, which included a balanced curriculum, an emphasis on students' personal and social development.	Townsend (1994)
Research in England and the Netherlands found that dimensions of secondary school effectiveness can be defined in terms of different outcomes, student groups, pupil cohorts, and curriculum stages.	Thomas and Smees (2000)
School research in Virginia, Minnesota, Colorado, and California found that school effectiveness was significantly related to strong links with parents, systematic assessment of pupil progress, and strong building communication and collaboration.	Taylor, Pearson, Clark, and Walpole (2000)

Table 1 (continued)

• An effective school is a process of constant improvement based on eleven basic beliefs. • There are four inherent characteristics in schools where positive change takes place. 1. Trust and trustworthiness 2. Empowerment 3. A sense of stewardship 4. Collaboration based on civility among the stakeholders • School improvement is based on five core components. 1. Preparation 2. Focus 3. Diagnosis and interpreting data 4. Plan development 5. Implementation, monitoring, evaluation, and renewal	Lezotte and Pepperl (1999)

School Size

School size has been a topic of debate since the 1950s due, in part, to research by James B. Conant. Conant (1959) stated that if schools did not have an enrollment of larger than 400 students, they would not be able to offer a comprehensive and rigorous academic program. This program was to include courses such as Calculus, Physics, and French 4. Comprehensive high schools of 400 students in the early-1990s would be considered small (Fowler, 1992). Along with the evolution of substantially larger school populations, there has been a decline in student achievement (Fowler, 1992; Klonsky, 1995; Raywid, 1996). Are larger schools that offer more comprehensive and rigorous academic programs effective?

Barker (1986) asserted that the characteristics and practices of effective schools are inherent in small schools, and he stated that in small schools:

> Students are at the center of the school. Discipline is usually not a serious problem, thereby, resulting in an increase in time spent learning. Teachers still have a sense of

> control over what and how they teach. A minimum of bureaucracy allows for more flexibility in decision making. Low pupil-teacher ratios allow for more individualized instruction and more attention given to students. Relationships between students, teachers, administrators, and school board members tend to be closer. Parental and community involvement tends to be stronger than in larger schools. (p. 3)

Irmsher (1997) suggested while larger schools may offer more comprehensive and specialized programs to students, many students feel left out of the school's culture. Large schools function similar to bureaucracies, while small schools function like communities. Howley (1994) concluded from his research in West Virginia that the ideal number of students in a school is dependent upon the community the school serves. On the average, more affluent students seem to thrive better in larger schools, while impoverished students seem to achieve higher in smaller schools (Howley, 1994). Viadero (2001) summarized that in smaller schools, students come to class more often, drop out of school less, earn higher grades, participate more often in all types of extracurricular activities, feel safer, and demonstrate fewer behavior problems.

Rogers (1992) found that in small schools students are known, students are engaged daily, there is a caring environment that lays the foundation for learning, there is a sense of belonging, and the environment is one of a community. Lee and Loeb (2000) explored the influence of school size on students and teachers in Chicago's inner city schools. The results from approximately 5,000 teachers and 23,000 sixth and eighth grade students showed that in small schools, teachers had more positive attitudes and students experienced better quality learning environments.

Ramirez (1990) examined 49 Nevada comprehensive high schools, ranging from in size from 22 to 2,493 students. Ramirez examined the schools' student achievement data, student-teacher ratio, media resources, staff certification, and course offerings. Ramirez found that large school size was associated with higher student-teacher ratio, higher student-per-guidance personnel ratio, and a greater amount of school media resources. Larger school size, though, was not clearly related to higher student achievement or outcomes.

Muir (2001) proposed that the movement toward smaller schools is not just a fad. He cautions, though, that there are many issues about the effects of school size, which need to be addressed. Muir believed that the following four issues are of vital importance: the effect of school size on student achievement; the importance of networking between students, parents, and teachers; cost differences in school sizes; and the long-term social benefits of smaller schools for students.

La Sage and Ye (2000) collected data on 251,049 students from kindergarten through 12th grade in 291 elementary, middle, and high schools in an urban Texas district. Reading and mathematics data were examined by school level. The gender of students was examined in order to control for issues of school size and equity, as well as alternatives such as school-within-a-school plans. Correlations between academic achievement and school size were then determined. Negative effects of school size on females were found in reading and mathematics at elementary, middle, and high school levels. Negative effects of school size on males were only found at the high school level. It was determined, though, that smaller school sizes and smaller class sizes helped educators to understand and to work more effectively with their students.

Howley and Bickel (2000) analyzed 29 different studies that dealt with school size, poverty, and student achievement. The collective group of studies examined data from various grade levels in Georgia, Montana, Ohio, and Texas. Howley and Bickel examined relationships between school-level performance on tests, school size, and community poverty level. A strong correlation was found between school size and student achievement. As schools become larger, the negative effects of poverty on student achievement increased. In all four states, the correlation between poverty and low achievement was as much as 10 times stronger in larger schools than in smaller ones. The benefits of smaller schools seem particularly significant at the middle grade level. Significant was that minority students were often enrolled in schools too big to achieve top performance due to poverty levels in their communities.

Johnson, Howley, and Howley (2002) looked at the relationship between size and achievement in Arkansas schools and districts that served students from different socioeconomic backgrounds. Varying results were found after collecting data from all schools and districts in Arkansas that included school district size, school size (enrollment per grade level being analyzed), standardized test scores, SES (proportion of students receiving subsidized meals), and proportion of African American students. Johnson et al. found that the negative influence of size was quite weak in affluent settings and comparatively strong in impoverished areas.

Huang and Howley (1993) studied 13,553 students in Grades 4, 6, and 8 in Alaska who had attended the same school since first grade and who had participated in the fall 1989 Alaska Statewide Student Testing Program. The disadvantaged status of students was rated on a scale of 0-4, with 1 point each given for minority ethnic status, migrant education status, Chapter 1 status, and handicapped status. Data were analyzed with multiple regression analysis, controlling for school resources, school climate, and student academic background. The overall

average achievement score was found to be lower for students in small schools than in larger schools. The negative effect of disadvantaged background on student achievement was significantly less in small schools than in medium or large schools. The interaction of disadvantaged status and school size explains an additional, significant amount of variance in student achievement.

Klonsky (2002) examined school size and its effects on school safety. He found that small schools are better able to combat school violence based on three pillars: (a) better visibility of students; (b) a more professional community of teachers; and (c) a clear sense of purpose. There is better visibility of students due to teachers being primarily responsible for approximately 14 students. There is a more professional community of teachers because there are more opportunities for teacher interaction and professional development. There is a clear sense of purpose emanating from a greater focus on character and academic development.

Cotton (1996) reviewed 49 studies and evaluations on school size, school climate, and student performance. Cotton stated that even though Conant made a case for larger and more comprehensive schools, they are not meeting the comprehensive educational needs of children. Smaller schools were found to be more effective than larger schools in the following areas: 1) quality of the curriculum, 2) academic achievement, 3) student attitudes, 4) social behavior, 5) participation in extracurricular activities, 6) higher attendance rate, 7) lower dropout rate, 8) stronger sense of belonging, 9) higher self-concept, 10) more secure interpersonal relationships, 11) higher staff morale, and 12) stronger student perceptions of teachers. Cotton also found that schools-within-schools contain many of the benefits of smaller schools.

Is there an "ideal" or "optimal" size for schools? Meier (1996) stated the optimal number of students in schools should range between 300 and 400. Meier supported why small schools of this size work best with eight pillars.

1. There is more effective communication going on within the staff.
2. There is greater mutual respect between students and teacher because of the closer personal relationships.
3. There is less bureaucracy that leads to individualizing things in an easier manner.
4. There is greater safety within the school because strangers are noticed more rapidly.
5. Teachers can deal with rudeness or frustration more quickly.
6. There are more alliances formed between teachers and parents because parents can visibly see the care and concern for their children.
7. There is greater accountability among stakeholders.
8. There is a stronger sense of belonging in the smaller school community.

Lee and Smith (1997) collected data on 9,812 students in 789 public, Catholic, and elite private high schools as a national representation. The study focused on students in the 8th, 10th, and 12th grades, and not on the high schools themselves. "Optimal was defined in terms of students' learning over the course of high school in reading comprehension and mathematics" (p. 216). Lee and Smith concluded that high schools should be smaller, but they can be too small. Lee and Smith stated that the ideal high school enrollment size is between 600 and 900 students. Finally, the study concluded that size is more important in certain types of schools, especially ones that serve disadvantaged students.

School size has been important for over half of a century, and will continue to be of great importance. According to the literature, positive student behavior, higher attendance rates,

positive school experiences, and better quality relationships between all stakeholders are examples of the benefits of smaller school size. The research was mixed with regard to the effects school size had on student achievement. Optimal school size figures varied; some authors reported 300-400 students as ideal (Irmsher, 1997; Meier, 1996), while others reported 600 to 900 students (Barker, 1986; Glass, 1982; Lee & Smith, 1997). Authors did agree that schools can both be too small and too large. The aim of reducing the number of students in a school population was to more effectively meet the needs of those students.

Table 2 summarizes some of the findings from the literature on school size.

Table 2. Findings from the literature on "school size"

Findings	Source
• Students in smaller schools had the same or higher academic achievement as students in larger schools. • Smaller schools benefited minority and lower economic status students. • Smaller schools positively affected students' attitudes and behavior.	Cotton (1997)
There was a negative relationship between elementary school size and mathematics and verbal ability, when controlling for socioeconomic status.	Keisling (1967)
School size was significantly negatively related to third grade mathematics and reading achievement, when controlling for socioeconomic status.	Wendling and Cohen (1981)
Characteristics and practices of "effective schools" are inherent in small schools.	Barker (1986); Rogers (1992)
• Many students feel left out of the large school culture. • Large schools function similar to bureaucracies, while small school function like communities.	Irmsher (1997)

Table 2 (continued)

• The ideal size of a school is dependent on the community it serves. • More affluent students seem to thrive in larger schools, while impoverished students seem to achieve higher in smaller schools.	Howley (1994)
Students in smaller schools have better attendance rates, lower dropout rates, earn higher grades, feel safer, fewer discipline problems, and participate more often in extracurricular activities.	Viadero (2001)
In small schools teachers had more positive attitudes and students experienced better learning.	Lee and Loeb (2000)
Larger school size was associated with a higher student-teacher ratio, higher student-per-guidance personnel ratio, greater amount of school media resources, but it was not clearly related to higher student achievement or outcomes.	Ramirez (1990)
Four issues need to be addressed concerning the effects of school size: 1. The effect of school size on student achievement. 2. The importance of networking between students, parents, and teachers. 3. Cost differences in school sizes. 4. The long-term social benefits for students.	Muir (2001)
Smaller school sizes and smaller class sizes help educators understand and work more effectively with students.	La Sage and Ye (2000)
• The correlation between poverty and low achievement was as much as 10 times stronger in large schools than in smaller ones. • The benefits of smaller schools seem particularly significant at the middle grade level. • Minority students were often enrolled in schools that are too big to achieve top performance due to community poverty levels.	Howley and Bickel (2000)

Table 2 (continued)

The negative influence of size was quite weak in affluent settings and comparatively strong in impoverished areas.	Johnson, Howley, and Howley (2002)
The negative effect of disadvantaged background on student achievement was significantly less in small schools than in medium or larger schools.	Huang and Howley (1993)
Small schools are better able to combat school violence based on three pillars.	Klonsky (2002)
Smaller schools are more effective than larger schools in twelve areas.	Cotton (1996)
"Ideal" or "optimal" size of a school is 300 to 400 students.	Irmsher, 1997; Meier, 1996
• "Ideal" size of a high school is 600 to 900 students. • Schools can become too small. • There should be no fewer than 600 students.	Barker, 1986; Glass, 1982; Lee & Smith, 1997

Class Size

Achilles, Finn, and Pate-Bain (2002) stated "class size involves organizing students for the delivery of instruction, whereas pupil-teacher ratio is an administrative statistic which helps account for the distribution of resources" (p. 24). The terms *class size* and *pupil-teacher (student-teacher) ratio* are not the same thing and must be differentiated (Ehrenberg, Brewer, Gamoran, & Willms, 2001). Otherwise, statistical data from class size studies can be interpreted incorrectly. Class size is the actual number of students in a particular class. The statistic that is often listed currently is the "average class size." This statistic is calculated by dividing the total number of students taking a specific subject by the number of classes offering the specific subject. In contrast, the pupil-teacher ratio is calculated by dividing the total number of students in a school by the total number of teachers (Ehrenberg, Brewer, Gamoran, & Willms, 2001).

Achilles and Sharp (1998) found the average difference between pupil-teacher ratio and class size in U.S. schools is 10. This means that in a school where the pupil-teacher ratio is 15-to-1, the majority of teachers will have an average of 25 students per class. Favorable pupil-teacher ratios may take place in schools and districts where there are many specialized educational professionals providing remedial services to students who struggle on standardized tests. Changes in pupil-teacher ratios do not influence overall student performance, whereas teachers servicing fewer numbers of students have proven to positively influence student performance (Haenn, 2002; Hunn-Sannito, Hunn-Tosi, & Tessling, 2001; Mitchell, 2000; Woessmann & West, 2002).

Why do smaller schools and smaller class sizes seem to bring more success in student achievement? Biddle and Berliner (2002) proposed two basic theories that answer this question. One theory focuses on the teacher, specifically the special relationships formed during the interaction between the teacher and students. A second theory focuses on the classroom environment and student conduct.

The first theory suggests that teachers feel more satisfaction in smaller classes. Teachers are able to help younger students learn to cope well with their new social environment by interacting positively with other people. Students learning to positively interact with each other is vital for succeeding academically. Teachers are also able to teach more effectively to smaller numbers because they can both challenge students and take time to remediate and answer questions along the way. If students are succeeding academically and learning positive coping and interaction skills in earlier grades, they will have better attitudes toward education as they grow and mature.

The second theory suggests that with fewer numbers of students, teachers are able to focus more individualized attention on all students. Having fewer numbers of students, in turn, leads to less behavior difficulties and more time spent on learning and instruction. Students are able to spend more time participating at higher levels of learning. An environment with smaller groups of students leads to greater subject-matter learning and more positive attitudes about education.

The two theories show what happens in the smaller classroom and how the established environment helps students. Handley (2002) supported these theories by stating five benefits of smaller class sizes: establishing a successful classroom community, more kid time, fewer discipline problems, more personalized assessment and the ability to use the best teaching practices. Handley adds that a small class offers a connected community of interested learners who have more opportunities to collaborate and to share knowledge. The benefits support the fact that "small class size makes a significant difference in the educational and social lives of children" (Handley, 2002, p. 35).

Pritchard (1999) found three patterns in his research on the positive benefits of smaller class sizes:

1. A consensus of research indicates that class size reduction in the early grades leads to higher student achievement. Researchers are more cautious about the question of the positive effects of class size reduction in 4th through 12th grades. The significant effects of class size reduction on student achievement appear when class size is reduced to a point somewhere between 15 and 20 students, and continue to increase as class size approaches the situation of a 1-to-1 tutorial.

2. The research data indicate that if class size is reduced from substantially more than 20 students per class to below 20 students, the related increase in student achievement moves the average student from the 50th percentile up to somewhere above the 60th percentile. For disadvantaged and minority students the effects are somewhat larger.
3. Student, teachers, and parents all report positive effects from the impact of class size reductions on the quality of classroom activity. (p. 6)

Glass (1982) conducted research on class size and drew five conclusions.

- Class size is strongly related to student achievement.
- Smaller classes lead to higher academic achievement.
- Smaller classes facilitate better adaptation of learning programs to individual needs.
- Students in small classes have a greater interest in learning.
- Smaller classes lead to higher teacher morale.

Smith, Lumsden, Leonard, Hertling, and Picus (2001) reported that small class size helps student achievement in the following ways: the student-teacher ratio is reduced significantly, reduction initiatives are implemented in grades K-3, and certain services and technologies are available to achieve the small-class effect.

Smith et al. (2001) reported several benefits of small classes from the teacher's perspective. Within the curriculum, teachers find that learning can take on more variety, breadth, depth, and richness. Teachers have more time for covering additional material and use more supplementary texts and enrichment activities. When instructing, teachers have a better handle on teaching materials, more organization, and more forms of creative instruction. Teachers have more opportunity for in-depth teaching of basic content and use concrete materials to engage students in authentic learning experiences. These teachers complete basic instruction more

quickly as students participate more and spend more time on task. Teachers also devote more time to instruction and have to spend less time on classroom management. While assessing, teachers can use meaningful assessment tools, and spend less time on paperwork and grading. While in a smaller class, teachers experience a greater sense of personal satisfaction, feel a greater sense of achievement, and deal more individually with behavioral problems and can diagnose causes before major problems occur.

Class Size Studies

In the 1970s, due largely in part to the Effective Schools research, many state legislatures began debating the effects of smaller class sizes on student achievement. These debates led to several field experiments: Indiana's Project Prime Time, Tennessee's Project STAR, Wisconsin's SAGE Program, California's Class Size Reduction Program, Burke County, North Carolina's Class Size Reduction Program, and Toronto's Class Size Reduction Program. These programs are summarized in the following pages.

Indiana—Project Prime Time

In 1981, Indiana started its Project Prime Time, and the legislature allocated $300,000 for a two-year study on the effects of reducing class size for early grades in 24 randomly selected public schools. The initial results were so positive that in 1984-1985, the state allocated more funds to reduce the class sizes of all of the state's first graders. This was expanded in 1987-88 to all K-3 classes to have an average of 18 students per teacher (Mueller, Chase, & Walden, 1988).

There were two issues that critics stated did not give clear results. The first issue was that the study was designed to be statewide. Since there were already schools that had small classes before the study began, results were not conclusive. As a result of this, researchers compared samples of second grade achievement records from six school districts that had reduced class

sizes with three school districts that did not. Substantially larger gains in reading and mathematics were found in students in smaller classes (Mueller, Chase, & Walden, 1988).

The second issue had several components. First, students were not assigned to experimental and control groups on a random basis. Second, other educational changes in state school policies had been made during the project. Third, teachers were motivated to keep the classes small by making sure students achieved because they knew how the results were supposed to come out (Mueller, Chase, & Walden, 1988).

Tennessee—Project STAR

In the mid-1980s, one of the largest and best-designed studies from funding provided by the Tennessee legislature. Project STAR (Student/Teacher Achievement Ratio) was a four-year study that compared the achievement of students in grades K-3. Students were assigned randomly to one of three conditions: *standard classes* (with one certified teacher and more than 20 students); *supplemental classes* (with one certified teacher and one full-time, non-certified teacher's aide); and *small classes* (with one certified teacher and approximately 15 students) (Word et al., 1990).

The study began in 1985 and it entailed students entering kindergarten to be placed into the same type of class for four years. In an attempt to control variables, the study asked participating schools to offer all three types of classes and to randomly assign students and teachers to these classes. Teachers in the participating schools were given no special training before the study began for the type of class to which they were assigned (Word et al., 1990).

In the first year of the study, there were only 79 schools, 328 classrooms, and about 6,300 students involved. The study invited all of the state's primary schools to be involved, but participation was limited for several reasons. Schools had to commit to being involved in the

study for four years, to have sufficient class space, and a minimum of 57 kindergarten students to be placed in the three types of classes. There was no additional funding given to schools, except what was needed to hire additional personnel. As a result, schools that were overcrowded, under-funded, too small, as well as troubled schools, and schools that disapproved with the study did not participate. The sampling of participating schools represented urban, inner city, rural, and suburban school districts, as well as a cross-section of students of different genders, races, and socio-economics (Word et al., 1990).

There were some problems in the study that resulted. Students moved in and out of participating schools, which led to inconsistencies. At the time the study began, Tennessee did not require all students to enter kindergarten. As a result of this, there were new students entering the STAR program in the first grade. Students, due to parental desires, changed groups within a school year, which led to some students participating in all three groups during one school year. Administration did keep the number of these types of students to a minimum (Finn & Achilles, 1990).

In the last part of each school year, the Stanford Achievement Test battery was administered to students participating in the study. Scores on the reading, word-study skills, and mathematics parts of the battery showed that students who were in classes with an untrained aide did not improve more than the control group. Students in small classes had very distinct positive results in their scores. The longer students were in small classes, the greater their scores improved over ones that were in the other two groups. The gains in scores were found to be similar for both boys and girls. The gains were greatest in African-American students, impoverished students, and students considered educationally disadvantaged (Achilles, 1995; Finn & Achilles, 1990; Finn et al., 1990; Word et al., 1990).

After this initial study, the Tennessee legislature authorized a second study, the Lasting Benefits Study, that looked at the retention of the gains students had made in early grades as they progressed on through upper grades and high school. At the end of each year, until they graduated in 1987-1998, the students were administered the Comprehensive Test of Basic Skills. The tests gave results in the areas of reading, mathematics, science, and social science. The results showed students who had been in small classes in the early grades were several months ahead of their peers. For example, students in small classes reaching grade 8 were 4.1 months ahead in reading, 3.4 months ahead in mathematics, 4.3 months ahead in science, and 4.8 months ahead in social science (Achilles, 1995; Finn & Achilles, 1990; Finn et al., 1990; Word et al., 1990).

Other benefits were observed in students involved in small classes. On average, they had higher grade point averages, had a lower dropout rate, opted to learn foreign languages, and studied advanced-level courses. They took the ACT and SAT college entrance examinations, graduated from high school, and were among the top 25 percent of their classes. The greatest gains were in students who were traditionally educationally disadvantaged (Achilles, 1995; Finn & Achilles, 1990; Finn et al., 1990; Word et al., 1990).

The study produced great results for educators and policymakers, alike. The population of Tennessee in the mid-1980s was not a true composite of the U.S. population, and therefore, there was a need for more testing. The state of Tennessee had very few Hispanic, Native American, and non-English-speaking immigrant families during this time. The fact that all schools participating in the STAR program volunteered seemed to signify that school administrators and teachers were more innovative in their instruction. Overall, though, the study produced very substantial evidence that smaller class size is a vital component to higher

academic achievement of students (Achilles, 1995; Finn & Achilles, 1990; Finn et al., 1990; Word et al., 1990).

Beginning in 1990, the state of Tennessee implemented Project Challenge. Project Challenge required 16 of its poorest school districts, as designated by the state, to implement smaller class sizes in kindergarten through third grade classrooms. The state ranked the districts according to lowest per capita income and highest proportion of students in subsidized school lunch programs. Student performance on a statewide achievement test was the means chosen to evaluate the program. The results were extremely positive as each of the districts' second grade students moved from near the bottom of school district performance to approximately the middle in the areas of reading and mathematics (Achilles, 1995; Finn & Achilles, 1990; Finn et al., 1990; Mosteller, 1995).

Wisconsin—SAGE Program

Molnar, Smith, Zahorik, Palmer, Halbach, and Ehrle (1999, 2000) led Wisconsin's Student Achievement Guarantee in Education (SAGE) Program, which studied the needs of disadvantaged students. This was a five-year pilot project aimed at K-3 classes in schools where 50 percent or more of the students were living below the poverty level. All schools within these types of districts were invited to participate, but only a few were chosen. The funding consisted of $2000 provided for each low-income student participating in the program. Thirty schools in 21 school districts entered the study with K-1 grade levels in 1996, second grade in 1997, and third grade in 1998 (Molnar et al., 1999; Molnar et al., 2000).

The SAGE program test groups consisted of 15 students in K-3 classrooms. The control groups were students in other schools of similar races, family income level, and prior records of achievement in reading. Results showed larger gains for students in small classes in the areas of

language arts, reading and mathematics on achievement batteries. Once again, the highest gains were in African American students (Molnar et al., 1999; Molnar et al., 2000).

This study involved a greater number of Hispanic, Asian, and Native American students than the STAR project. As a result of the initial findings, the legislature allowed this pilot project to become the norm. Small classes in early grades are available for all schools that serve needy students (Molnar et al., 1999; Molnar et al., 2000).

California—Class Size Reduction Program

In 1996, California began their California Class Size Reduction program, and they are an example of how not to do a study. The program provided schools with an additional $650 per student if they would reduce class sizes from the state average of 28 to no more than 20 students in each class.

Several problems quickly arose in this program (Biddle & Berliner, 2002). The first problem stemmed from the class size of 20 being a standard size in many other states, but not in California. This reduction to 20 was an optimal number, though, for California, because in many of the state's schools the class sizes were 30-40 students. A second problem was the inadequacy of the funding, especially since the SAGE program was more than three times higher. Many schools participated, but many had to sacrifice other needed expenditures to hire teachers for smaller classes. A third problem arose from schools being already overcrowded and understaffed due to teacher shortages. The program led these schools to find and create classroom space wherever they could. The program also led to the hiring of many teachers without certification or prior training (Biddle & Berliner, 2002).

Results in California due to smaller class sizes have been modest at best, but lessons learned are significant. Class size reduction programs must be well planned with the strengths and weaknesses of schools in mind and more than adequately funded (Biddle & Berliner, 2002).

Burke County, North Carolina

In 1995, the Burke County, North Carolina school district pilot-tested a class size reduction program. The program was phased in slowly, and in 1995-1996, 1,193 first graders and 1,125 second graders participated. The program's goal was to have all first, second, and third graders to have class sizes of 15 students. The program had one other feature to it that was unique; it provided professional development activities in the areas of instruction and assessment. Pritchard (1999) stated the following results from the program:

1. The students who participated in the program outperformed students not participating on both reading and mathematics achievement tests.
2. According to independent observations, the percentage of classroom time spent on instruction increased from 80% to 86% as compared to the larger classes.
3. Also according to independent observations, the amount of classroom time spent on non-instructional activities such as discipline decreased from 20% to 14%.

Toronto

Shapson, Wright, Eason, and Fitzgerald (1978) studied the effects of class reduction of fourth and fifth graders in Toronto, Ontario. Class sizes of 16, 22, 30, and 37 students were observed. Results reported small gains in reading and large gains in mathematics for the smaller classes in relation to larger classes. Grade four was found to be the oldest age-level at which smaller classes positively affected student achievement.

Conclusions from Class Size Studies

Achilles, Finn, and Pate-Bain (2002) have concluded from Project STAR and other class size researchers that there are three conditions which must be met for substantial, long-term academic improvement to be made: early intervention, duration, and intensity. Students need to start school in kindergarten or pre-kindergarten and should be in small size classes for three, and preferably, four years. Students should be in small size classes all day, every day.

Biddle and Berliner (2002) concluded from the studies in Indiana, Tennessee, Wisconsin and California that small classes in early grades yield substantial gains in improving academic achievement. These gains are maintained the longer students are involved in these small classes, and greater improvement is seen in classes where there are fewer than 20 students. The extra gains in early grades are seen across disciplines and on traditional achievement measures, as well as other student success indicators. Achievement gains are retained in standard- size classes in upper elementary grades, and middle and high school grades. Achievement gains are seen in every type of student, but greater gains seem to be more prevalent in students who have had educational disadvantages. Students who have traditionally had educational disadvantages seem to carry their achievement gains from early-grade intervention into upper grades and beyond. Extra gains from early-grade intervention tend to be found across genders. Evidence for upper grades and high school achievement gains are inconclusive at this time.

Conclusions from Class Size Research

Given the positive results from research of smaller schools and class sizes over the last 20 years, why have there not been more successful efforts at positively influencing student achievement? Biddle and Berliner (2002) concluded that most primary schools do not operate under policies that mandate small classes in early grades. There is a great deal of ignorance of

the issue, confusion over the class size research, as well as, problems with interpreting the results, prejudices against poor and minority students, and problems with the application of reducing class sizes. Reducing class sizes means additional funds are needed to hire additional staff, and to find and create additional classroom space. Most legislatures are conservative, and unwilling to allocate more money to education budgets for the purpose of reducing class sizes. The results also showed the following:

> Reducing the size of classes for students in the early grades often requires additional funds. All students would reap sizable education benefits and long-lasting advantages, however, and students from educationally disadvantaged groups would benefit even more. Indeed, if we are to judge by available evidence, no other education reform has yet been studied that would provide such striking benefits. Debates about reducing class sizes, then, are disputes about values. If citizens are truly committed to providing a quality public education and a level playing field for all students regardless of background, they will find the funds needed to reduce class size. (p. 22)

Raywid (2002) stated that changing structures and policies in education are necessary in allowing small schools to fulfill their potential. Raywid challenged that these policies and structures must be examined at the state level. Raywid found various models which have emerged to help fit new and small schools into existing schools and districts. In 1983, New York City's school district created a separate office that had exclusive responsibility to oversee these new units. In 1994, Philadelphia Superintendent David Hornbeck mandated that no "small learning community" would have more than 400 students in it. In 1995, the Boston Public School System started 11 new and innovative small schools with great and broad freedom. In the past decade, New York City's Community School District 3 has wavered in its ability to

affect student outcomes at the middle school level due to the vacillating support of its superintendents.

In Chicago, the school board encouraged the establishment of small schools, but the central office was not as supportive until the last year and a half. Over the last five years, Kapaa Elementary School, on Hawaii's island of Kauai, has been transformed into eight schools-within-a-school. The principal encouraged self-selected groups of teachers to design and to develop their own school-within-a-school, which was led by a teacher leader. Finally, a common model has been one of parents and teachers proposing a school-within-a-school in which they must attain approval for each step in the process from the building principal (Raywid 2002).

Raywid (2002) generalized her findings into major policy difficulties of schools-within-schools. The principal is the central figure in the approval and support for the restructuring. This support for or against schools-within-a-school, though, shifts depending on who is in power at the time. Most principals want to be the:

> central authority, decision maker, and monitor in their school. The schools-within-schools structure challenges such centralized control. To fulfill the goal of cultivating schools that can succeed with a broad range of students, this structure invite diversity, making the control and oversight of the resulting differentiated units more difficult and awkward. (p. 50)

The idea of the principal being the person charged with keeping the school as a cohesive unit can conflict with the concept that schools-within-a-school are separate and distinctive. The principal should therefore be the one who manages more as an "on-site superintendent" allowing the schools-within-a-school to fulfill their individual purposes and objectives. Traditional schools consist of a structure that is horizontally divided into subject areas and grade levels. This

structure will be in tension with the schools-within-schools structure that seeks to organize teachers of diverse subject areas and grade levels into one cohesive unit.

Due to funding constraints, Solomon (1999) supported the need for high schools to downsize. Downsizing allows high schools to be more intimate, less dangerous, and more effective. Solomon stated that smaller classes, not smaller schools, are the answer to greater student achievement. Raywid (2002) stated "that downsizing will lead to safer, more humane, and more effective schools that can reach an expanded variety of students successfully. This goal, in turn, calls for new school environments, programs, and organizations … the challenge of downsizing requires more than simply making schools smaller" (p. 47).

In 1996, South Grand Prairie High School in Grand Prairie, Texas transitioned from a more than 2,000-student high school into five academies of varying size, due to students being able to spend from one to four years in an academy. The academies focused on the following content areas: business and computer technology; communications, humanities, and law; creative and performing arts; health science and human service; and math, science, and engineering. Students have the option of staying in the academies from one to four years. Results showed greater morale, an increase from 79 students to more than 300 students taking an Advanced Placement (AP) exam, higher attendance and graduation rates. The faculty members at this high school chose to transition, and they had the support and funding of the school and system administration because the goal was for all students to reach their potential (Nathan, 2002).

Research supports the fact that well-planned and effectively executed class size reduction programs do positively affect student achievement. Smaller student populations in schools also positively affect student achievement due to many factors, especially smaller class sizes. However, funding, political, and other issues often times keep these reform efforts from being

effective. As a result, many districts are downsizing schools through the schools-within-schools model, which has been effective in reducing class sizes.

A list of findings from research studies on class size is given in Table 3.

Table 3. Findings from the literature on "class size"

Findings	Source
• Class size is a term used for curriculum and instruction issues. • Pupil-teacher ratio is an administrative statistic used for the distribution of resources.	Achilles, Finn, and Pate-Bain (2002)
• Class size and pupil-teacher (student-teacher) ratio are not the same thing and must be differentiated.	Ehrenberg, Brewer, Gamoran, and Willms (2001)
• The average difference between pupil-teacher ratio and class size in U.S. schools is 10. • Teachers servicing fewer numbers of students positively influence student performance.	Achilles and Sharp (1998)
Smaller classes have the following benefits: • Establishment of a successful classroom community. • More time for students. • Fewer discipline problems. • More personalized assessment. • The ability to use the best teaching practices.	Handley (2002)
• Class size reduction in the early grades leads to higher student achievement. • When class size is reduced to between 15 and 20 per class, there is an increase in achievement of approximately 10 percentage points. • Students, teachers, and parents all report positive effects from the impact of class size reductions on the quality of classroom activity.	Pritchard (1999)

Table 3 (continued)

• Class size is strongly related to student achievement. • Smaller classes lead to higher academic achievement. • Smaller classes facilitate better adaptation of learning programs to individual needs. • Students in small classes have a greater interest in learning. • Smaller classes lead to higher teacher morale.	Glass (1982)
Indiana—Project Prime Time found smaller classes led to larger gains in reading and mathematics.	Mueller, Chase, and Walden (1988)
Tennessee—Project STAR • The longer the students were involved in smaller classes, the greater their scores improved. • African-American students, impoverished students, and students considered educationally disadvantaged recorded the highest gains.	Achilles, 1995; Finn and Achilles (1990); Finn et al (1990); Word et al (1990); and Mosteller (1995)
Tennessee—The Lasting Benefits Study • Students, who were involved in Project STAR, showed higher grade point averages, had a lower dropout rate, and were among the top 25 percent in their graduating class. • Students who were traditionally educationally disadvantaged showed the greatest gains. • Smaller class size is a vital component to a student's higher academic achievement.	Achilles, 1995; Finn and Achilles (1990); Finn et al (1990); Word et al (1990); and Mosteller (1995)
Tennessee—Project Challenge Lower socioeconomic districts showed that second grade students rose from near the bottom of school district performance to approximately the middle in the areas of reading and mathematics.	Achilles, 1995; Finn and Achilles (1990); Finn et al (1990); Word et al (1990); and Mosteller (1995)
There was a positive relationship between K-3 class size and language arts, reading, and mathematics achievement, when controlling for socioeconomic status, race, and previous achievement performance.	Molnar et al. (1999) Molnar et al. (2000)

Table 3 (continued)

California—Class Size Reduction Program • Smaller class sizes resulted in modest to low gains in student achievement. • Class size reduction programs must be well planned with the strengths and weaknesses of schools in mind and more than adequately funded.	Biddle and Berliner (2002)
Burke County, North Carolina • Experimental group of students outperformed control group on both reading and mathematics achievement tests. • The percentage of classroom time spent on instruction increased from 80% to 86%. • The percentage of classroom time spent on non-instructional activities such as discipline decreased from 20% to 14%.	Pritchard (1999)
Toronto • Small classes produced small gains in reading and large gains in mathematics. • Grade four was the oldest age-level that positively affected student achievement.	Shapson et al (1978)
Substantial, long-term academic improvement results when: • There is early intervention. • Students stay in these classes for three or four years. • Students are in small classes all day, every day.	Achilles, Finn, and Pate-Bain (2002)

Chapter Summary

Johnson and Schneider (1985) conducted a trend analysis of school size and pupil-teacher ratios in private elementary and secondary schools from 1976 to 1980. Two data types obtained from the National Center of Educational Statistics (1997) showed that private schools had smaller class sizes at the end of these five years even though their enrollments had increased. Choy (1997, 1998) looked at various differing factors of private and public schools that included

teaching and learning atmospheres, teacher qualifications and salaries, and student population and class sizes. She found, among many conclusions, that while salaries were greater in public schools, teachers and students were more satisfied with the academic program in private schools, as well as the smaller class sizes.

Substantial, long-term academic improvements occur when students are in small classes starting in the early grades and continuing throughout. An effective school is one where the following are present: learning is taking place and is inspired by leadership; expectations are at a high level; learning opportunities abound that include various forms of evaluation; the environment is safe, orderly, and motivating; and the relationship among home, school, and community is positive. Private schools, from their inception, have sought to provide a strong and rigorous academic program for students through high academic expectations, committed and conscientious faculties, and small class sizes (Choy, 1997; & Choy, 1998). Therefore, the conclusion can be drawn that private schools should be places where academic achievement is taking place.

Chapter II examined the history of private schools, a review of effective schools research, a literature review on school size, and a research review of literature and studies on class size. This chapter provided a basis to test the conclusion, drawn from the review of literature, that private schools are positively affecting student achievement.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this study was to determine the relationship between class size, school size, and student achievement, as measured by the Scholastic Aptitude Test (SAT). This chapter describes the methods and procedures used in this study. This chapter is divided into the following sections: population and sample selection, data collection, hypotheses, data analysis, and summary. This study was quantitative and employed the bivariate and partial correlation procedures to test the hypothesis concerning the possible relationship between class size, school size, and student achievement. This study compared private, independent high schools in the southeastern region of the United States.

Population/Sample Selection

The population for this study included 212 private, independent schools, all members of the Southern Association of Independent Schools (SAIS). SAIS member schools are located in the following 10 states: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. A sample of 156 schools was selected for this study. Fifty-six schools were eliminated from the sample due to either not offering a high school program or offering a program designed for a specialized population.

Data Collection

Data for this study were collected using a letter (see Appendix A) and questionnaire (see Appendix B) sent to 156 members of the Southern Association of Independent Schools. This questionnaire collected data consisting of the following factors: minority enrollment percentages,

low socioeconomic status percentages, students' number of years in the private high school, teacher experience, teacher education, and average class size in core subjects (language arts, science, mathematics, and social studies). Permission from the participants was implicitly granted by completing and returning the questionnaire to the researcher.

Hypotheses

The following null hypotheses were examined for this study:

Null Hypothesis 1: There is no statistically significant relationship between class size and the academic achievement of private, independent high school students as measured by the SAT.

Null Hypothesis 2: There is no statistically significant relationship between school size and the academic achievement of private, independent high school students as measured by the SAT.

Data Analysis

The statistical software program *SPSS Graduate Pack 10.0 for Windows* (2000) was used to provide the statistical analysis for this study. This study used the bivariate and partial correlation procedures to determine any possible relationship between class size, school size, and student achievement. The independent variables were class size and school size. The dependent variables were the 2001-2002 average SAT scores. Control variables used in this study included the ethnicity of the students, the experience of the faculty, and the percentage of teachers with advanced education. The control variable used as a measure of socioeconomic status was the percentage of students receiving financial aid. Partial correlations were computed while controlling for the following 14 combinations:

1) percentage of students receiving financial aid;
2) percentage of minority students;
3) average number of years of faculty experience;

4) percentage of faculty with advanced education;
5) percentage of students receiving financial aid and percentage of minority students;
6) percentage of students receiving financial aid and average number of years of faculty experience;
7) percentage of students receiving financial aid and percentage of faculty with advanced education;
8) percentage of minority students and average number of years of faculty experience;
9) percentage of minority students and percentage of faculty with advanced education;
10) average number of years of faculty experience and percentage of faculty with advanced education;
11) percentage of students receiving financial aid, percentage of minority students, and average number of years of faculty experience;
12) percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education;
13) percentage of minority students, average number of years of faculty experience, and percentage of faculty with advanced education; and
14) percentage of students receiving financial aid, percentage of minority students, average number of years of faculty experience, and percentage of faculty with advanced education.

Summary

Chapter III included a description of the methods and procedures used in this study. The following were included in the contents of this chapter: introduction, population and sample selection, data collection, hypotheses, and data analysis.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

The purpose of this study was to determine the relationship between class size, school size, and student achievement in private, independent schools. Data collected for this study came from a sample of 61 members of the Southern Association of Independent Schools (SAIS). SAIS members are located in the following ten states: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. This chapter includes the following three sections: an overview of the statistical analysis; descriptive statistics and inferential statistics of the initial set of data; and descriptive and inferential statistics of the data with removed outliers.

Section One

Overview of the Statistical Analysis

Initially, 156 schools were chosen for this study from the 212 members of the SAIS. Fifty-six schools were eliminated from the sample due to either not offering a high school program or offering a program designed for a specialized population. A letter and questionnaire were mailed to the lead administrators of each school (see Appendix A and Appendix B). Of the 156 schools, 61 of those responded (which implied participation) resulting in a response rate of 39%.

This study used the bivariate and partial correlation procedures to determine any possible relationship between class size, school size, and student achievement. The independent variables were class size (Language Arts, mathematics, science, social studies, Language Arts and social

studies, mathematics and science, Language Arts and mathematics, and core subjects) and school size (as determined by total enrollment). The dependent variables were the 2001-2002 average SAT scores (verbal, mathematics, and combined). Control variables used in this study included the ethnicity of the students (percentage of minority students), the experience of the faculty (average number of years of faculty experience), and the percentage of teachers with advanced education. The control variable used as a measure of socioeconomic status was the percentage of students receiving financial aid.

The four combinations of variables (Language Arts and social studies, mathematics and science, Language Arts and mathematics, and core subjects) represented areas used to determine additional possible relationships when looking at SAT verbal, mathematics, and combined scores. The verbal section of the SAT includes questions in the following areas: critical reading, sentence completion, and analogies (The College Board, 2003). Therefore, Language Arts and social studies were grouped together. The mathematics section of the SAT includes questions in the following areas: arithmetic, algebra and functions, geometry and measurement, and data analysis, statistics, and probability (The College Board, 2003). Therefore, mathematics and science were grouped together. The combined SAT score is computed by adding the scores from the verbal section and mathematics section together (The College Board, 2003). Therefore, the two combinations of Language Arts and mathematics, and the core subjects, were tested for possible relationships.

Section Two

Descriptive Statistics of the Initial Data

Descriptive statistics of the initial data were calculated for each of the variables (see Table 4, Appendix Table C1, and Appendix Figure C1 through C23). The data for the following

variables indicated limited variance: Language Arts average class size mean was 15.31 (SD=3.33), mathematics average class size mean was 15.22 (SD=3.47), science average class size mean was 15.39 (SD=3.75), social studies average class size mean was 16.38 (SD=3.81), Language Arts and social studies average class size mean was 15.85 (SD=3.41), mathematics and science average class size mean was 15.30 (SD=3.52), Language Arts and mathematics average class size mean was 15.26 (SD=3.30), and core subjects average class size mean was 15.57 (SD=3.38). The data for the SAT Verbal, SAT Mathematics, and SAT Combined indicated moderate ranges of variance. The mean for the SAT Verbal was 589.02 (SD=58.30), the mean for the SAT Mathematics was 591.52 (SD=57.28), and the mean for the SAT Combined was 1179.57 (SD=112.17). The control variables all indicated large variances except for the average number of years of faculty experience, which showed only a moderate variance. The mean for the percentage of students receiving financial aid was 12.48 (SD=9.51), the mean for the percentage of minority students was 10.72 (SD=11.22), and the mean for the percentage of faculty with advanced education was 59.29 (SD=18.80), while the mean for the average years of experience of faculty was 14.16 (SD=3.66).

Table 4. Descriptive Statistics (Initial Data)

Variable	N	Minimum	Maximum	Mean	Standard Deviation
SAT Verbal score	61	400.00	690.00	589.0197	58.3015
SAT Mathematics score	61	400.00	697.00	591.5197	57.2787
SAT Combined score	61	800.00	1380.00	1179.5721	112.1734
Language Arts Average Class Size	61	6.00	23.00	15.3066	3.3260

Table 4 (continued)

Mathematics Average Class Size	61	6.00	23.00	15.2215	3.4689
Science Average Class Size	61	5.00	24.00	15.3861	3.7462
Social Studies Average Class Size	61	5.00	24.00	16.3836	3.8117
Language Arts & Social Studies Average Class Size	61	5.50	23.00	15.8451	3.4075
Mathematics & Science Average Class Size	61	5.50	23.00	15.3038	3.5185
Language Arts & Mathematics Average Class Size	61	6.00	23.00	15.2640	3.2983
Core Subjects Average Class Size	61	5.50	23.00	15.5744	3.3816
Percentage of Students Receiving Financial Aid	60	.00	49.00	12.4817	9.5134
Percentage of Minority Students	60	.00	70.00	10.7233	11.2192
Average Years of Experience of Faculty	60	5.00	23.00	14.1562	3.6629
Percentage of Faculty with Advanced Education	56	25.00	96.00	59.2893	18.7956
School Size (Total Enrollment)	61	60.00	1032.00	348.4590	237.0410

Section Two

Inferential Statistics of the Initial Data

Bivariate correlations were used initially to determine any possible relationships between three dependent variables and nine independent variables of the initial data (see Table 5). The three dependent variables were: SAT Verbal, SAT Mathematics, and SAT Combined scores. The nine independent variables were: Language Arts average class size, mathematics average class size, science average class size, social studies average class size, Language Arts and social studies average class size, mathematics and science average class size, Language Arts and mathematics average class size, core subjects average class size, and school size. Pearson' correlation coefficient levels and Bonferonni's significance levels were employed. Because there were no correlation coefficients of zero, there is some relationship among all of the variables. Significant correlations were found among all of the independent variables.

The relationship among Language Arts average class size and all three dependent variables resulted in the following: with SAT Verbal, p=.016 and r (59) =.308; with SAT Mathematics, p=.038 and r (59) =.267; and with SAT Combined, p=.021 and r (59) =.295. The relationship between mathematics average class size and all three dependent variables reported the following: with SAT Verbal, p=.019 and r (59) =.299; with SAT Mathematics, p=.043 and r (59) =.260; and with SAT Combined, p=.024 and r (59) =.288. The relationship with science average class size and all three dependent variables yielded the following significant levels: with SAT Verbal, p=.026 and r (59) =.286; with SAT Mathematics, p=.043 and r (59) =.260; and with SAT Combined, p=.030 and r (59) =.278. The relationship between social studies average class size and two of the dependent variables resulted in the following: with SAT Verbal, p=.021 and r (59) =.296; and with SAT Combined, p=.034 and r (59) =.272.

The relationship between Language Arts and social studies average class size and all three of the dependent variables reported the following: with SAT Verbal, p=.014 and r (59) =.312; with SAT Mathematics, p=.042 and r (59) =.261; and with SAT Combined, p=.020 and r (59) =.296. The relationship between mathematics and science average class size and all three of the dependent variables yielded the following significant levels: with SAT Verbal, p=.019 and r (59) =.299; with SAT Mathematics, p=.038 and r (59) =.267; and with SAT Combined, p=.023 and r (59) =.290. The relationship among Language Arts and mathematics average class size and all three of the dependent variables showed the following; with SAT Verbal, p=.014 and r (59) =.312; with SAT Mathematics, p=.034 and r (59) =271; and with SAT Combined, p=.019 and r (59) =.301. The relationship among the average class size for all core courses and all three of the dependent variables showed the following; with SAT Verbal, p=.013 and r (59) =.315; with SAT Mathematics, p=.035 and r (59) =.270; and with SAT Combined, p=.019 and r (59) =.300. The relationship between school size (as determined by the school's total enrollment) and all three of the dependent variables resulted in the following; with SAT Verbal, p=.018 and r (59) =.302; with SAT Mathematics, p=.011 and r (59) =.323; and with SAT Combined, p=.011 and r (59) =.325.

Table 5. Bivariate Correlations (Initial Data)

Independent Variable	N	SAT Verbal	SAT Mathematics	SAT Combined
Language Arts Average Class Size	56	.308	.267	.295
*Significance level		.016**	.038**	.021**
Mathematics Average Class Size	56	.299	.260	.288
*Significance level		.019**	.043**	.024**
Science Average Class Size	56	.286	.260	.278
*Significance level		.026**	.043**	.030**
Social Studies Average Class Size	56	.296	.233	.272
*Significance level		.021**	.070	.034**
Language Arts & Social Studies Average Class Size	56	.316	.261	.296
*Significance level		.013**	.042**	.020**
Mathematics & Science Average Class Size	56	.299	.267	.290
*Significance level		.019**	.038**	.023**
Language Arts & Mathematics Average Class Size	56	.312	.271	.301
*Significance level		.014**	.034**	.019**
Core Subjects Average Class Size	56	.315	.270	.300
*Significance level		.013**	.035**	.019**
School Size	56	.302	.323	.325
*Significance level		.018**	.011**	.011**

Pearson Correlation
*2-tailed Significance
**$p < .05$

Univariate correlations of the initial data were calculated to determine further possible relationships between the three dependent variables and the seven independent variables, while controlling for 14 combinations of four variables (see Table 6, Table 7, Table 8, and Table 9). The three dependent variables were: SAT Verbal, SAT Mathematics, and SAT Combined scores.

The seven independent variables were: Language Arts average class size, mathematics average class size, Language Arts and social studies average class size, mathematics and science average class size, Language Arts and mathematics average class size, core subjects average class size, and school size (as determined by total enrollment). The control variables were: percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education. Pearson's correlation coefficient levels and Bonferonni's significance levels were employed. Because there were no correlation coefficients of zero, there is some relationship among all of the variables. Significant correlations were found among all of the independent variables.

The average class sizes of Language Arts and the combination of Language Arts and social studies were both correlated with SAT Verbal scores, while controlling for 14 combinations of four variables (see Table 6). Levels of significance were found in six of the combinations of control variables among both independent variables. Language Arts average class size correlated with SAT Verbal scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.34, p<.01; while controlling for average years of experience of faculty, r (57) =.26, p<.05; while controlling for percentage of faculty with advanced education, r (53) =.31, p<.03; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.29, p<.04; while controlling for percentage of student receiving financial aid and percentage of faculty with advanced education, r (51) =.34, p<.02; and while controlling for average years of experience of faculty and percentage of faculty with advanced education, r (51) =.29, p<.04. The combination of Language Arts and social studies average class size correlated with SAT Verbal scores reported the following significance levels: while controlling for percentage of student receiving

financial aid, r (57) =.35, p<.01; while controlling for average years of experience of faculty, r (57) =.27, p<.04; while controlling for percentage of faculty with advanced education, r (53) =.32, p<.02; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.31, p<.03; while controlling for percentage of student receiving financial aid and percentage of faculty with advanced education, r (51) =.37, p<.01; and while controlling for average years of experience of faculty and percentage of faculty with advanced education, r (51) =.30, p<.03.

Table 6. Partial Correlations for SAT Verbal scores (Initial Data)

SAT Verbal	Language Arts Average Class Size	Language Arts & Social Studies Average Class Size
Controlling for percentage of students receiving financial aid		
r	.3394	.3546
d.f.	(57)	(57)
p	.009*	.006*
Controlling for percentage of minority students		
r	.1299	.1176
d.f.	(57)	(57)
p	.327	.375
Controlling for average years of experience of faculty		
r	.2616	.2715
d.f.	(57)	(57)
p	.045*	.038*
Controlling for percentage of faculty with advanced education		
r	.3129	.3246
d.f.	(53)	(53)
p	.020*	.016*
Controlling for percentage of students receiving financial aid and percentage of minority students		
r	.1626	.1575
d.f.	(55)	(55)
p	.227	.242
Controlling for percentage of students receiving financial aid and average years of experience of faculty		
r	.2857	.3066
d.f.	(55)	(55)
p	.031*	.020*

Table 6 (continued)

Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education		
r	.3461	.3725
d.f.	(51)	(51)
p	.011*	.006*
Controlling for percentage of minority students and average years of experience of faculty		
r	.0796	.0662
d.f.	(55)	(55)
p	.556	.624
Controlling for percentage of minority students and percentage of faculty with advanced education		
r	.1183	.1060
d.f.	(51)	(51)
p	.399	.450
Controlling for average years of experience of faculty and percentage of faculty with advanced education		
r	.2896	.3036
d.f.	(51)	(51)
p	.035*	.027*
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty		
r	.1018	.1001
d.f.	(53)	(53)
p	.460	.467
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education		
r	.1507	.1542
d.f.	(49)	(49)
p	.291	.280
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.0943	.0815
d.f.	(49)	(49)
p	.510	.570
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.1204	.1277
d.f.	(47)	(47)
p	.410	.382

(Correlation Coefficient / (D.F.) / 2-tailed Significance)
*$p < .05$

The average class sizes of mathematics and the combination of mathematics and science were both correlated with SAT mathematics scores, while controlling for 14 combinations of

four variables (see Table 7). Levels of significance were found in one of the combinations of control variables among both independent variables. Mathematics average class size correlated with SAT mathematics scores reported the following significance level, while controlling for percentage of student receiving financial aid, r (57) =.27, p<.04. The combination of mathematics and science average class size correlated with SAT mathematics scores reported the following significance level: while controlling for percentage of student receiving financial aid, r (57) =.28, p<.04.

Table 7. Partial Correlations for SAT Mathematics scores (Initial Data)

SAT Mathematics	Mathematics Average Class Size	Mathematics & Science Average Class Size
Controlling for percentage of students receiving financial aid		
r	.2720	.2802
d.f.	(57)	(57)
p	.037*	.032*
Controlling for percentage of minority students		
r	.1286	.1372
d.f.	(57)	(57)
p	.332	.300
Controlling for average years of experience of faculty		
r	.2118	.2278
d.f.	(57)	(57)
p	.107	.083
Controlling for percentage of faculty with advanced education		
r	.2186	.2468
d.f.	(53)	(53)
p	.109	.069
Controlling for percentage of students receiving financial aid and percentage of minority students		
r	.1370	.1479
d.f.	(55)	(55)
p	.309	.272
Controlling for percentage of students receiving financial aid and average years of experience of faculty		
r	.2302	.2437
d.f.	(55)	(55)
p	.085	.068

Table 7 (continued)

Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education		
r	.2391	.2657
d.f.	(51)	(51)
p	.085	.055
Controlling for percentage of minority students and average years of experience of faculty		
r	.0705	.0883
d.f.	(55)	(55)
p	.602	.514
Controlling for percentage of minority students and percentage of faculty with advanced education		
r	.0602	.0873
d.f.	(51)	(51)
p	.668	.534
Controlling for average years of experience of faculty and percentage of faculty with advanced education		
r	.2105	.2491
d.f.	(51)	(51)
p	.130	.072
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty		
r	.0861	.1013
d.f.	(53)	(53)
p	.532	.462
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education		
r	.0748	.0988
d.f.	(49)	(49)
p	.602	.490
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.0466	.0828
d.f.	(49)	(49)
p	.746	.564
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.0705	.1017
d.f.	(47)	(47)
p	.630	.487

(Correlation Coefficient / (D.F.) / 2-tailed Significance)
*$p < .05$

The average class size of the combination of Language Arts and mathematics was correlated with SAT combined scores, while controlling for 14 combinations of four variables

(see Table 8). Levels of significance were found in five of the combinations of control variables among both independent variables. The average class size of the core subjects was correlated with SAT combined scores, while controlling for 14 combinations of four variables (see Table 8). Levels of significance were found in four of the combinations of control variables among both independent variables.

The combination of Language Arts and mathematics average class size correlated with SAT combined scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.32, p<.02; while controlling for percentage of faculty with advanced education, r (53) =.29, p<.04; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.27, p<.05; while controlling for percentage of student receiving financial aid and percentage of faculty with advanced education, r (51) =.32, p<.03; and while controlling for average years of experience of faculty and percentage of faculty with advanced education, r (51) =.27, p<.05. The core courses average class size correlated with SAT combined scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.33, p<.02; while controlling for percentage of faculty with advanced education, r (53) =.30, p<.03; while controlling for percentage of student receiving financial aid and percentage of faculty with advanced education, r (51) =.34, p<.02; and while controlling for average years of experience and percentage of faculty with advanced education, r (51) =.29, p<.04.

Table 8. Partial Correlations for SAT Combined scores (Initial Data)

SAT Combined	Language Arts & Mathematics Average Class Size	Core Courses Average Class Size
Controlling for percentage of students receiving financial aid		
r	.3243	.3281
d.f.	(57)	(57)
p	.012*	.011*
Controlling for percentage of minority students		
r	.1371	.1281
d.f.	(57)	(57)
p	.300	.334
Controlling for average years of experience of faculty		
r	.2514	.2564
d.f.	(57)	(57)
p	.055	.050
Controlling for percentage of faculty with advanced education		
r	.2892	.3006
d.f.	(53)	(53)
p	.032*	.026*
Controlling for percentage of students receiving financial aid and percentage of minority students		
r	.1603	.1547
d.f.	(55)	(55)
p	.234	.251
Controlling for percentage of students receiving financial aid and average years of experience of faculty		
r	.2735	.1547
d.f.	(55)	(55)
p	.040*	.251
Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education		
r	.3181	.3372
d.f.	(51)	(51)
p	.020*	.014*
Controlling for percentage of minority students and average years of experience of faculty		
r	.0785	.0729
d.f.	(55)	(55)
p	.562	.590
Controlling for percentage of minority students and percentage of faculty with advanced education		
r	.1008	.0989
d.f.	(51)	(51)
p	.473	.481

Table 8 (continued)

Controlling for average years of experience of faculty and percentage of faculty with advanced education		
r	.2725	.2896
d.f.	(51)	(51)
p	.048*	.035*
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty		
r	.0988	.0971
d.f.	(53)	(53)
p	.473	.481
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education		
r	.1267	.1314
d.f.	(49)	(49)
p	.376	.358
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.0800	.0816
d.f.	(49)	(49)
p	.577	.569
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education		
r	.1062	.1166
d.f.	(47)	(47)
p	.467	.425

(Correlation Coefficient / (D.F.) / 2-tailed Significance)
*$p < .05$

The variable of school size (as determined by total enrollment) was correlated with each of the three dependent variables: SAT Verbal scores, SAT mathematics scores, and SAT combined scores, while controlling for 14 combinations of four variables (see Table 9). Levels of significance were found in seven of the combinations of control variables among both independent variables. School size (as determined by total enrollment) correlated with SAT Verbal scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.32, p<.02; while controlling for percentage of minority students, r (57) =.33, p<.02; while controlling for average years of experience of faculty, r (57) =.30, p<.03; while controlling for percentage of student receiving financial aid and percentage of

minority students, r (55) =.35, p<.01; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.32, p<.02; while controlling for percentage of minority students and average years of experience of faculty, r (55) =.32, p<.02; and while controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty, r (53) =.33, p<.02.

School size (as determined by total enrollment) correlated with SAT mathematics scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.33, p<.02; while controlling for percentage of minority students, r (57) =.34, p<.01; while controlling for average years of experience of faculty, r (57) =.33, p<.02; while controlling for percentage of student receiving financial aid and percentage of minority students, r (55) =.35, p<.01; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.33, p<.02; while controlling for percentage of minority students and average years of experience of faculty, r (55) =.33, p<.02; and while controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty, r (53) =.33, p<.02.

School size (as determined by total enrollment) correlated with SAT combined scores reported the following significance levels: while controlling for percentage of student receiving financial aid, r (57) =.34, p<.01; while controlling for percentage of minority students, r (57) =.35, p<.01; while controlling for average years of experience of faculty, r (57) =.33, p<.02; while controlling for percentage of student receiving financial aid and percentage of minority students, r (55) =.36, p<.01; while controlling for percentage of student receiving financial aid and average years of experience of faculty, r (55) =.33, p<.02; while controlling for percentage of minority students and average years of experience of faculty, r (55) =.34, p<.01; and while

controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty, r (53) =.35, p<.01.

Table 9. Partial Correlations for School Size (Initial Data)

Total Enrollment	SAT Verbal	SAT Mathematics	SAT Combined
Controlling for percentage of students receiving financial aid			
r	.3181	.3332	.3388
d.f.	(57)	(57)	(57)
p	.014*	.010*	.009*
Controlling for percentage of minority students			
r	.3275	.3363	.3479
d.f.	(57)	(57)	(57)
p	.011*	.009*	.007*
Controlling for average years of experience of faculty			
r	.3025	.3253	.3275
d.f.	(57)	(57)	(57)
p	.020*	.012*	.011*
Controlling for percentage of faculty with advanced education			
r	.2232	.2356	.2390
d.f.	(53)	(53)	(53)
p	.101	.083	.079
Controlling for percentage of students receiving financial aid and percentage of minority students			
r	.3450	.3461	.3626
d.f.	(55)	(55)	(55)
p	.009*	.008*	.006*
Controlling for percentage of students receiving financial aid and average years of experience of faculty			
r	.3118	.3272	.3339
d.f.	(55)	(55)	(55)
p	.018*	.013*	.011*
Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education			
r	.2331	.2299	.2420
d.f.	(51)	(51)	(51)
p	.093	.098	.081
Controlling for percentage of minority students and average years of experience of faculty			
r	.3216	.3329	.3448
d.f.	(55)	(55)	(55)
p	.015*	.011*	.009*
Controlling for percentage of minority students and percentage of faculty with advanced education			
r	.2458	.2515	.2622
d.f.	(51)	(51)	(51)
p	.076	.069	.058

Table 9 (continued)

Controlling for average years of experience of faculty and percentage of faculty with advanced education			
r	.2508	.2721	.2729
d.f.	(51)	(51)	(51)
p	.070	.049*	.048*
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty			
r	.3330	.3344	.3523
d.f.	(53)	(53)	(53)
p	.013*	.013*	.008*
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education			
r	.2565	.2440	.2647
d.f.	(49)	(49)	(49)
p	.069	.084	.060
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education			
r	.2653	.2806	.2886
d.f.	(49)	(49)	(49)
p	.060	.046*	.040*
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education			
r	.2721	.2678	.2867
d.f.	(47)	(47)	(47)
p	.059	.063	.046*

(Correlation Coefficient / (D.F.) / 2-tailed Significance)
*$p < .05$

Section Three

Descriptive Statistics of Data with Removed Outliers

It was determined from the initial data that there were outliers in the class size variables and the school size variable. The new data, with removed outliers, consisted of two criteria: one, class size greater than or equal to 10.00, and two, school size greater than 100 and less than 500. As a result, the new sample size was 43.

Descriptive statistics of the data with removed outliers were calculated for each of the variables (see Table 10, Appendix Table D1, and Appendix Figure D1 through D23). The data for the following variables indicated limited variance: Language Arts average class size mean

was 15.50 (SD=2.49), mathematics average class size mean was 15.50 (SD=2.68), science average class size mean was 15.78 (SD=2.82), social studies average class size mean was 16.77 (SD=3.17), Language Arts and social studies average class size mean was 16.14 (SD=2.59), mathematics and science average class size mean was 15.64 (SD=2.62), Language Arts and mathematics average class size mean was 15.50 (SD=2.42), and core subjects average class size mean was 15.89 (SD=2.49). The data for the SAT Verbal scores, SAT Mathematics scores, and SAT Combined scores indicated moderate ranges of variance. The mean for the SAT Verbal scores was 598.07 (SD=42.41), the mean for the SAT Mathematics scores was 595.97 (SD=44.08), and the mean for the SAT Combined scores was 1192.65 (SD=81.95). The control variables all indicated large variances except for the average number of years of faculty experience, which showed only a moderate variance. The mean for the percentage of students receiving financial aid was 13.05 (SD=10.24), the mean for the percentage of minority students was 8.16 (SD=6.60), and the mean for the percentage of faculty with advanced education was 58.07 (SD=19.95), while the mean for the average years of experience of faculty was 14.43 (SD=3.89).

Table 10. Descriptive Statistics (Data with Removed Outliers)

Variable	N	Minimum	Maximum	Mean	Standard Deviation
SAT Verbal score	43	505.00	680.00	598.0744	42.4129
SAT Mathematics score	43	500.00	690.00	595.9698	44.0751
SAT Combined score	43	1022.00	1338.00	1192.6488	81.9547
Language Arts Average Class Size	43	10.00	22.00	15.5000	2.4865

Table 10 (continued)

Mathematics Average Class Size	43	11.00	22.00	15.5049	2.6756
Science Average Class Size	43	10.00	22.00	15.7802	2.8239
Social Studies Average Class Size	43	12.00	24.00	16.7744	3.1688
Language Arts & Social Studies Average Class Size	43	11.00	22.00	16.1372	2.5867
Mathematics & Science Average Class Size	43	10.50	22.00	15.6426	2.6172
Language Arts & Mathematics Average Class Size	43	10.50	22.00	15.5024	2.4165
Core Subjects Average Class Size	43	11.00	22.00	15.8899	2.4865
Percentage of Students Receiving Financial Aid	42	.00	49.00	13.0524	10.2389
Percentage of Minority Students	43	1.00	33.00	8.1628	6.6014
Average Years of Experience of Faculty	42	5.00	23.00	14.4310	3.8901
Percentage of Faculty with Advanced Education	41	25.00	96.00	58.0707	19.9514
School Size (Total Enrollment)	43	100.00	488.00	271.6744	102.8605

Section Three

Inferential Statistics of Data with Removed Outliers

Bivariate correlations were used initially to determine any possible relationships between three dependent variables and nine independent variables of the data with removed outliers (see Table 11 and Appendix Tables E1 through E17). The three dependent variables were: SAT Verbal, SAT Mathematics, and SAT Combined scores. The nine independent variables were: Language Arts average class size, mathematics average class size, science average class size, social studies average class size, Language Arts and social studies average class size, mathematics and science average class size, Language Arts and mathematics average class size, core subjects average class size, and school size. Pearson' correlation coefficient levels and Bonferonni's significance levels were employed. Because there were no correlation coefficients of zero, there is some relationship among all of the variables. There were negative correlation coefficients reported among the independent variables, but there were no levels of significance.

Table 11. Bivariate Correlations (Data with Removed Outliers)

Variable	N	Verbal SAT scores	Mathematics SAT scores	Combined SAT scores
Language Arts Average Class Size	43	-.125	-.162	-.154
*Significance Level		.425	.298	.325
Mathematics Average Class Size	43	-.113	-.134	-.128
*Significance Level		.470	.392	.412
Science Average Class Size	43	-.139	-.098	-.131
*Significance Level		.373	.531	.401

Table 11 (continued)

Social Studies Average Class Size	43	-.012	-.121	-.071
*Significance Level		.941	.438	.650
Language Arts & Social Studies Average Class Size	43	-.067	-.152	-.118
*Significance Level		.669	.329	.453
Mathematics & Science Average Class Size	43	-.133	-.121	-.136
*Significance Level		.396	.438	.383
Language Arts & Mathematics Average Class Size	43	-.127	-.158	-.150
*Significance Level		.417	.213	.336
Core Subjects Average Class Size	43	-.105	-.143	-.133
*Significance Level		.503	.360	.395
School Size (Total Enrollment)	43	.221	.225	-.236
*Significance Level		.155	.146	.128

Pearson Correlation
*2-tailed Significance

Univariate correlations of the data with removed outliers were calculated to determine any possible relationships between the three dependent variables and the seven independent variables, while controlling for 14 combinations of four variables (see Appendix Tables F1 through F17). The three dependent variables were: SAT Verbal, SAT Mathematics, and SAT Combined scores. The seven independent variables were: Language Arts average class size, mathematics average class size, Language Arts and social studies average class size, mathematics and science average class size, Language Arts and mathematics average class size,

core subjects average class size, and school size (as determined by total enrollment). The control variables were: percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education. Pearson's correlation coefficient levels and Bonferonni's significance levels were employed. Because there were no correlation coefficients of zero, there is some relationship among the variables. Significant negative correlations were found among two of the independent variables.

The mathematics SAT scores were correlated with the seven independent variables, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience (see Table 12). Levels of significance were found among the following three dependent variables: Language Arts average class size, r (35) = -.36, p=.027; Language Arts and social studies average class size, r (35) = -.32, p=.050; and Language Arts and mathematics average class size, r (35) = -.34, p=.040.

The combined SAT scores were correlated with the seven independent variables, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience (see Table 12). Levels of significance were found among the following two dependent variables: Language Arts average class size, r (35) = -.35, p=.032; and Language Arts and mathematics average class size, r (35) = -.33, p=.048.

Table 12. Partial Correlations (Data with Removed Outliers): Controlling for Percentage of Students Receiving Financial Aid, Percentage of Minority Students, and Average Years of Experience of Faculty

Variable	d.f.	Verbal SAT scores	Mathematics SAT scores	Combined SAT scores
Language Arts Average Class Size	35	-.3139	-.3642	-.3541
*Significance Level		.058	.027**	.032**
Mathematics Average Class Size	35	-.2412	-.2743	-.2617
*Significance Level		.150	.100	.118
Science Average Class Size	35	-.2268	-.1786	-.2132
*Significance Level		.177	.290	.205
Social Studies Average Class Size	35	-.1047	-.2277	-.1753
*Significance Level		.537	.175	.299
Language Arts & Social Studies Average Class Size	35	-.2210	-.3244	-.2859
*Significance Level		.189	.050**	.086
Mathematics & Science Average Class Size	35	-.2487	-.2400	-.2521
*Significance Level		.138	.152	.132
Language Arts & Mathematics Average Class Size	35	-.2956	-.3397	-.3275
*Significance Level		.076	.040**	.048**
Core Subjects Average Class Size	35	-.2476	-.2953	-.2823
*Significance Level		.140	.076	.090
School Size	35	.1132	.1779	.1590
*Significance Level		.505	.292	.347

Pearson Correlation
*2-tailed Significance
**$p \leq .05$

Summary

Chapter IV presented descriptive data and results of the descriptive and inferential statistics of initial data and data with removed outliers. A statistically significant relationship was found between class size and the academic achievement of private, independent high school students in the initial data. A statistically significant relationship was also found between school size and the academic achievement of private, independent high school students. Therefore, the hypotheses were rejected. However, the statistically significant relationships were positive correlations. When outliers were removed, significance levels and negative correlations were found among three independent variables. Chapter V follows with the conclusions of the study and recommendations for further research.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This study examined the relationship between class size, school size, and student achievement. It used the bivariate and partial correlation procedures to determine any possible relationship between class size, school size, and student achievement. Private, independent high schools in the southeastern region of the United States (members of SAIS) were compared. Data were obtained from the schools' completed and returned questionnaires.

Chapter I included the introduction to the study, the statement of the problem, the purpose of the study, the research hypotheses, the definition of terms, the significance of the study, and the limitations of the study. In Chapter II, a review of the related literature provided the foundation for this study. Chapter III described the methodology of the study, which included the data collection and statistical analysis procedures. The findings related to the tested hypotheses were presented in Chapter IV. This chapter will summarize the findings of the research, draw conclusions, discuss the findings, and make recommendations for further research.

Summary of the Findings

The null hypotheses for this study were: there is no statistically significant relationship between class size and the academic achievement of high school students; and, there is no statistically significant relationship between school size and the academic achievement of private, independent high school students. Bivariate and partial correlation procedures were used to test the hypotheses, while controlling for four variables. The variables were: ethnicity of the

students (percentage of minority students); the experience of the faculty (average number of years of faculty experience); the percentage of teachers with advanced education; and socioeconomic status (percentage of students receiving financial aid).

In the initial data, statistically significant positive correlations were found among all independent variables. Because of these significant results, the hypotheses were rejected. Positive, statistically significant relationships between class size and the academic achievement of private, independent high school students, and between school size and the academic achievement of private, independent high school students, were found.

In the data with removed outliers, statistically significant negative correlations were found among three independent variables. Because of these significant results, the hypotheses were rejected. A negative, statistically significant relationship between class size and the academic achievement of private, independent high school students was found.

Conclusions

Fraenkel and Wallen (2000) reported that when examining correlation coefficients in the testing of research hypotheses, levels of the magnitude of *r* differ in their theoretical and practical importance. When *r* ranges from .00 to .40, there is theoretical value but little practical importance, while *r* ranging from .41 to .60 signifies both theoretical as well as practical importance (Fraenkel & Wallen, 2000). While this study found 23 statistically significant relationships of class size and student achievement and 12 statistically significant relationships of school size and student achievement at the .05 level within the initial data, there were only 5 relationships involving class size having the *r* magnitude of .33 or greater. These magnitude levels were approaching the *r* magnitude level of both theoretical and practical importance. These significant relationships, though, reported positive correlations, which was undesirable for

the study. The study reported 5 relationships in the data with removed outliers among the class size variables having an *r* magnitude of .32 or greater. These relationships also reported the desired negative correlations.

Conclusions: Initial Data

The correlation of Language Arts average class size with SAT verbal scores in the initial data, when controlling for the percentage of student receiving financial aid and the percentage of faculty with advanced education, reported the highest magnitude of *r*: r (51) = .3461, p=.011, while when controlling for the percentage of students receiving financial reported the highest level of significance: r (57) = .3394, p=.009. The correlation of Language Arts and social studies average class size with SAT verbal scores, when controlling for the percentage of student receiving financial aid and the percentage of faculty with advanced education, reported the highest magnitude of *r* and the highest significance level: r (51) = .3725, p=.006. Therefore, when controlling for socioeconomic status and faculty advanced education, the Language Arts average class size correlated with achievement on the verbal section of the SAT resulted in r^2=.138. This coefficient of determination indicated that the two variables had a shared variance of 13.8%.

The correlation of mathematics average class size with SAT mathematics scores in the initial data, when controlling for the percentage of student receiving financial aid, and the correlation of mathematics and science average class size with SAT mathematics scores, when controlling for the percentage of student receiving financial aid, both were significant at the .05 level, but neither reported a magnitude of *r* greater than .30. Therefore, the relationship between the mathematics average class size and the achievement of the mathematics section of the SAT is significant, but according to Fraenkel and Wallen (2000) it is not of practical significance.

The correlation of Language Arts and mathematics average class size with SAT combined scores in the initial data, when controlling for the percentage of student receiving financial aid, reported the highest magnitude of *r* and highest level of significance: *r* (57) = .3243, *p*=.012. The correlation of core courses average class size with SAT combined scores, when controlling for the percentage of student receiving financial aid and the percentage of faculty with advanced education, reported the highest magnitude of *r*: *r* (51) = .3372, *p*=.014, while when controlling for the percentage of students receiving financial aid reported the highest level of significance: *r* (57) = .3281, *p*=.011. Therefore, when controlling for socioeconomic status and faculty advanced education, the average Language Arts and mathematics class size correlated with the combined score on the SAT resulted in a shared variance of 10.5%, 11.3%, and 10.7% respectively.

The correlation of school size with SAT verbal scores in the initial data, when controlling for the percentage of student receiving financial aid and the percentage of minority students, reported the highest magnitude of *r* and the highest significance level: *r* (55) = .3450, *p*=.009. The correlation of school size with SAT mathematics scores, when controlling for the percentage of student receiving financial aid and the percentage of minority students, reported the highest magnitude of *r* and the highest significance level: *r* (55) = .3461, *p*=.008. The correlation of school size with SAT combined scores, when controlling for the percentage of student receiving financial aid and the percentage of minority students, reported the highest magnitude of *r* and the highest significance level: *r* (55) = .3626, *p*=.006. Therefore, school size correlated with verbal scores on the SAT, with mathematics scores on the SAT, and with combined scores on the SAT, reported a shared variance of 11.9%, 12.0%, and 13.1% respectively.

Conclusions: Data with Removed Outliers

The correlation of SAT mathematics scores with Language Arts average class size with removed outliers, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience reported the highest magnitude of *r* and the highest significance level: r (35) = -.3642, p=.027. The correlation of SAT mathematics scores with Language Arts and mathematics average class size with removed outliers, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience reported the second highest magnitude of *r*: r (35) = -.3397, p=.040. Therefore, when controlling for socioeconomic status, ethnicity, and faculty experience, achievement on the mathematics section of the SAT correlated with the Language Arts average class size resulted in r^2=.133 and with the Language Arts and mathematics class size resulted in r^2=..115. These coefficients of determination indicated that the two variables had a shared variance of 13.3% and 11.5% respectively.

The correlation of SAT combined scores with Language Arts average class size with removed outliers, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience reported the highest magnitude of *r* and the highest significance level: r (35) = -.3541, p=.032. The correlation of SAT combined scores with Language Arts and mathematics average class size with removed outliers, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience reported the second highest magnitude of *r*: r (35) =-.3275, p=.048. Therefore, when controlling for socioeconomic status, ethnicity, and faculty experience, achievement on the combined section of the SAT correlated with the Language Arts average class size resulted in r^2=.125 and with the Language

Arts and mathematics class size resulted in r^2=.107. These coefficients of determination indicated that the two variables had a shared variance of 12.5% and 10.7% respectively.

The correlation of SAT mathematics scores with Language Arts and social studies average class size with removed outliers, while controlling for percentage of students receiving financial aid, percentage of minority students, and the average number of years of faculty experience reported the lowest magnitude of *r*: r (35) = -.3244, p=.050. Therefore, when controlling for socioeconomic status, ethnicity, and faculty experience, achievement on the mathematics section of the SAT correlated with the Language Arts and social studies average class size resulted in r^2=.105. This coefficient of determination indicated that the variable had a shared variance of 10.5%. This result, though, does not report any significant and practical relevance. Language Arts and social studies classes have no effect on mathematics achievement scores.

The null hypotheses for this study were: there is no statistically significant relationship between class size and the academic achievement of high school students; and, there is no statistically significant relationship between school size and the academic achievement of private, independent high school students. Statistical significance was found, and the null hypotheses were rejected. The conclusion from the initial data in this study is that there were significant, but positive, correlations between class size, school size, and the academic achievement of private, independent high school students. The conclusion from the data with removed outliers in this study is that there was a significant, and practical, negative correlation between class size and the academic achievement of private, independent high school students.

Discussion

The initial data reported a strong, positive relationship between class size and student achievement among private, independent schools. Pritchard (1999) reported when class sizes are between 15 and 20 students, there was significant increase in achievement among public school students. The core subjects average class size mean of the initial data was 15.6 (SD=3.38). The data with removed outliers reported a strong, negative relationship among class size and student achievement among private, independent schools. The core subjects average class size mean of the data with removed outliers was 15.9 (SD=2.49). Therefore, this study found, according to Pritchard (1999) and Achilles (1995), class sizes within a range that should influence student achievement positively.

The initial data reported a strong, positive relationship between school size and student achievement among private, independent schools. Irmsher (1997) and Meier (1996) reported the "ideal" or "optimal" school size is 300 to 400 students, while Barker (1986), Glass (1982), and Lee and Smith (1997) reported the ideal size of a high school is 600 to 900 students. The school size mean of the initial data was 348.5 (SD=237.04), with a minimum of 60 and a maximum of 1032. Therefore, this study found school sizes that are within a range, which should influence student achievement positively.

Recommendations

Based on the results of this study, the following recommendations for further study are made:

1. The impact of class size and school size on academic achievement in private, independent school should be studied from a nationwide (and worldwide) sampling of private, independent schools.

2. The impact of class size and school size on academic achievement in private, independent schools should be studied focusing on schools with an enrollment greater than 600 students.
3. The impact of class size and school size on academic achievement in private, independent schools should be studied in relation to public schools in the same geographical area.
4. Further research should take place on the effects of class size and school size on private, independent elementary school students related to the effects on private, independent middle and high school students.

REFERENCES

Achilles, C. M. (1995). *Summary of recent class-size research with an emphasis on Tennessee's Project STAR and its derivative research studies.* Nashville, TN: Tennessee State University, Center of Excellence for Research and Policy on Basic Skills.

Achilles, C. M., Finn, J.D., & Pate-Bain, H. (2002). Measuring class size: Let me count the ways. *Educational Leadership*, 59(5), 24-26.

Achilles, C. M., & Sharp, M. (1998). Solve your puzzles using class size and pupil-teacher ratio (PTR) differences. *Catalyst for Change*, 28(1), 5-10.

Ayers, P. D. (1999). *Exploring the relationship between high school facilities and achievement of high school students in Georgia.* Unpublished doctoral dissertation, University of Georgia, Athens.

Baird, L. L. (1977). *The elite schools.* Lexington, MA: D. C. Heath and Company.

Barker, B. O. (1986). *The advantages of small schools*. *ERIC Digests*. Retrieved August 4, 2002, from http://www.ed.gov/databases/ERIC_Digests/ed265988.html.

Beadie, N., & Tolley, K. (Eds.). (2002). *Chartered schools: Two hundred years of independent academies in the United States, 1727-1925*. New York: Routledge Falmer.

Biddle, B. J. & Berliner, D. C. (2002). Small class size and its effects. *Educational Leadership*, 59(5), 12-23.

Blackmer, A. R. (1970). *An inquiry into student unrest in independent secondary schools.* Boston, MA: National Association of Independent Schools.

Brown v. Board of Education, 347 U.S. 483 (1954).

Choy, S. P. (1998). Public vs. private schools. *Principal, 77*(5), 28, 30-32.

Choy, S. P. (1997). *Public and private schools: How do they differ? Findings from "The conditions of education, 1997," No. 12.* Washington, DC: U.S. Government Printing Office, Superintendent of Documents. (ERIC Document Reproduction Service No. ED411593)

Chrispeels, J. H. (2002). The California center for effective schools: The Oxnard school district partnership. *Phi Delta Kappan, 83*(5), 382-387.

Coleman, J. (1966). *On equality of educational opportunity.* Washington, DC: U.S. Department of Health, Education, and Welfare, Office of Education/National Center for Education StatisticsColeman, J., & Hoffer, T. (1987). *Public and private high schools. The impact on communities*. New York: Basic Books, Inc.

Conant, J. B. (1959). *The American high school today*. New York: McGraw Hill.

Cooper, B. S. (1988). The changing universe of U. S. private schools. In T. James, & H. M. Levin (Eds.), *Comparing public and private schools: Volume 1: Institutions and organizations*, (pp.9-45). New York: The Falmer Press.

Cotton, K. (1997). *School size, school climate, and student performance*. Retrieved August 26, 2002, from http://www.nwrel.org/scpd/sirs/10/c020.html.

Cotton, K. (1996). *Affective and social benefits of small-scale schooling.* Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools. (ERIC Document Reproduction Service No. ED401088)

Edwards, N., & Richey, H. G. (1963). *The school in the American social order*. Boston, MA: The Houghton Mifflin Company.

Edmonds, R. (1979). Effective schools for the urban poor. *Educational leadership*, 37(1), 15-27.

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.

Finn, J. D. (1998). *Class size and students at risk: What is known? What is next.* Washington, DC: National Institute on the Education of At Risk Students. Office of Educational Research and Improvement. U.S. Department of Education. Retrieved on August 17, 2002, from http://www.ed.gov/pubs/ClassSize/title.html.

Finn, J. D., & Achilles, C. M. (1990). Answers about questions about class size: A statewide experiment. *American Educational Research Journal*, *27*, 557-577.

Finn, J. D., Achilles, C. M., Bain, H. P., Folger, J., Johnston, J. M., Lintz, M. N., & Word, E. R. (1990). Three years in a small class. *Teaching and Teacher Education, 6*(2), 127-136.

Fraenkel, J. R., & Wallen, N. E. (2000). *How to design & evaluate research in education* (4th ed.). Boston, MA: McGraw Hill.

Fried, R. (Ed.). (1982). *Effective schooling in a rural context: A New Hampshire view.* Chelmsford, MA: Northeast Regional Exchange.

Fowler, W. J., Jr. (1992, April). *What do we know about school size? What should we know?* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA. (ERIC Reproduction Service No. ED347675)

Fuller, L. B. (1971). A sense of our own history. *Independent School Bulletin, 31*(2), 26-28.

Gentry, K. J. (2000). *The relationship between school size and academic achievement in Georgia's public high schools.* Unpublished doctoral dissertation, University of Georgia, Athens.

Glass, G. (Ed.). (1982). *School class size: Research and policy.* Beverly Hills, CA: Sage Publications.

Griffeth, R. H. (1990). *Reasons reported by parents for choosing an independent school for their children.* Unpublished doctoral dissertation, University of Georgia, Athens.

Haenn, J. F. (2002, April). *Class size and student success: Comparing the results of five elementary schools using small class sizes.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED464725)

Handley, P. (2002). Every classroom teacher's dream. *Educational Leadership*, *59*(5), 33-35.

Hawley,W. D., Ed. (2002). *The keys to effective schools: Educational reform as continuous improvement*. Thousand Oaks, CA: Corwin Press, Inc.

Howley, C. (1994). *The academic effectiveness of small-scale schooling*. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools. (ERIC Document Reproduction Service No. ED372897)

Howley, C. B., & Bickel, R. (2000). *When it comes to schooling…small works: School size, poverty, and student achievement.* Randolph, VT: Rural School and Community Trust. (ERIC Document Reproduction Service No. ED447973)

Huang, G., & Howley, C. (1993). Mitigating disadvantage: Effects of small-scale schooling on student achievement in Alaska. *Journal of Research in Rural Education, 9*(3), 137-149.

Hunn-Sannito, R., Hunn-Tosi, R., & Tessling, M. (2001). *Classroom size: Does it make a difference?* Chicago, IL: Saint Xavier University Master of Arts Action Research Project. (ERIC Document Reproduction Service No. ED453601)

Irmsher, K. (1997). *School size. ERIC Digest, Number 113*. Retrieved August 24, 2002, from http://www.ed.gov/databases/ERIC_Digests/ed414615.html.

Johnson, J. D., Howley, C. B., & Howley, A. A. (2002). Size, excellence, and equity: A report on Arkansas schools and districts. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools. (ERIC Document Reproduction Service No. ED459987)

Johnson, C. B., & Schneider, B. L. (1985, March-April). *Trends in private schools: Schools and class size implications*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL. (ERIC Document Reproduction Service No. ED254958)

Kane, P. R., (Ed.). (1992). *Independent schools, independent thinkers*. San Francisco: Jossey-Bass Publishers.

Kiesling, H. J. (1967). Measuring a local government service: A study of school districts in New York State. *Review of Economics and Statistics*, *49*, 356-367.

Klonsky, M. (1995). *Small schools: The numbers tell a story. A review of the research and current experiences.* Chicago, IL: University of Illinois, College of Education. (ERIC Document Reproduction Service No. ED386517)

Klonsky, M. (2002). How smaller schools prevent school violence. *Educational Leadership, 54*(1), 65-69.

Kraushaar, O. F. (1976). Private schools: From the puritans to the present. *Phi Delta Kappan, Fastback Series, No.78.* (ERIC Document Reproduction Service No. ED119390)

La Sage, E., & Ye, R. (2000, January). *A study of the relationship between students' achievement, school size, and gender.* Paper presented at the annual meeting of the Southwest Educational Research Association, Dallas, TX. (ERIC Document Reproduction Service No. ED445072)

Lee, V. E., & Loeb, S. (2000). School size in Chicago elementary schools: Effects on teachers' attitudes and students' achievement. *American School Board Journal, 37*(1), 3-31.

Lee, V. E., & Smith, J. B. (1997). High school size: Which works best and for whom? *Educational Evaluation and Policy Analysis*, *19*(03), 205-227.

Lee, V. E. & Smi th, J. B. (1996, April). *High school size: Which works best, and for whom?* Paper presented at the annual meeting of the American Educational Research Association, New York, NY.

Levine, D. U. (1992). An interpretive review of U. S. research and practice dealing with unusually effective schools. In D. Reynolds & P. Cuttance (Eds.), *School effectiveness: Research, policy and practice* (pp. 25-47). New York, NY: Cassell Villiers House.

Levine, D. U., Cooper, E. J., & Hilliard, A. (2000). National urban alliance professional development model for improving achievement in the context of effective schools research. *The Journal of Negro Education, 69*(4), 305-322.

Levine, D. U. & Lezotte, L. W. (1990). *Unusually effective schools: A review and analysis of research and practice.* Madison, WI: National Center for Effective Schools Research and Development.

Lezotte, L. W. & Pepperl, J. C. (1999). *The effective schools process: A proven path to learning for all*. Okemos, MI: Effective Schools Products, Ltd.

Lines, P. M. (1986). The new private schools and their historic purpose. *Phi Delta Kappan, 67*(5), 373-79.

March, J. K. & Peters, K. H. (2002). Curriculum development and instructional design in the effective schools process. *Phi Delta Kappan, 83*(5), 379-381.

Meier, D. (1996). The big benefits of smallness. *Educational Leadership, 54*(1), 12-15.

Meier, D. W. (1995). Small schools, big results. *The American School Board Journal*, *182*(7), 12-15.

Mitchell, R. E. (2000, August). *Early elementary class-size reduction: A neo-institutional analysis of the social, political, and economic influences on state-level policymaking.* Paper presented at the annual meeting of the American Sociological Association, Washington, DC. (ERIC Document Reproduction Service No. ED466008)

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*(1), 165-177.

Molnar, A. Smith, P., Zahorik, J., Palmer, A., Halbach, A., & Ehrle, K. (2000). Wisconsin's student achievement guarantee in education (SAGE) class size reduction program: Achievement effects, teaching, and classroom implications. In M. C. Wang & J. D. Finn (Eds.), *How small classes help teachers to do their best* (pp. 227-277). Philadelphia: Temple University, Center for Research in Human Development and Education.

Mosteller, F. (1995). The Tennessee study of class size in the early grades. *Critical Issues for Children and Youths*, *5*(02), 113-127.

Mueller, D. J., Chase, C. I., & Walden, J. D. (1988). Effects of reduced class size in primary classes. *Educational Leadership, 45*(7), 48-50.

Muir, E. (2001). Smaller schools: How much more than a fad? *American Educator, 24*(4), 40-46.

Myers, K. (Ed.). (1996). *School improvement in practice.* Bristol, PA: The Falmer Press.

Nash, M. A. (2002). A triumph of reason: Female education in academies in the New Republic. In N. Beadie & K. Tolley (Eds.), *Chartered schools: Two hundred years of independent academies in the United States, 1727-1925* (pp. 64-86). New York: Routledge Falmer.

Nathan, J. (2002). Using small-schools and shared-facilities research. *Principal Leadership, 2*(6), 37-41.

National Center of Educational Statistics (2002). The digest of educational statistics: 2001. U.S. Department of Education: Office of Educational Research. Available at http://nces.ed.gov//pubs2002/digest2001/list_tables.asp

National Center of Educational Statistics (1997). The condition of education: 1997. U.S. Department of Education: Office of Educational Research. Available at http://nces.ed.gov/pubs/ce/

Nye, K. E. (1995). *The effect of school size and the interaction of school size and class type on selective student achievement measures in Tennessee elementary schools.* Unpublished doctoral dissertation, University of Tennessee, Knoxville.

Palmer, J. M. (1974). *The impact of private education on the rural south*. Austin, TX: National Educational Laboratory Publishers, Inc.

Pierce v. Society of Sisters of the Holy Names of Jesus and Mary, 268 U.S. 510 (1925).

Pritchard, I. (1999). *Reducing class size: What do we know?* Washington, DC: Office of Educational Research and Improvement. U. S. Department of Education. Retrieved August 17, 2002, from http://www.ed.gov/pubs/ReducingClass/title.html.

Ramirez, A. (1990). High school size and equality of educational opportunity. *Journal of Rural and Small Schools, 4*(2), 12-19.

Ramirez, A. (1989). High school size and equality of educational opportunity. *Journal of Rural and Small Schools, 4*(2), 12-19.

Randall, E. V. (1994). *Private schools and public power: A case for pluralism*. New York: Teachers College, Columbia University.

Ravitch, D. (1992). The role of private schools in American education. In P. R. Kane (Ed.), *Independent schools independent thinkers* (pp. 20-26). San Francisco: Jossey-Bass Publishers.

Raywid, M. A. (1996). *Taking stock: The movement to create mini-schools, schools-within-schools, and separate small schools.* Madison, WI: Center on Organizing and Restructuring of Schools. (ERIC Document Reproduction Service No. ED393958)

Raywid, M. A. (2002). The policy environments of small schools and schools-within-schools. *Educational Leadership*, *59*(5), 47-51.

Reynolds, D., Creemers, B. P. M., Nesselrodt, P. S., Schaffer, E. C., Stringfield, S., & Teddlie, C. (1994). *Advances in school effectiveness research and practice.* Tarrytown, NY: Elsevier Science Inc.

Robinson, G. E. (1985). *Effective schools research: A guide to school improvement.* Arlington, VA: Educational Research Service, Inc. (ERIC Document Reproduction Service No. ED252970)

Rogers, B. (1992). *Small is beautiful.* Chicago, IL: Coalition of Essential Schools Center. (ERIC Document Reproduction Service No. ED361163)

The College Board. (2003). *SAT I.* Retrieved July 25, 2003, from http://www.collegeboard.com/student/testing/sat/about/SATI.html.

Schutt, A. (2002). From Anstalt to academy: Moravian boarding education for Native American children in the eighteenth century. In N. Beadie & K. Tolley (Eds.), *Chartered schools: Two hundred years of independent academies in the United States, 1727-1925* (pp. 44-63). New York: Routledge Falmer.

Seybolt, R. F. (1971). *Source studies in American colonial education: The private school*. New York: Arno Press & The New York Times.

Shapson, S. M., Wright, E. N., Eason, G., & Fitzgerald, J. (1978, March). *Results of an experimental study of the effects of class size.* Paper presented at the annual meeting of the American Educational Research Association, Toronto, Ontario.

Sizer, T. Ed. (1964). *The age of academies*. New York: Bureau of Publications, Teachers College, Columbia University.

Smith, S. C., Lumsden, L., Leonard, C., Hertling, E., & Picus, L. O. (2001). *Class Size: Can school districts capitalize on the benefits of smaller classes?* Eugene, OR: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. ED447584)

Smitherman, K. (2003). *Association of Christian schools international.* Retrieved July 1, 2003, from http://www.acsi.org/acsi/.

Solomon, B. (1999). For high schools, small is beautiful. *National Journal,*1484-1485.

SPSS Graduate Pack 10.0 for Windows (1999) [Computer software and manual]. Chicago, IL: SPSS, Inc.

Steller, A. W. (1988). *Effective schools research: Practice and promise*. Bloomington, IN: Phi Delta Kappa Educational Foundation.

Stevenson, K. (1996). Elementary school student capacity: What size is the right size? *The Educational Facility Planner, 33*(4), 10-14.

Swift, D. O. (2000). *Effects of student population density on academic achievement in Georgia elementary schools.* Unpublished doctoral dissertation, University of Georgia, Athens.

Taylor, A., Valentine, B., & Jones, M. (1985). *What research says about: Effective schools, Number 1*. West Haven, CT: National Education Association.

Taylor, B. O. (2002). The effective school process: Alive and well. *Phi Delta Kappan, 83*(5), 375-378.

Taylor, B., Pearson, D., Clark, K., & Walpole, S. (2000). *Beating the odds in teaching all students to read: Lessons from effective schools and accomplished teachers.* Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED450352)

Thomas, S., & Smees, R. (2000, April). *Dimensions of secondary school effectiveness: Comparative analyses across regions.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED441871)

Tolley, K. (2002a). Mapping the landscape of higher schooling, 1727-1850. In N. Beadie & K. Tolley (Eds.), *Chartered schools: Two hundred years of independent academies in the United States, 1727-1925* (pp. 19-43). New York: Routledge Falmer.

Tolley, K. (2002b). Many years before the Mayflower: Catholic academies and the development of parish high schools in the United States, 1727-1925. In N. Beadie & K. Tolley (Eds.), *Chartered schools: Two hundred years of independent academies in the United States, 1727-1925* (pp. 304-328). New York: Routledge Falmer.

Townsend, T. (1994, April). *Community perceptions of the goals of an effective school: A comparison between communities in Austrailia and USA*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED441871)

Viadero, D. (2001). Research: Smaller is better. *Education Week*, *21*(13), 28-30.

Wendling, W., & Cohen, J. (1981). Education resources and student achievement: Good news for students. *Journal of Educational Finance*, *7*(01), 44-63.

Woessmann, L., & West, M. R. (2002). *Class-size effects in school systems around the world: Evidence from between-grade variation in TIMSS.* Cambridge, MA: Harvard University's Kennedy School of Government. (ERIC Document Reproduction Service No. ED467039)

Word, E. R., Johnston, J., Bain, H. P., Fulton, D. B., Boyd-Zaharias, J., Lintz, M. N., Achilles, C. M., Folger, J., & Breda, C. (1990). *Student/Teacher Achievement Ratio (STAR): Tennessee's K-3 Class Size Study.* Nashville, TN: Tennessee State Department of Education.

APPENDICIES

APPENDIX A

RESEARCH LETTER TO SCHOOL ADMINISTRATORS

Date

Mr./Mrs. Administrator
Headmaster
School
School Address
City, State Zip Code

Dear Mr./Mrs. Administrator:

There have been numerous studies completed that support the positive effects of smaller class size on student achievement in public schools. There have been no studies specifically on the effects of class size on student achievement in private schools. I am administrator in a private, independent school and have a personal interest in providing supportive data for private schools. Because I am committed to private schools, I chose to examine the relationship of class size and private schools for the topic of my dissertation. This research is the culminating activity of my doctoral studies under the direction of C. Kenneth Tanner, Professor in the Department of Educational Leadership at the University of Georgia.

You and your school have been randomly selected as one of more than 150 private, independent schools throughout the southeast region of the United States to participate in this study. Please respond to the enclosed survey and return it in the self-addressed and stamped envelope within fifteen days of the date of this letter. The results and responses will remain confidential. Neither you nor your school will be identified in the dissertation.

Completing the survey is voluntary and will take approximately thirty minutes. All participating schools will have an opportunity to receive a copy of a summary of findings once the study has been completed. Please indicate at the end of the survey your name and e-mail address if you are interested in a summary.

Thank you for participating in this important study. The results of this study will be posted under "Class Size and Student Achievement in Private Schools" on UGA's School Design and Planning Laboratory's website at: (http://www.coe.uga.edu/sdpl)

Sincerely,

Mark J. Jones
High School Dean of Students
770-279-7200
E-mail: mjones@providencechristianacademy.org

Additional questions or problems regarding your rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

APPENDIX B

RESEARCH QUESTIONNAIRE

School Code_____

Dear Headmaster,
Please complete the following survey.

1. What was the average SAT score for students in your school in 2001-2002?
   Verbal _____
   Mathematics _____
   Combined _____

2. What was the average high school class size in the core subjects (English, mathematics, science, and social studies)?
   English _____
   Mathematics _____
   Science _____
   Social Studies_____

3. What percentage of your high school student population is comprised of minority students? _____

4. What is the total number of minority students in your high school student population? _____

5. What percentage of your high school student population receives financial aid? _____

6. What is the total number of high school students that receive financial aid? _____

7. What is the average number of years that a high school student has been enrolled in your high school? _____

8. What is the enrollment of your high school?_____

9. What is the average number of years of educational experience of your high school faculty? _____

10. What is the percentage of your high school teaching faculty with the following levels of education:
    (a) Bachelor's degree _____
    (b) Master's degree _____
    (c) Specialist's degree _____
    (d) Doctoral degree _____

Would you like to receive results of this study via e-mail?
Yes _____
No _____

What is your e-mail address?

_____

Thank you for returning this survey.

Mark Jones
mjones@providencechristianacademy.org

APPENDIX C

DESCRIPTIVE STATISTICS OF THE INITIAL DATA

Table C1. Descriptive Statistics for All Variables (Initial Data)

Variable	N	Range	Minimum	Maximum	Mean	Standard Deviation
SAT Verbal score	61	290.00	400.00	690.00	589.0197	58.3015
SAT Mathematics score	61	297.00	400.00	697.00	591.5197	57.2787
SAT Combined score	61	580.00	800.00	1380.00	1179.5721	112.1734
Language Arts Average Class Size	61	17.00	6.00	23.00	15.3066	3.3260
Mathematics Average Class Size	61	17.00	6.00	23.00	15.2215	3.4689
Science Average Class Size	61	19.00	5.00	24.00	15.3861	3.7462
Social Studies Average Class Size	61	19.00	5.00	24.00	16.3836	3.8117
Language Arts & Social Studies Average Class Size	61	17.50	5.50	23.00	15.8451	3.4075
Mathematics & Science Average Class Size	61	17.50	5.50	23.00	15.3038	3.5185
Language Arts & Mathematics Average Class Size	61	17.00	6.00	23.00	15.2640	3.2983
Core Subjects Average Class Size	61	17.50	5.50	23.00	15.5744	3.3816
School Size (Total Enrollment)	61	972.00	60.00	1032.00	348.4590	237.0410

Table C1. (continued)

Percentage of Students Receiving Financial Aid	60	49.00	.00	49.00	12.4817	9.5134
Number of Students Receiving Financial Aid	60	164.00	.00	164.00	43.0333	38.3136
Percentage of Minority Students	60	70.00	.00	70.00	10.7233	11.2192
Number of Minority Students	60	170.00	.00	170.00	37.6000	39.0259
Average Number of Years of Student Enrollment	46	2.00	2.00	4.00	3.5822	.5870
Average Number of Years of Faculty Experience	60	18.00	5.00	23.00	14.1562	3.6629
Percentage of Faculty with Bachelor's Degree	56	71.00	4.00	75.00	40.6964	19.0518
Percentage of Faculty with Master's Degree	56	60.00	20.00	80.00	51.3929	16.2726
Percentage of Faculty with Specialist's Degree	56	20.00	.00	20.00	2.2286	4.5074
Percentage of Faculty with Doctor's Degree	56	20.00	.00	20.00	5.6679	4.8260
Percentage of Faculty with an Advanced Degree	56	71.00	25.00	96.00	59.2893	18.7956

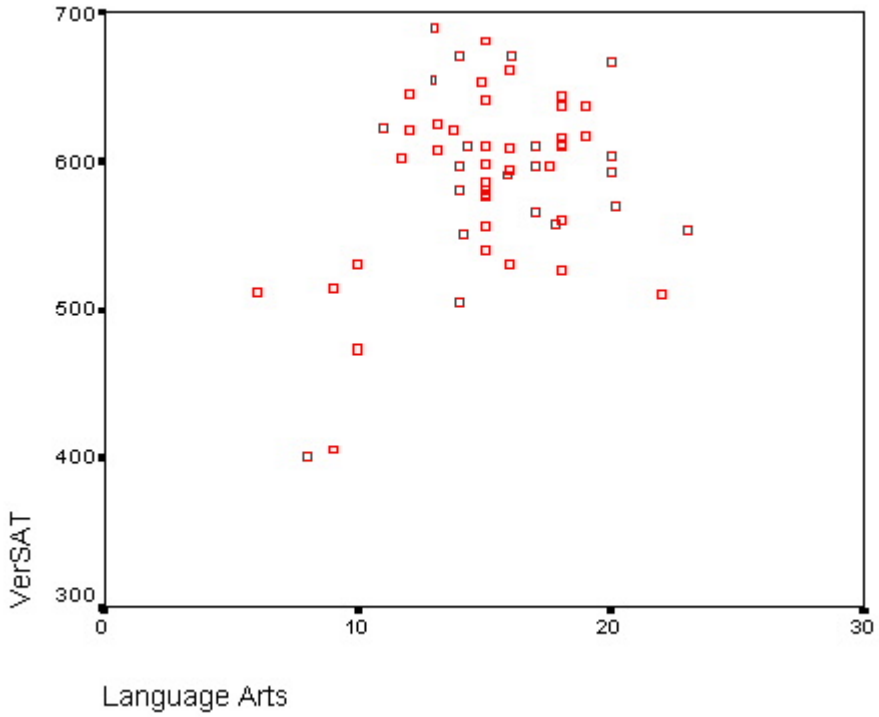

Figure C1. Scatter Plot: Verbal SAT scores vs. Language Arts Average Class Size (Initial Data)

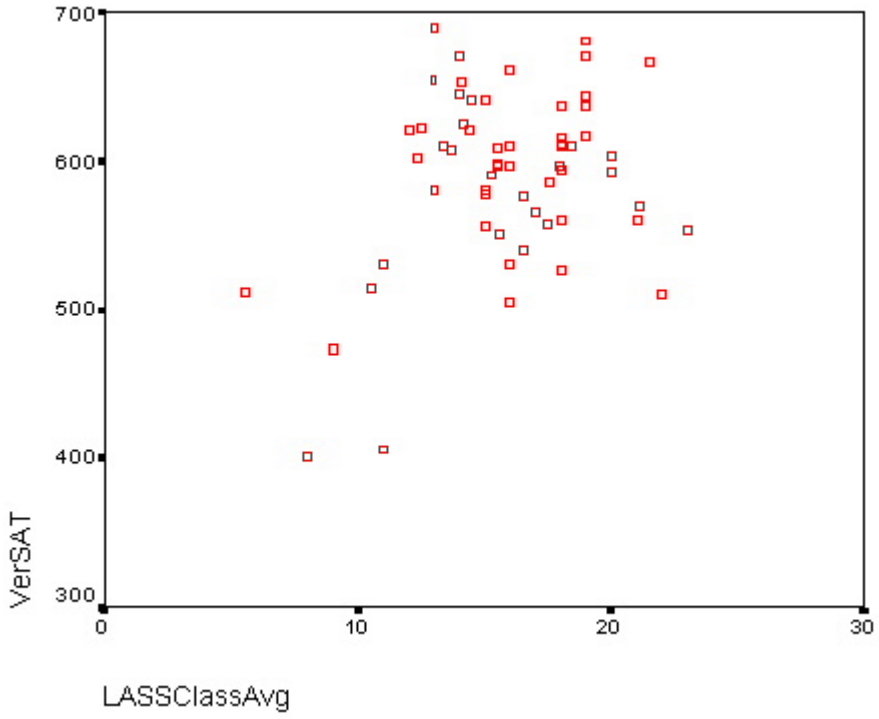

Figure C2. Scatter Plot: Verbal SAT scores vs. Language Arts & Social Studies Average Class Size (Initial Data)

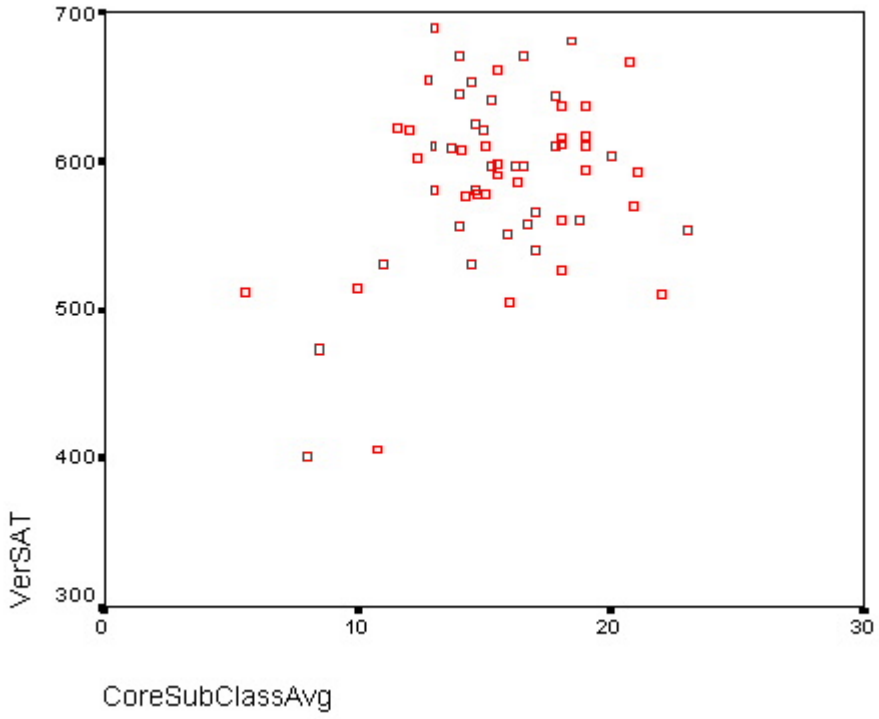

Figure C3. Scatter Plot: Verbal SAT scores vs. Core Subjects Average Class Size (Initial Data)

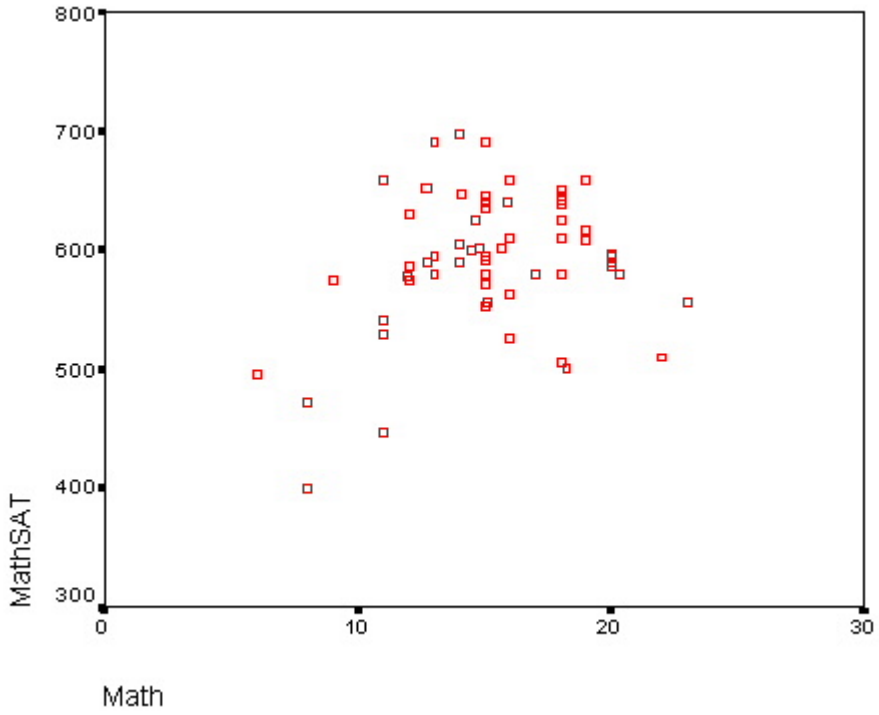

Figure C4. Scatter Plot: Mathematics SAT scores vs. Mathematics Average Class Size (Initial Data)

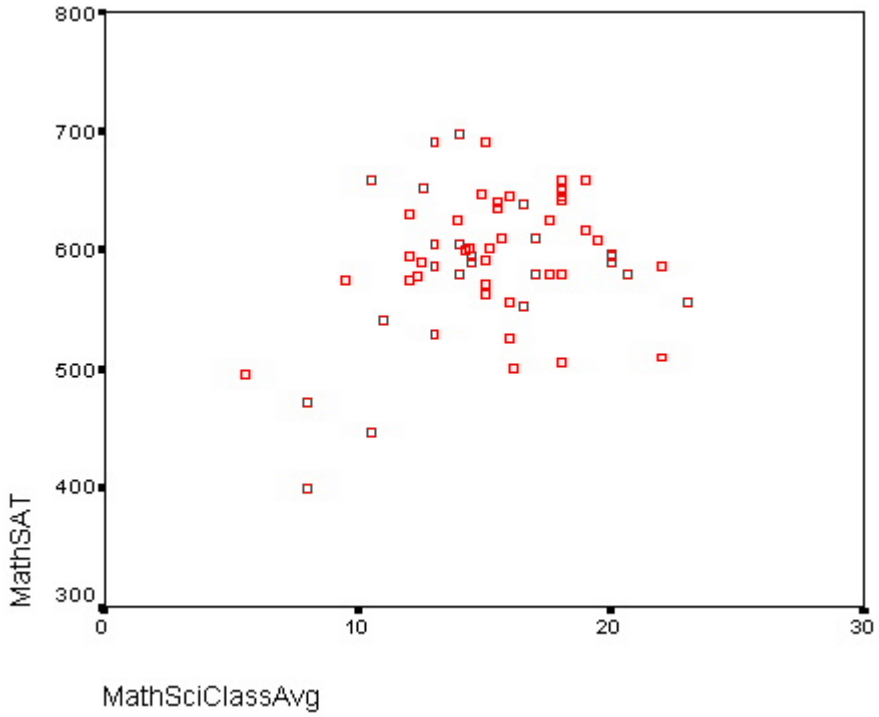

Figure C5. Scatter Plot: Mathematics SAT scores vs. Mathematics & Science Average Class Size (Initial Data)

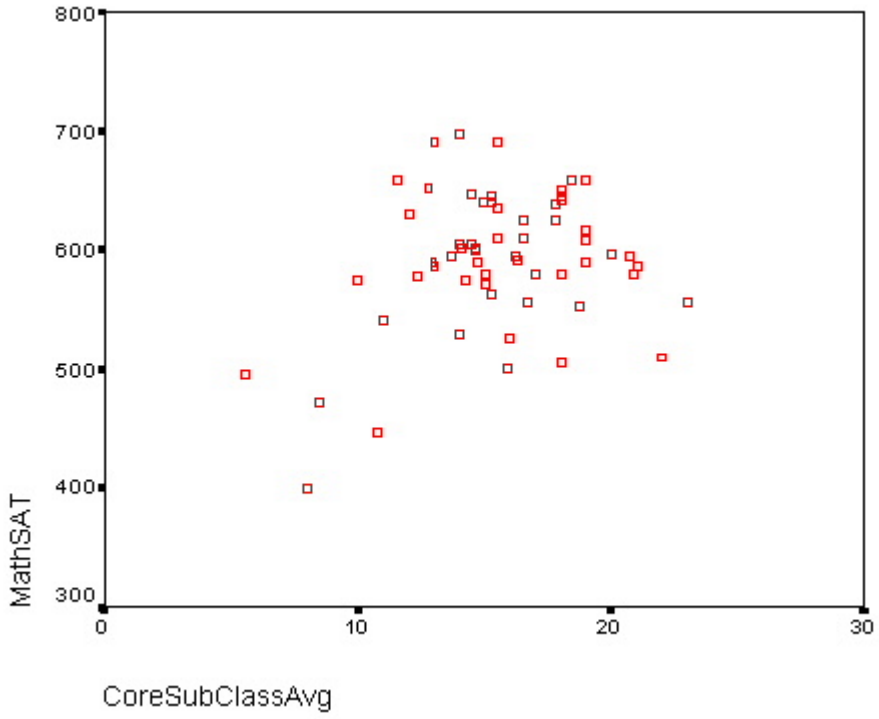

Figure C6. Scatter Plot: Mathematics SAT scores vs. Core Subjects Average Class Size (Initial Data)

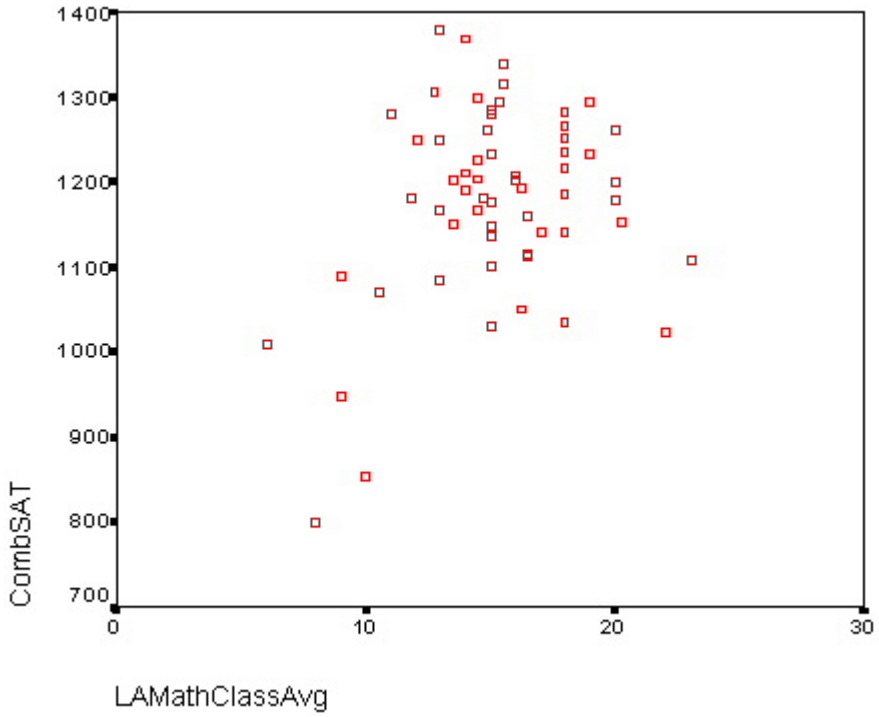

Figure C7. Scatter Plot: Combined SAT scores vs. Language Arts & Mathematics Average Class Size (Initial Data)

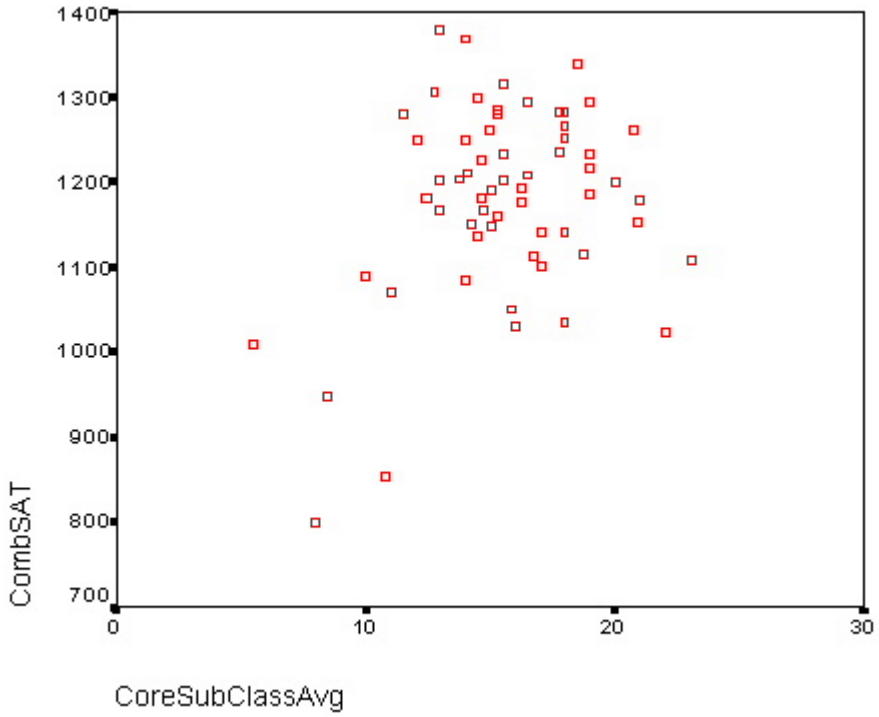

Figure C8. Scatter Plot: Combined SAT scores vs. Core Subjects Average Class Size (Initial Data)

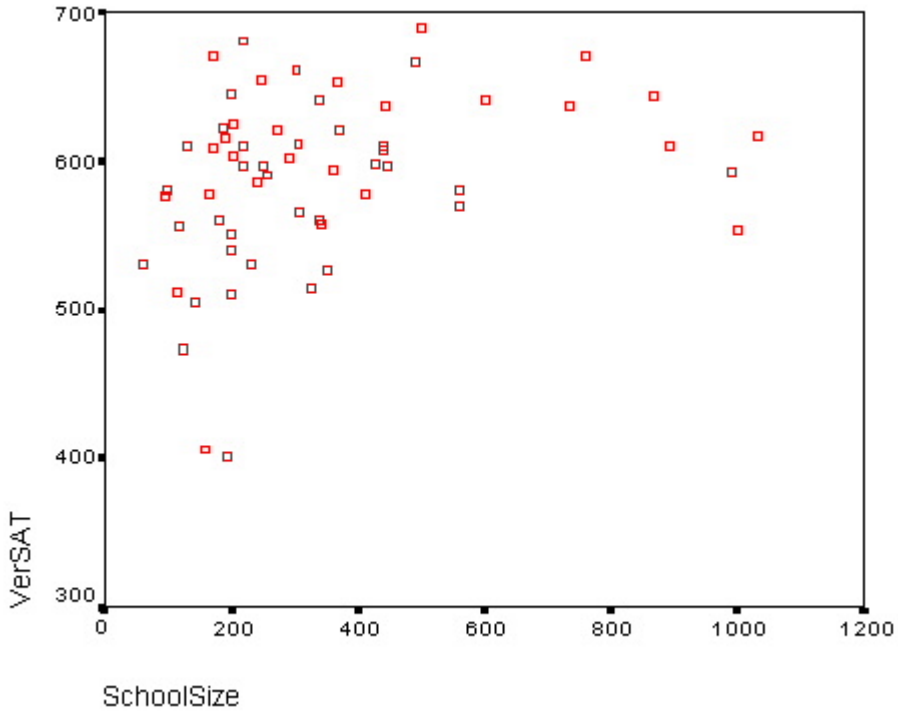

Figure C9. Scatter Plot: Verbal SAT scores vs. School Size (Initial Data)

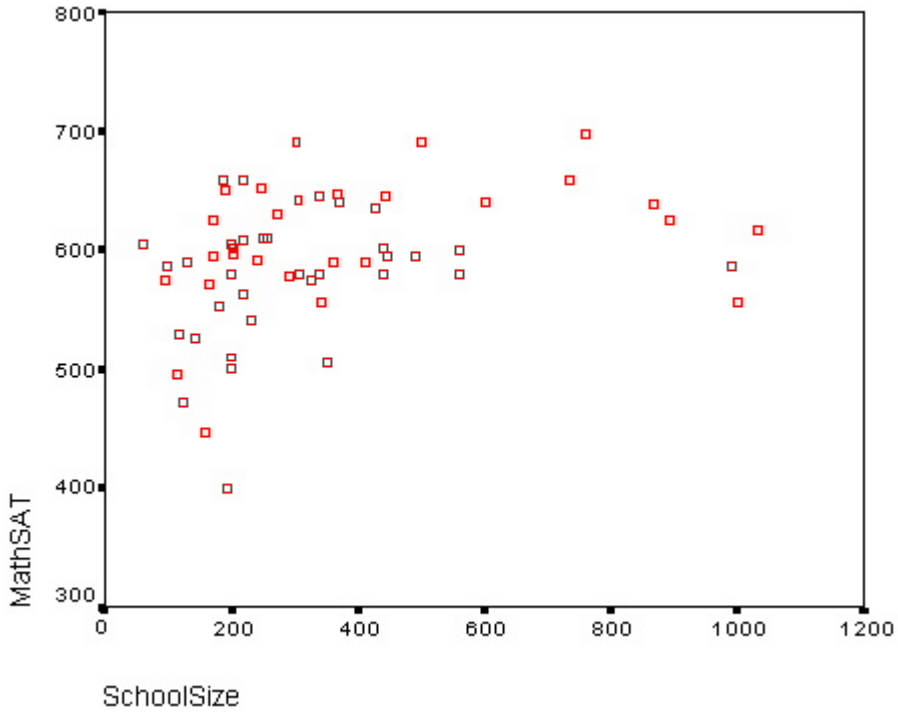

Figure C10. Scatter Plot: Mathematics SAT scores vs. School Size (Initial Data)

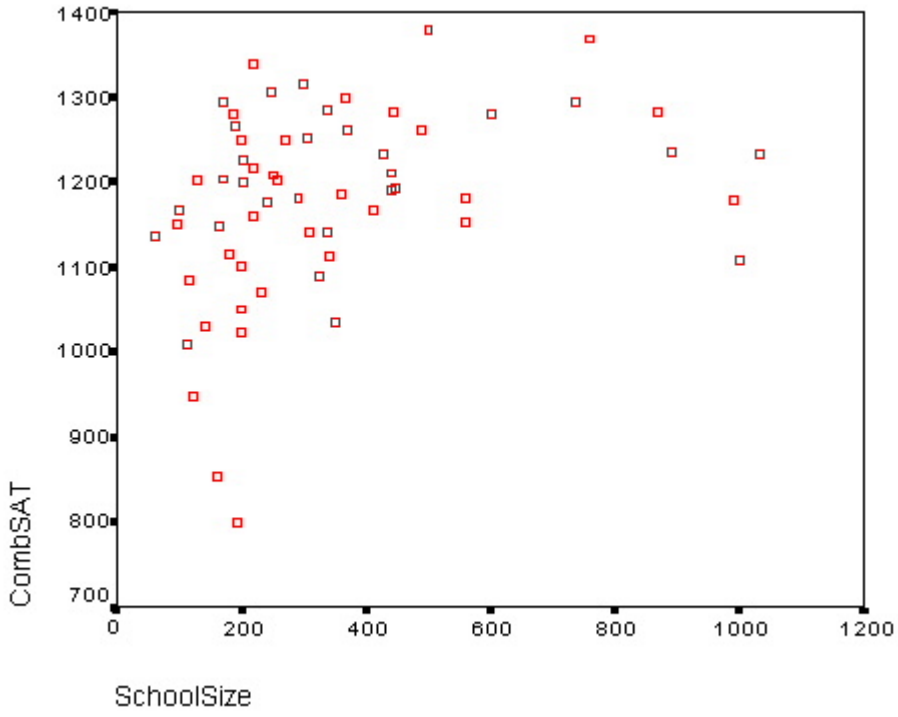

Figure C11. Scatter Plot: Combined SAT scores vs. School Size (Initial Data)

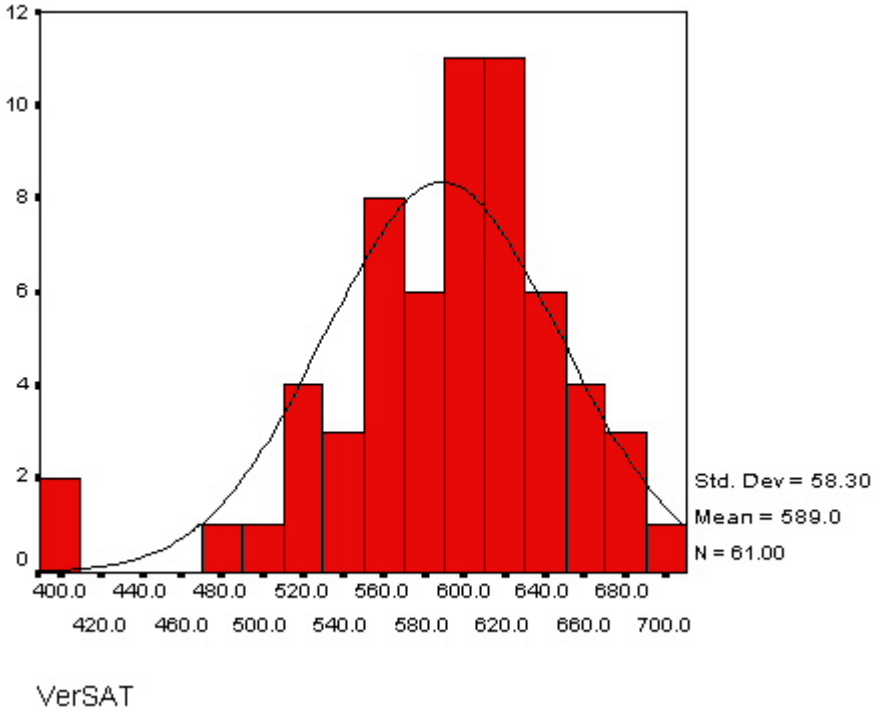

Figure C12. Histogram: Verbal SAT scores (Initial Data)

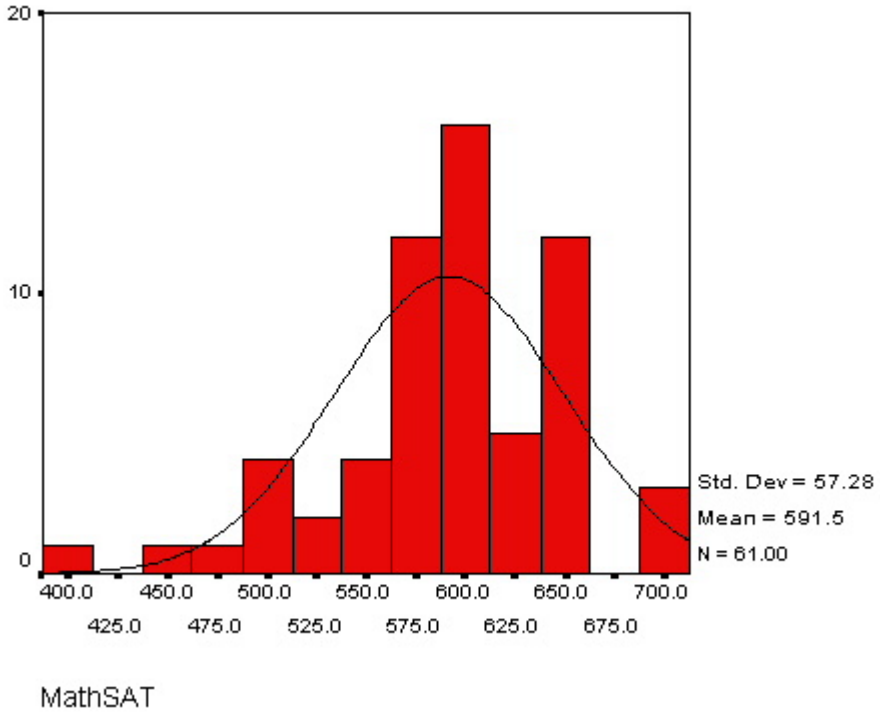

Figure C13. Histogram: Mathematics SAT scores (Initial Data)

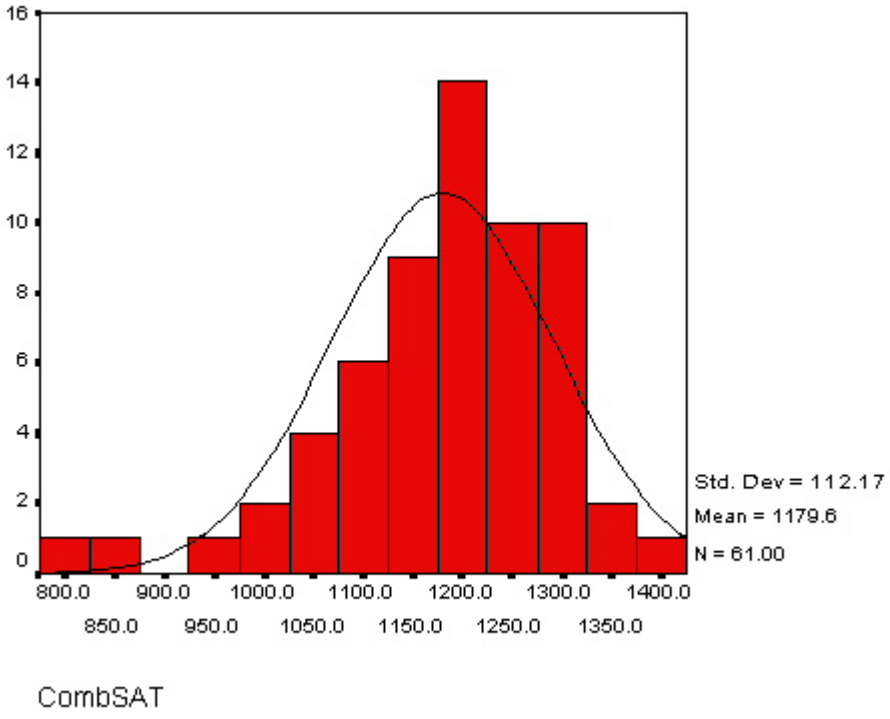

Figure C14. Histogram: Combined SAT scores (Initial Data)

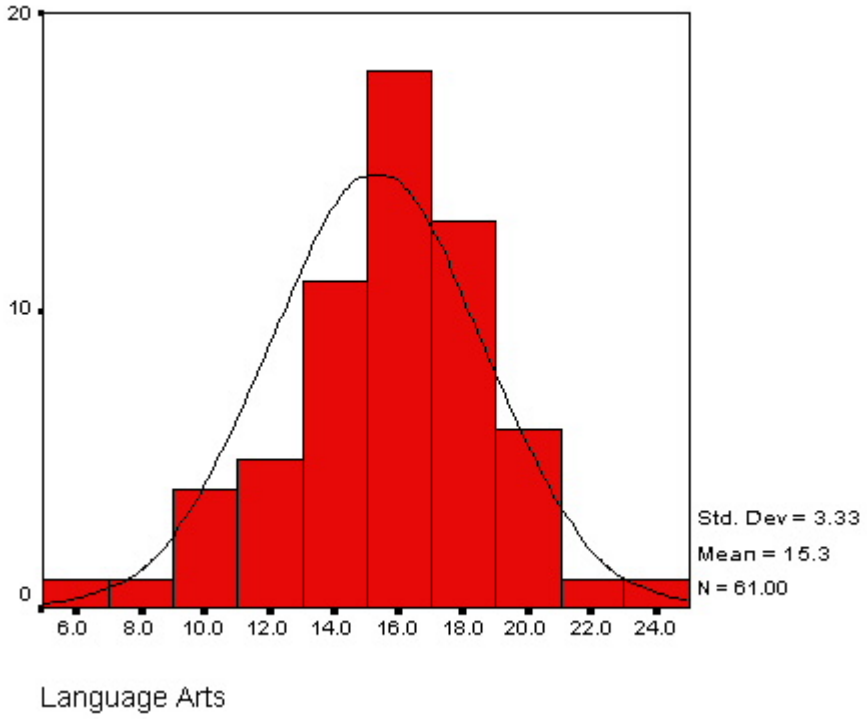

Figure C15. Histogram: Language Arts Average Class Size (Initial Data)

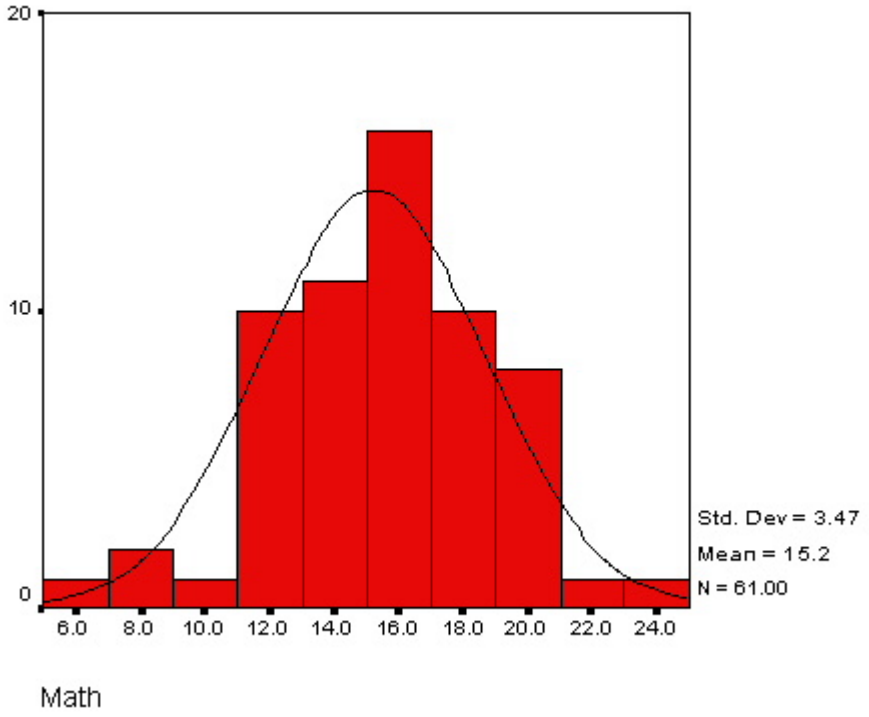

Figure C16. Histogram: Mathematics Average Class Size (Initial Data)

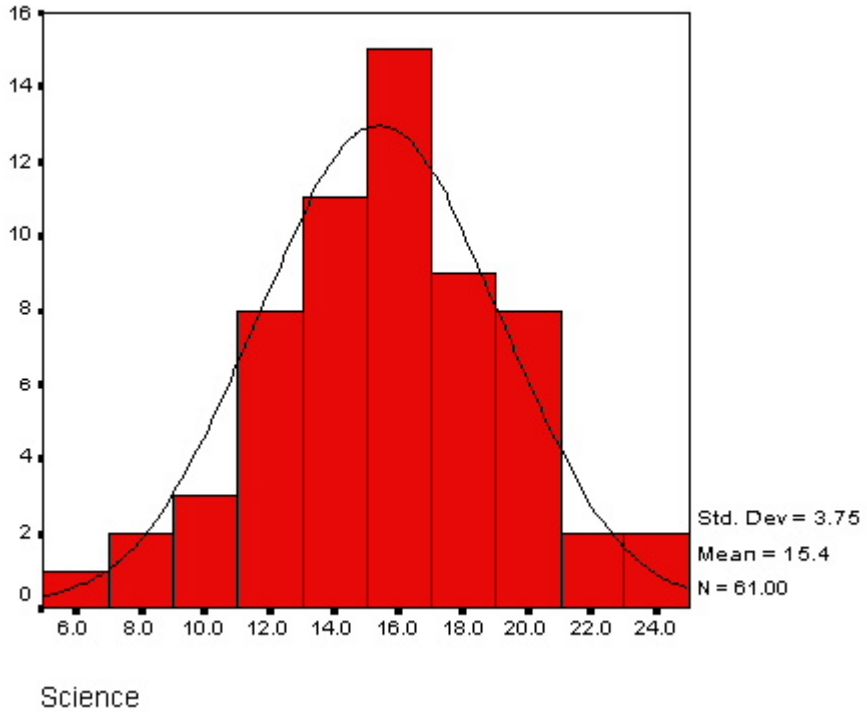

Figure C17. Histogram: Science Average Class Size (Initial Data)

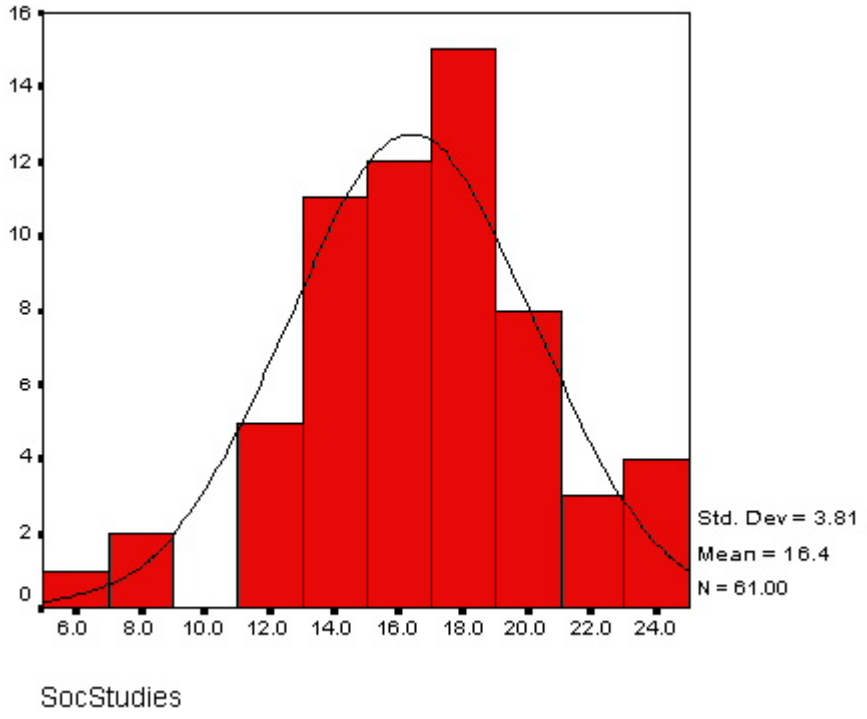

Figure C18. Histogram: Social Studies Average Class Size (Initial Data)

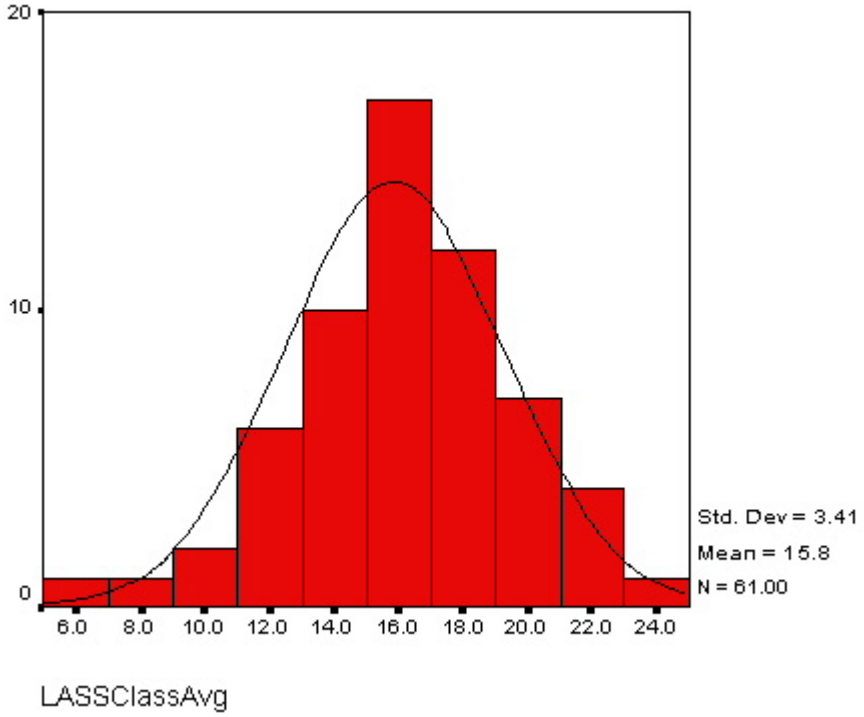

Figure C19. Histogram: Language Arts & Social Studies Average Class Size (Initial Data)

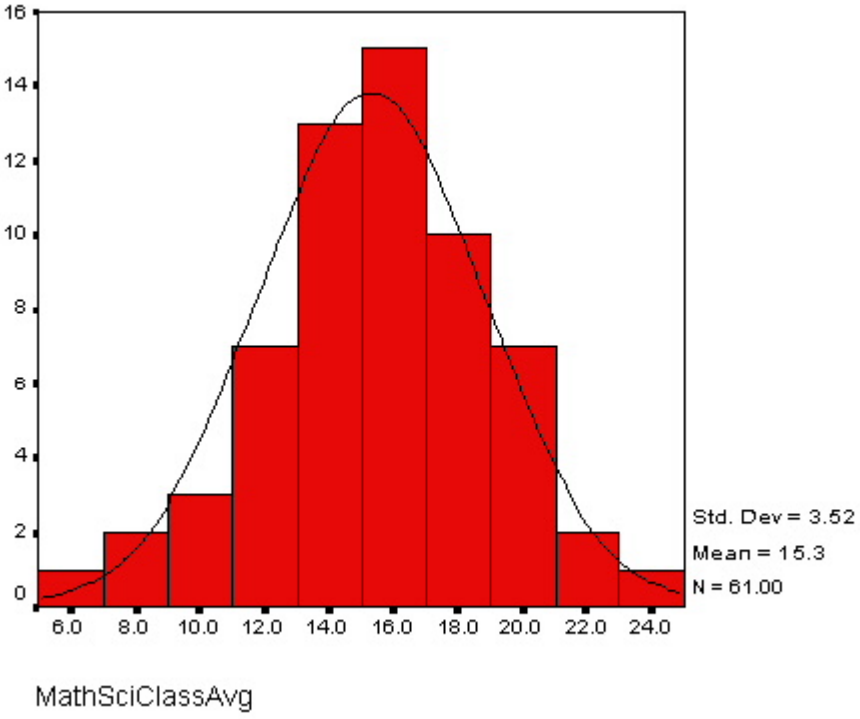

Figure C20. Histogram: Mathematics & Science Average Class Size (Initial Data)

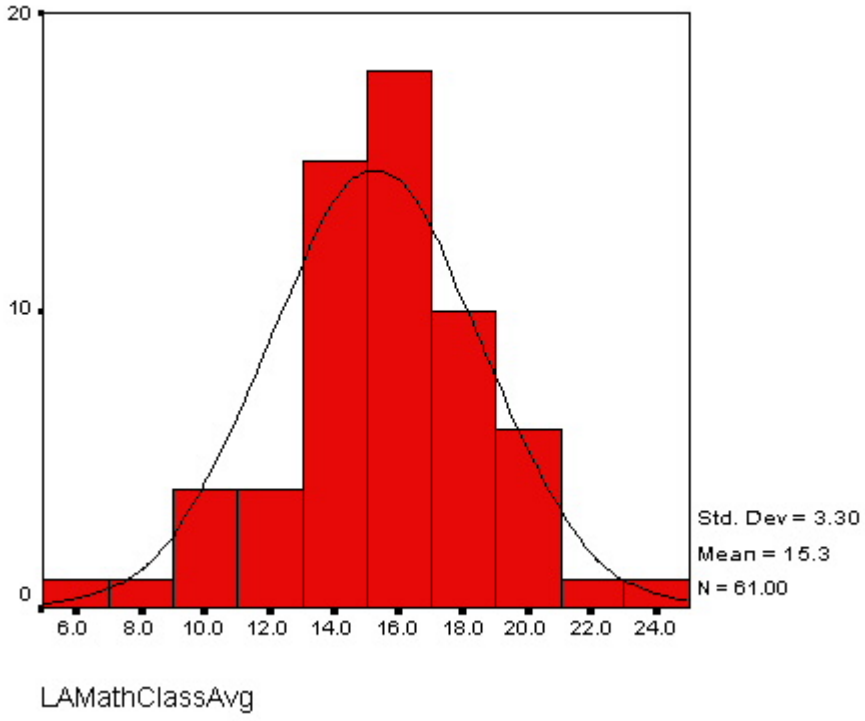

Figure C21. Histogram: Language Arts & Mathematics Average Class Size (Initial Data)

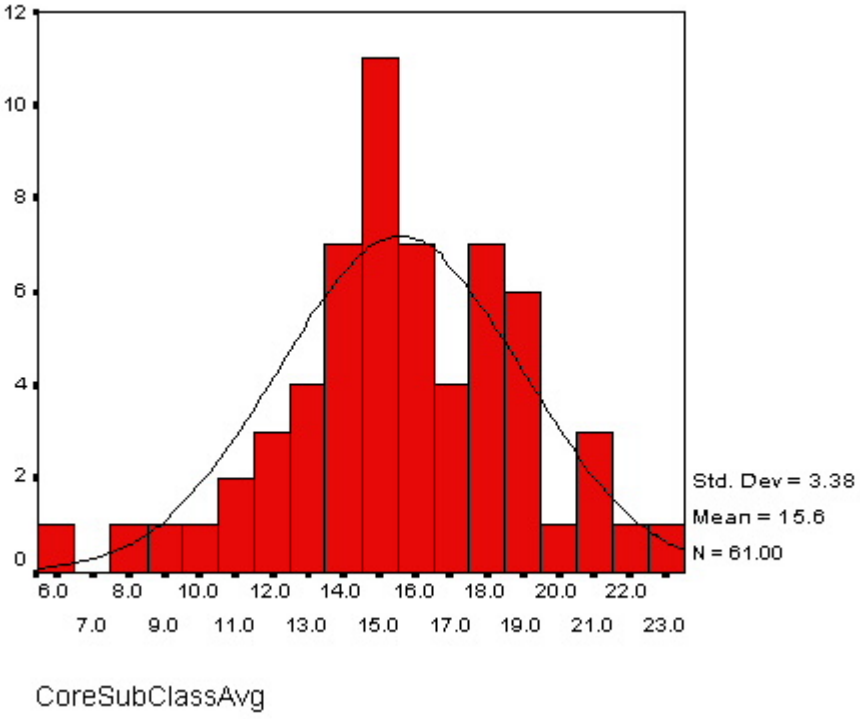

Figure C22. Histogram: Core Subjects Average Class Size (Initial Data)

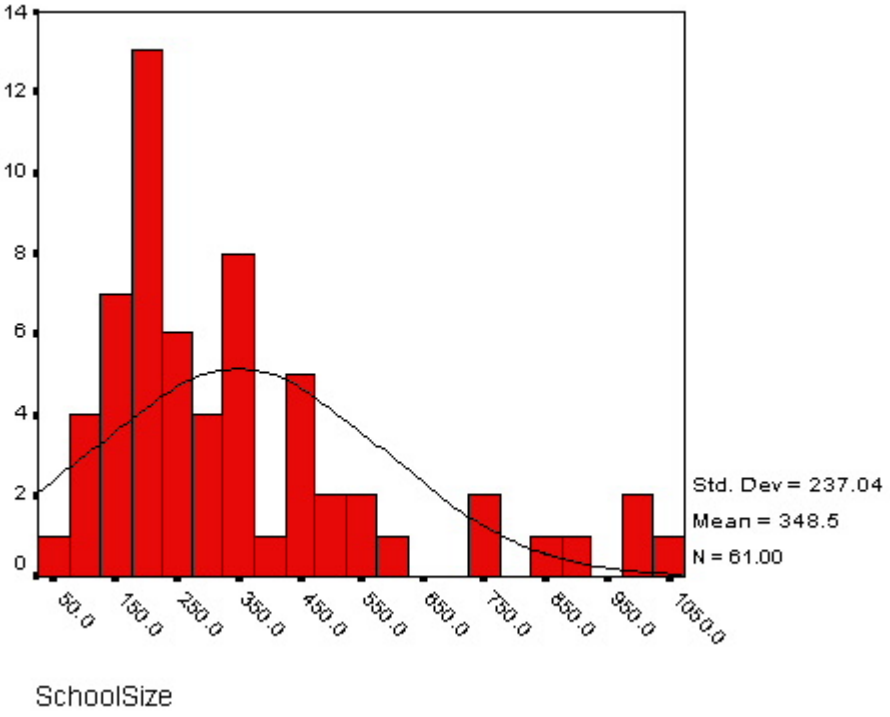

Figure C23. Histogram: School Size (Initial Data)

APPENDIX D

DESCRIPTIVE STATISTICS OF THE DATA WITH REMOVED OUTLIERS

Table D1. Descriptive Statistics of the Data with Removed Outliers

Variable	N	Range	Minimum	Maximum	Mean	Standard Deviation
SAT Verbal score	42	175.00	505.00	680.00	596.4810	41.6039
SAT Mathematics score	42	190.00	500.00	690.00	595.9929	44.6091
SAT Combined score	42	316.00	1022.00	1338.00	1191.0452	82.2625
Language Arts Average Class Size	42	12.00	10.00	22.00	15.3929	2.4141
Mathematics Average Class Size	42	11.00	11.00	22.00	15.3979	2.6133
Science Average Class Size	42	12.00	10.00	22.00	15.6798	2.7793
Social Studies Average Class Size	42	12.00	12.00	24.00	16.6262	3.0526
Language Arts & Social Studies Average Class Size	42	11.00	11.00	22.00	16.0095	2.4771
Mathematics & Science Average Class Size	42	11.50	10.50	22.00	15.5388	2.5578
Language Arts & Mathematics Average Class Size	42	11.50	10.50	22.00	15.3954	2.3403
Core Subjects Average Class Size	42	11.00	11.00	22.00	15.7742	2.3965
School Size (Total Enrollment)	42	345.00	100.00	445.00	266.5238	98.3350

Table D1. (continued)

Percentage of Students Receiving Financial Aid	41	49.00	.00	49.00	13.0780	10.3647
Number of Students Receiving Financial Aid	41	114.00	.00	114.00	35.3659	28.4049
Percentage of Minority Students	42	32.00	1.00	33.00	8.3095	6.6101
Number of Minority Students	42	107.00	1.00	108.00	23.6667	21.7027
Average Number of Years of Student Enrollment	30	1.60	2.40	4.00	3.6397	.4574
Average Number of Years of Faculty Experience	41	15.00	8.00	23.00	14.6610	3.6378
Percentage of Faculty with Bachelor's Degree	40	71.00	4.00	75.00	41.2750	20.3038
Percentage of Faculty with Master's Degree	40	58.00	22.00	80.00	50.9500	16.8906
Percentage of Faculty with Specialist's Degree	40	20.00	.00	20.00	1.8625	4.1679
Percentage of Faculty with Doctor's Degree	40	20.00	.00	20.00	5.6350	4.6790
Percentage of Faculty with an Advanced Degree	40	71.00	25.00	96.00	58.4475	20.0574

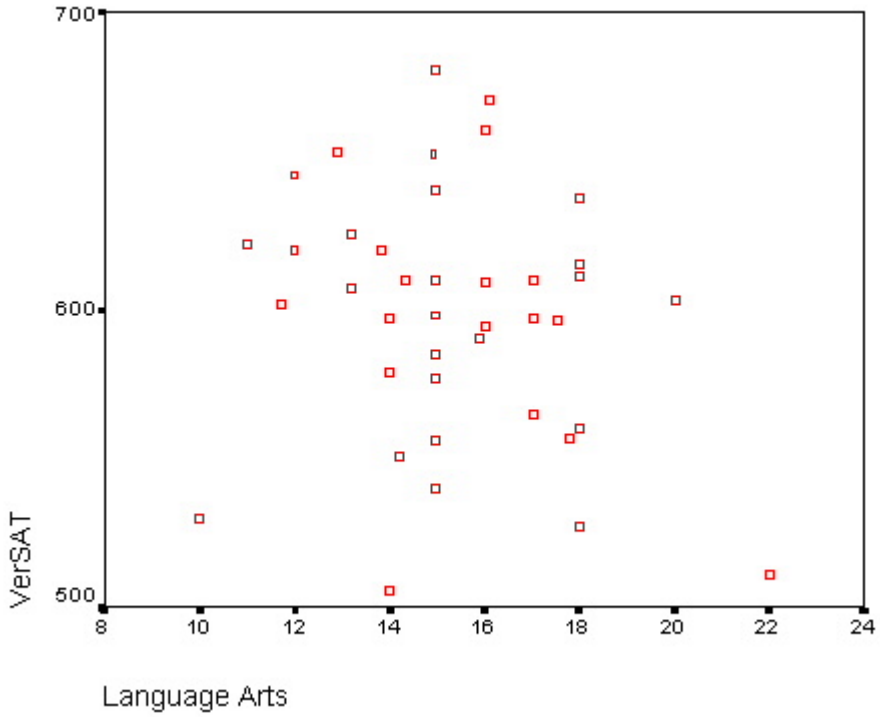

Figure D1. Scatter Plot: Verbal SAT scores vs. Language Arts Average Class Size (Data with Removed Outliers)

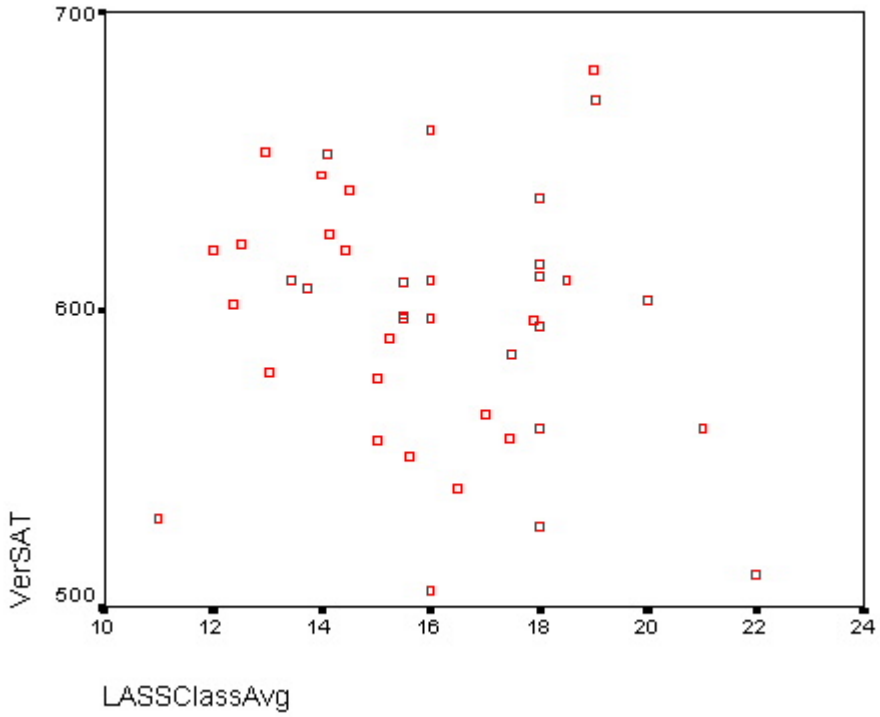

Figure D2. Scatter Plot: Verbal SAT scores vs. Language Arts & Social Studies Average Class Size (Data with Removed Outliers)

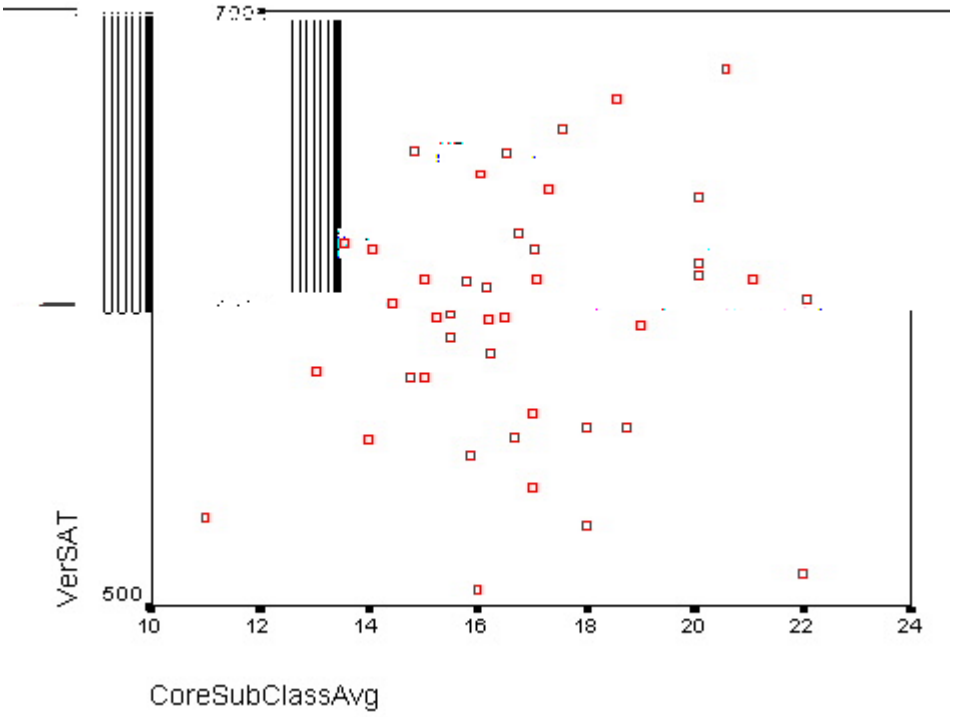

Figure D3. Scatter Plot: Verbal SAT scores vs. Core Subjects Average Class Size (Data with Removed Outliers)

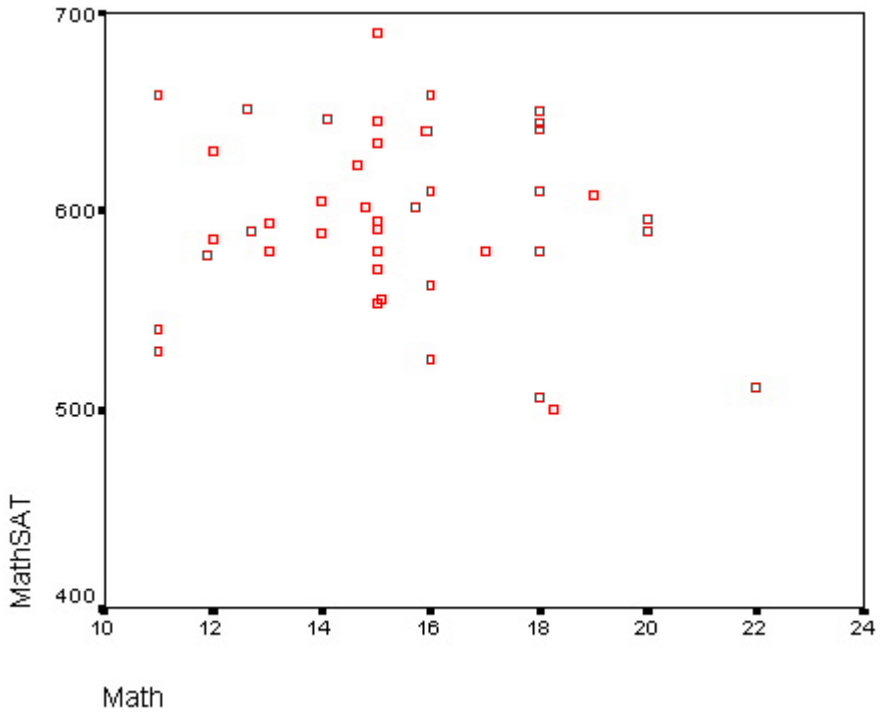

Figure D4. Scatter Plot: Mathematics SAT scores vs. Mathematics Average Class Size (Data with Removed Outliers)

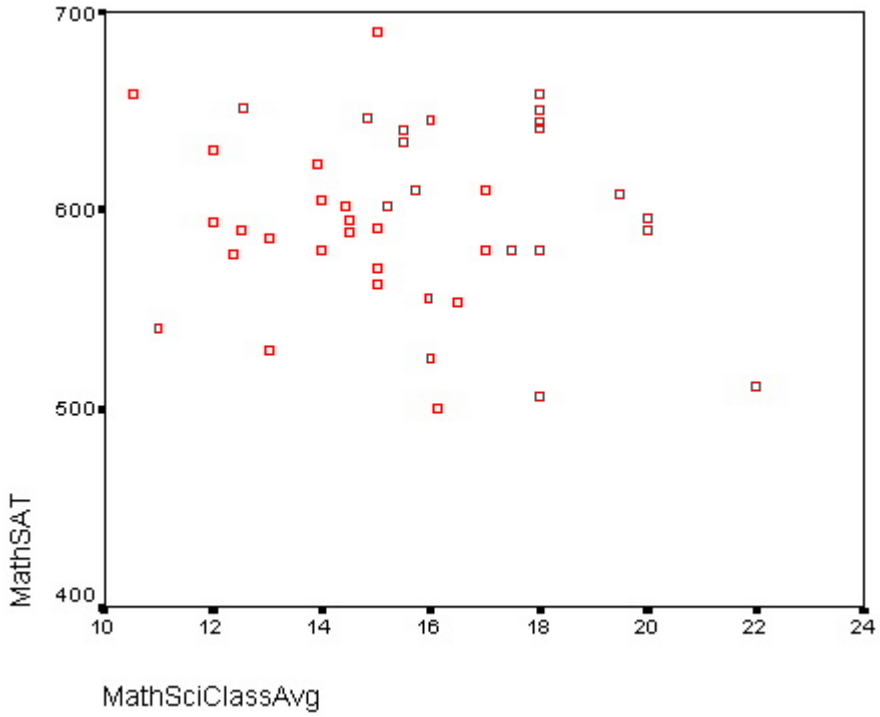

Figure D5. Scatter Plot: Mathematics SAT scores vs. Mathematics & Science Average Class Size (Data with Removed Outliers)

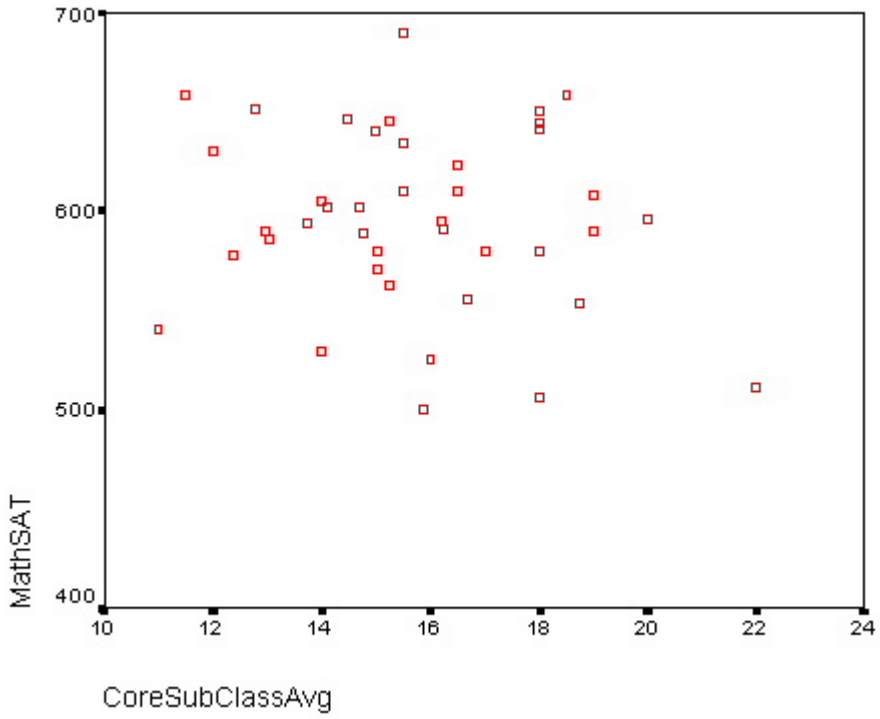

Figure D6. Scatter Plot: Mathematics SAT scores vs. Core Subjects Average Class Size (Data with Removed Outliers)

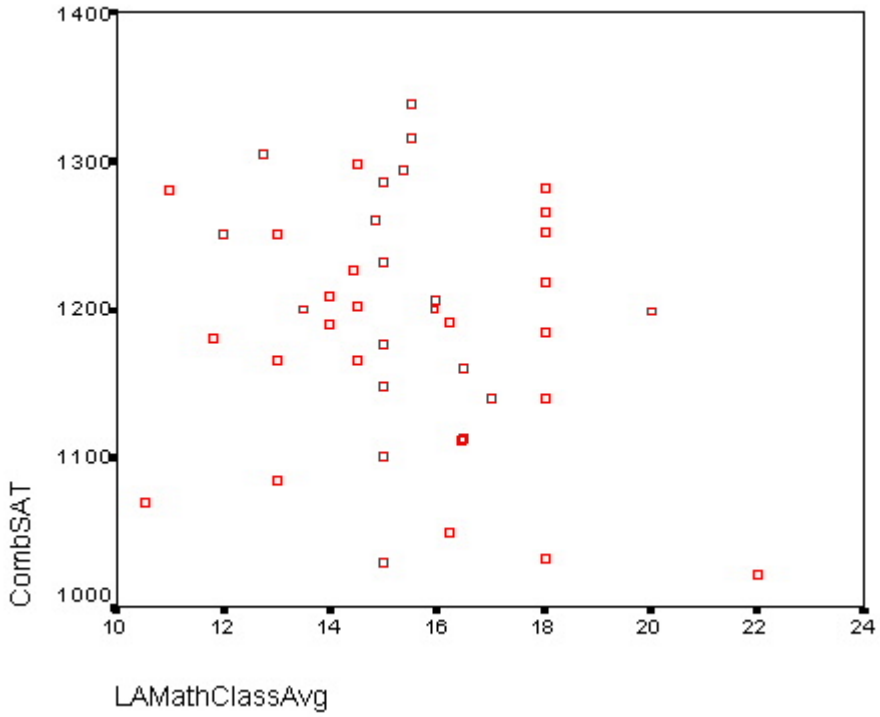

Figure D7. Scatter Plot: Combined SAT scores vs. Language Arts & Mathematics Average Class Size (Data with Removed Outliers)

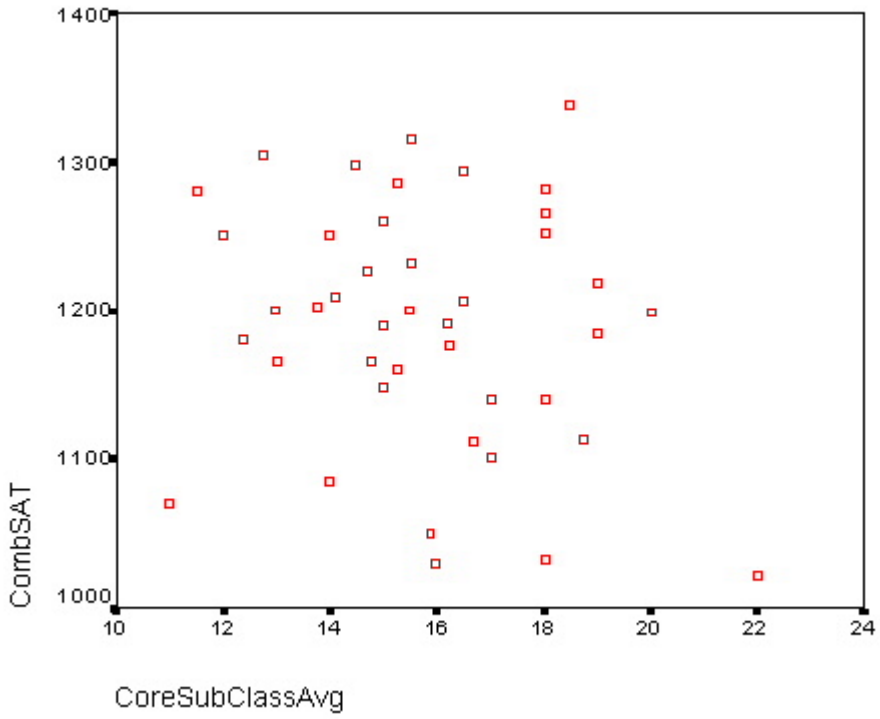

Figure D8. Scatter Plot: Combined SAT scores vs. Core Subjects Average Class Size (Data with Removed Outliers)

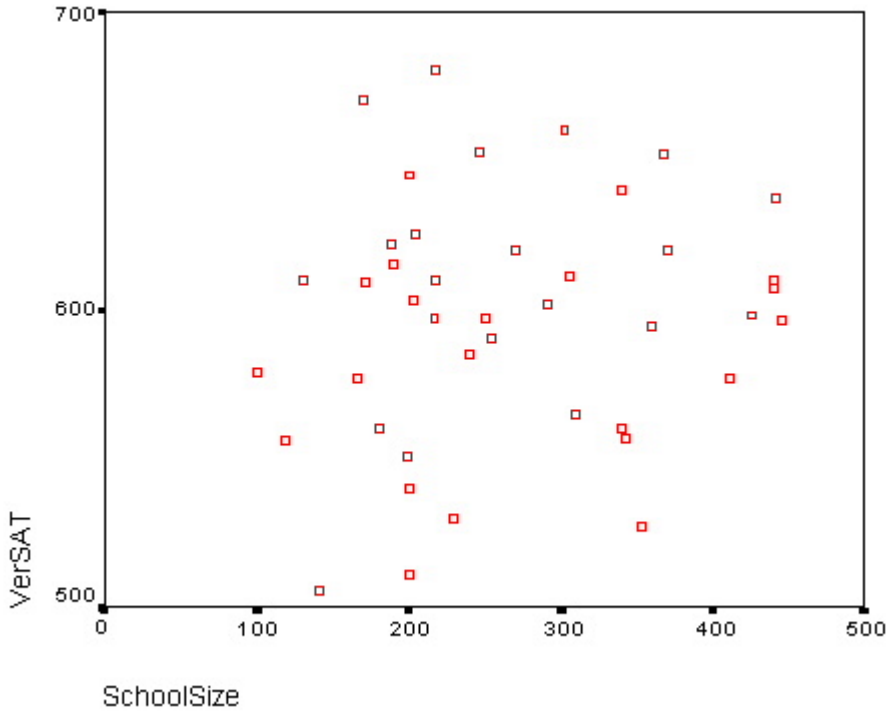

Figure D9. Scatter Plot: Verbal SAT scores vs. School Size
(Data with Removed Outliers)

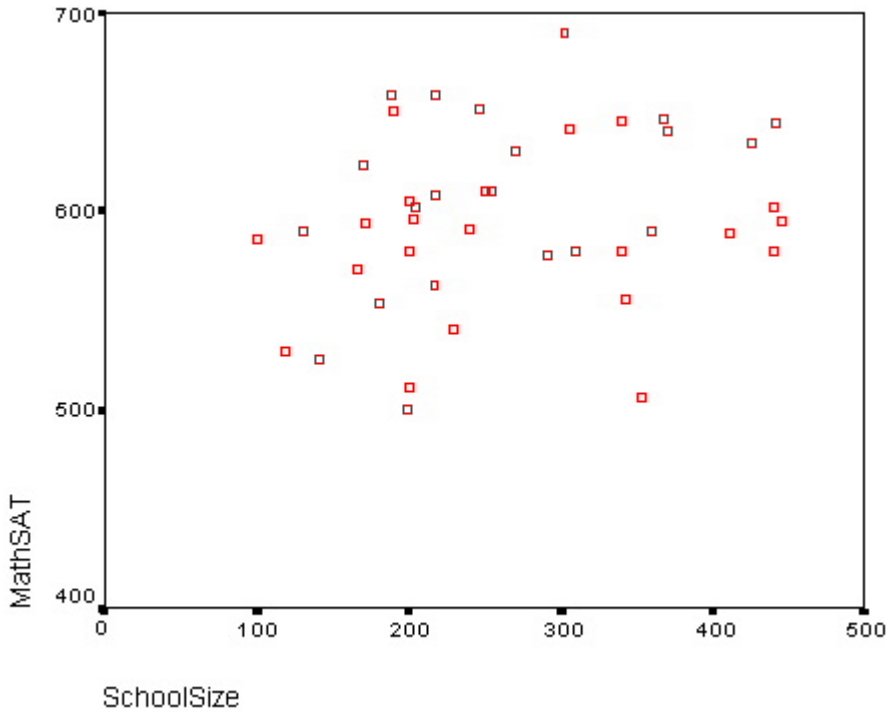

Figure D10. Scatter Plot: Mathematics SAT scores vs. School Size
(Data with Removed Outliers)

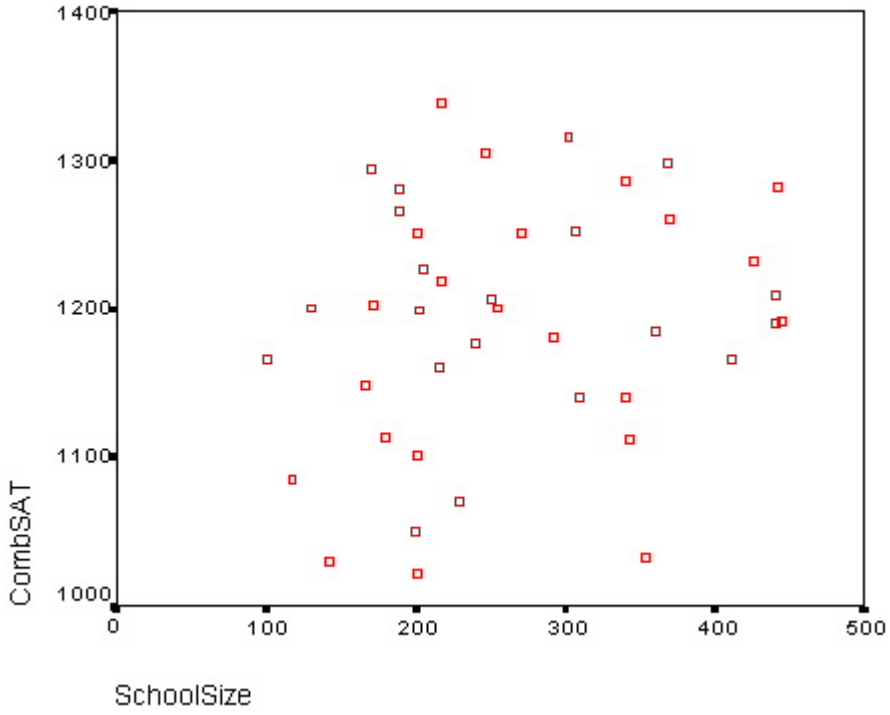

Figure D11. Scatter Plot: Combined SAT scores vs. School Size
(Data with Removed Outliers)

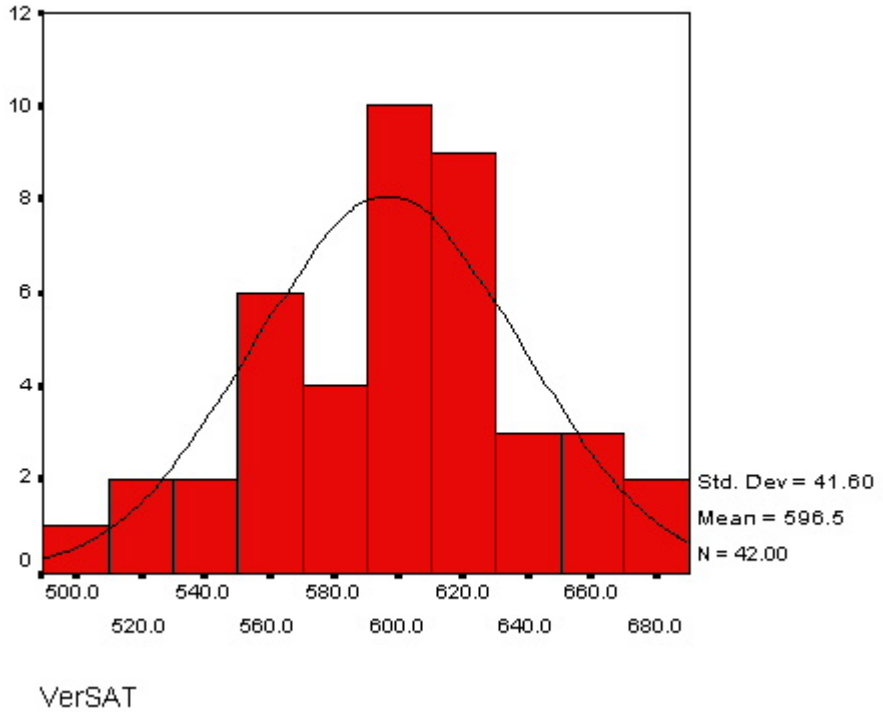

Figure D12. Histogram: Verbal SAT scores (Data with Removed Outliers)

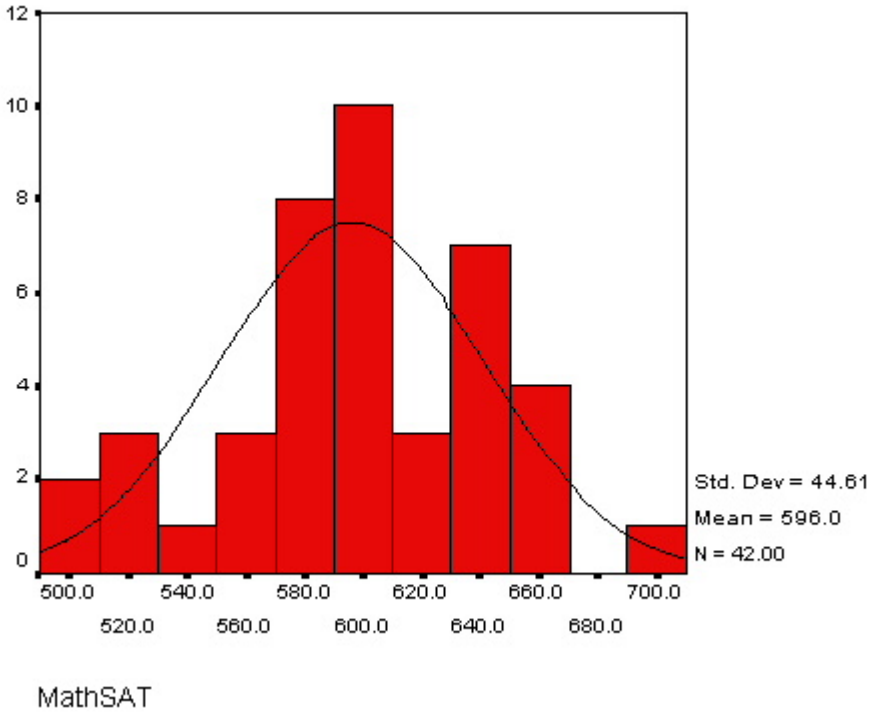

Figure D13. Histogram: Mathematics SAT scores (Data with Removed Outliers)

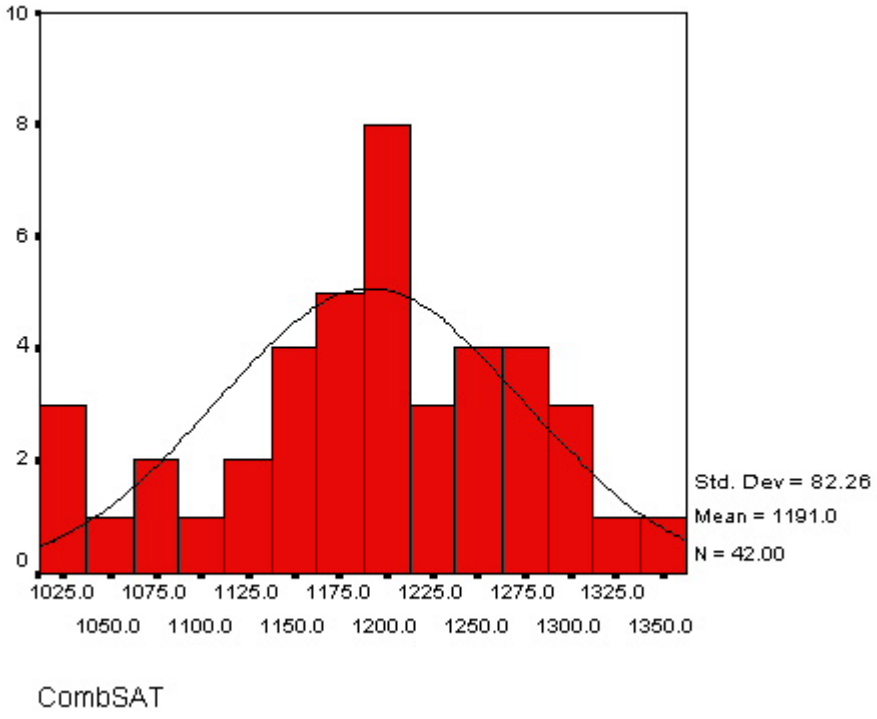

Figure D14. Histogram: Combined SAT scores (Data with Removed Outliers)

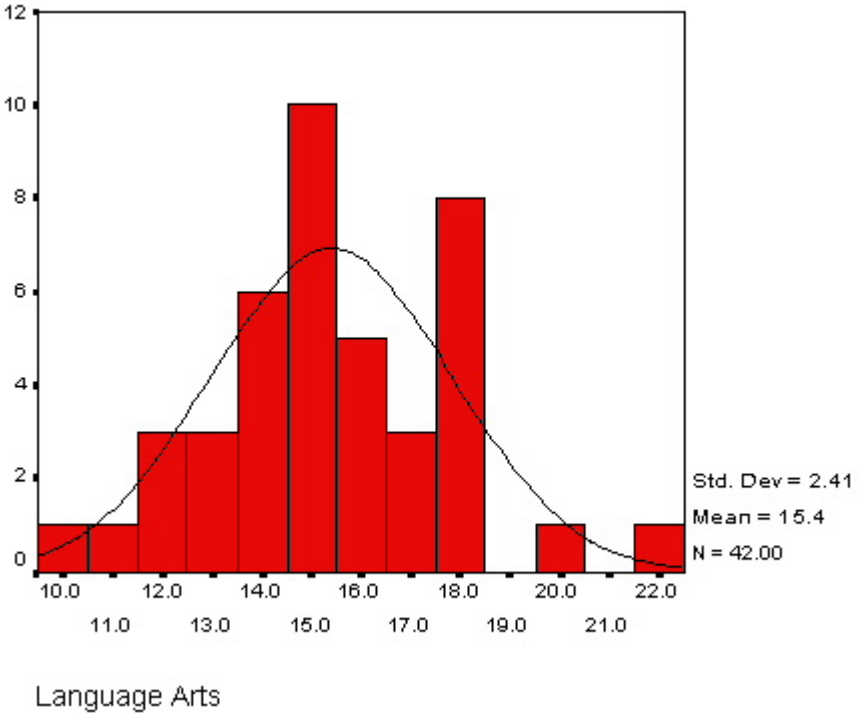

Figure D15. Histogram: Language Arts Average Class Size
(Data with Removed Outliers)

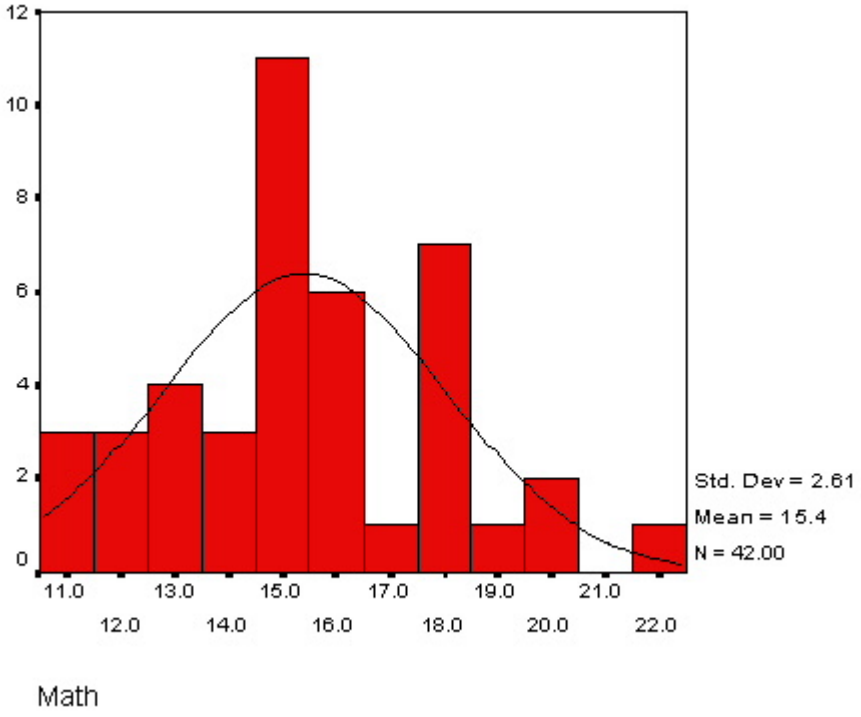

Figure D16. Histogram: Mathematics Average Class Size
(Data with Removed Outliers)

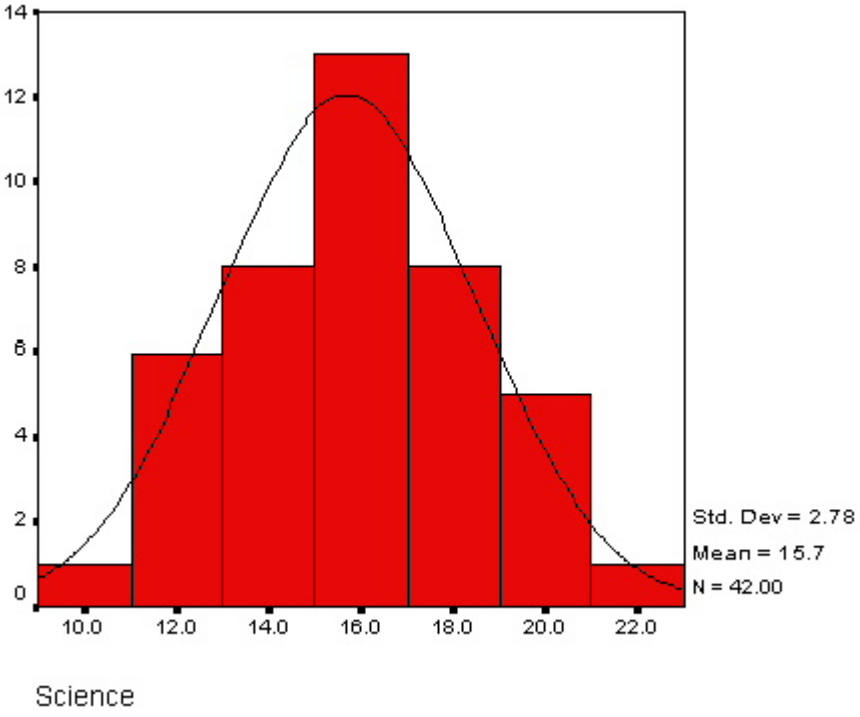

Figure D17. Histogram: Science Average Class Size
(Data with Removed Outliers)

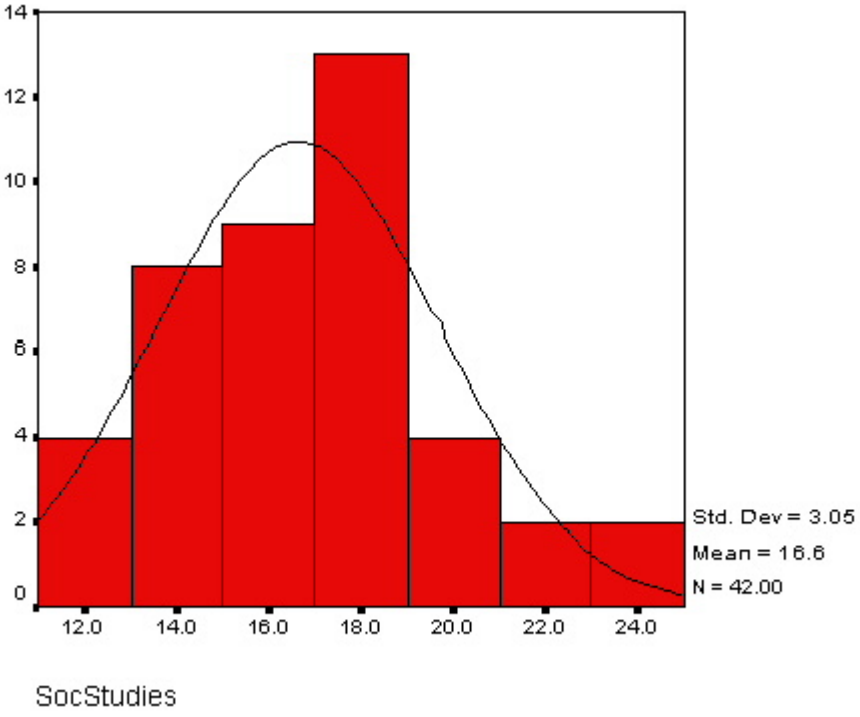

Figure D18. Histogram: Social Studies Average Class Size
(Data with Removed Outliers)

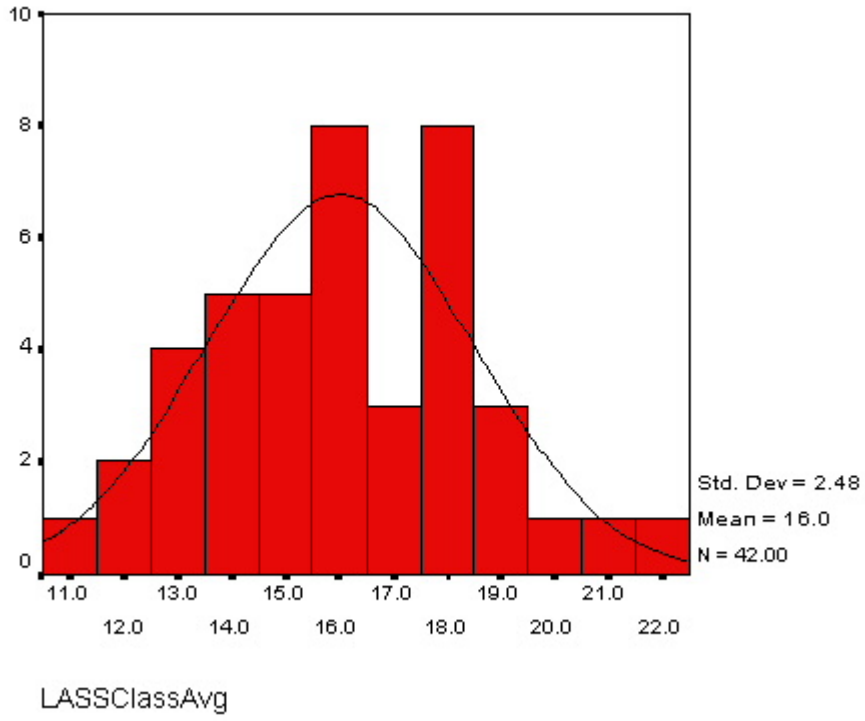

Figure D19. Histogram: Language Arts & Social Studies Average Class Size (Data with Removed Outliers)

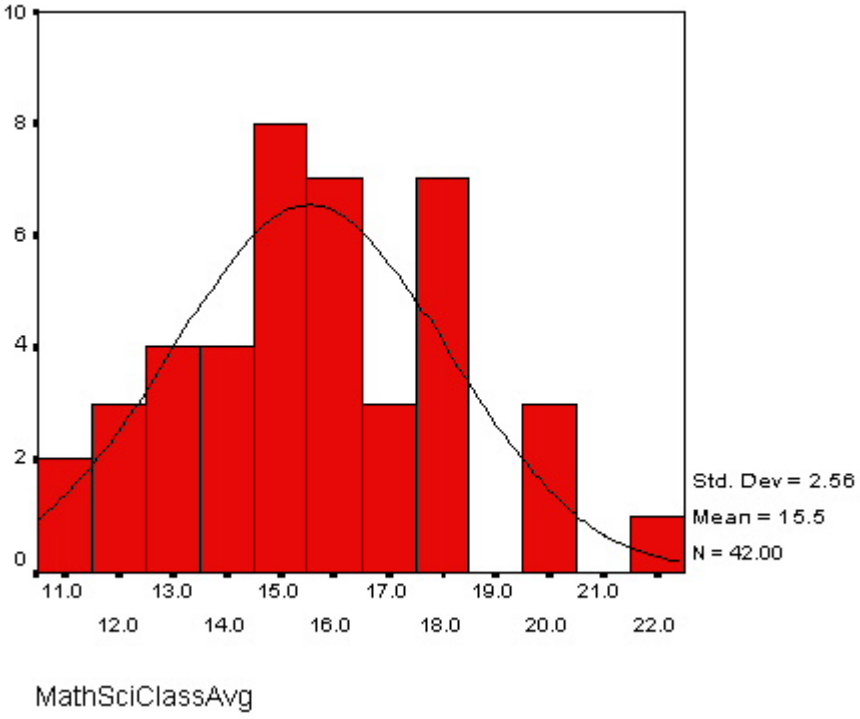

Figure D20. Histogram: Mathematics & Science
Average Class Size (Data with Removed Outliers)

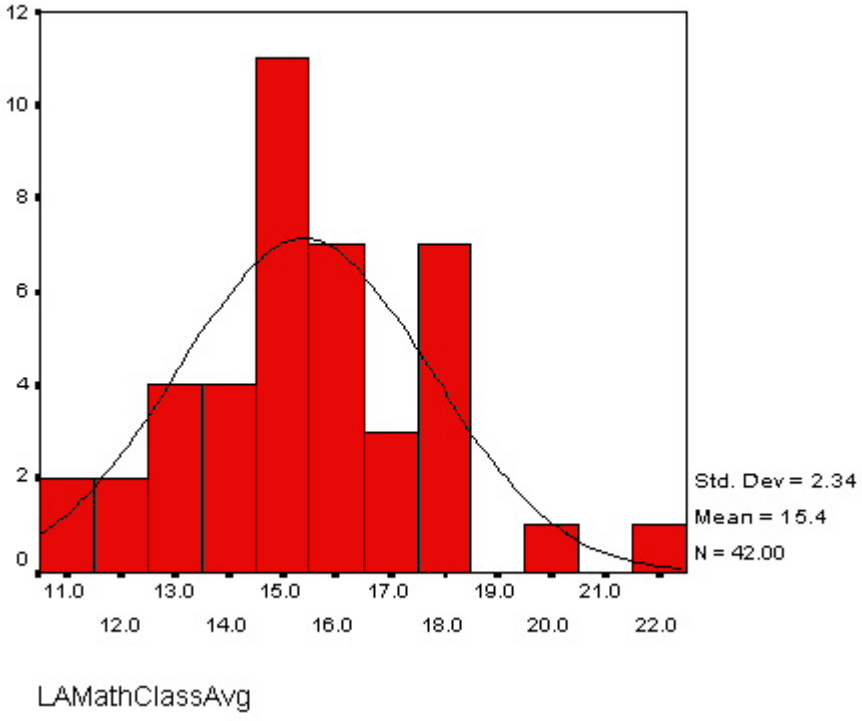

Figure D21. Histogram: Language Arts & Mathematics Average Class Size (Data with Removed Outliers)

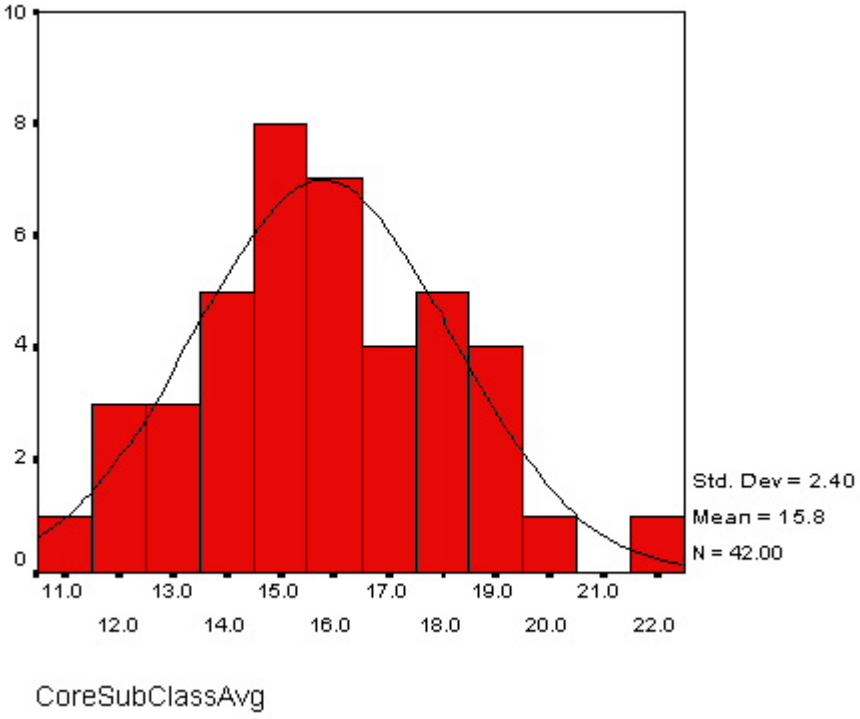

Figure D22. Histogram: Core Subjects Average Class Size
(Data with Removed Outliers)

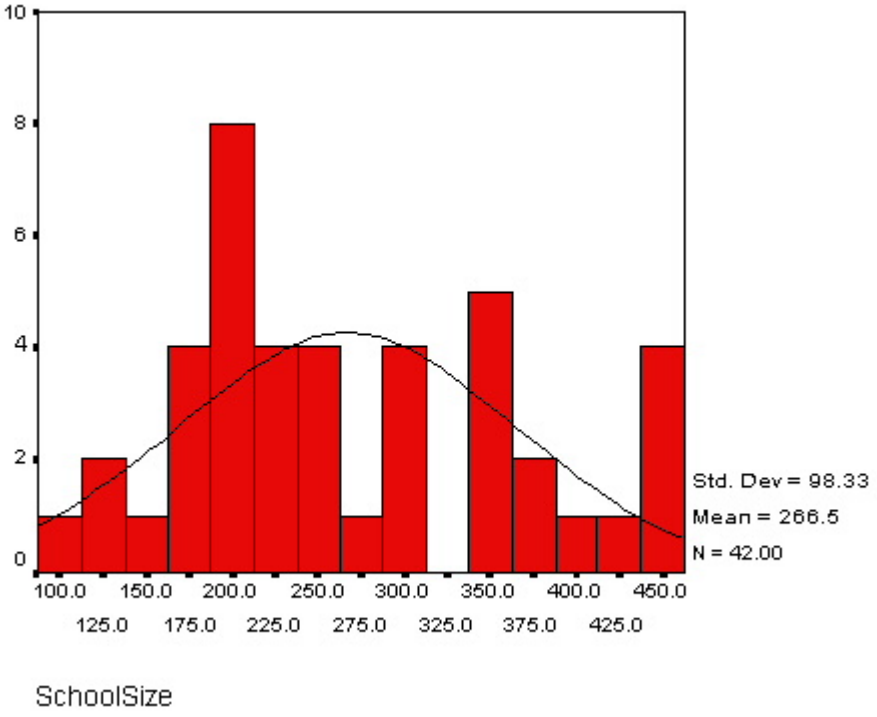

Figure D23. Histogram: School Size (Data with Removed Outliers)

APPENDIX E

INFERENTIAL STATISTICS OF THE INITIAL DATA

Table E1. Bivariate Correlations (Initial Data)

		Language Arts Average Class Size	Mathematics Average Class Size	Science Average Class Size	Social Studies Average Class Size
SAT Verbal scores	Pearson Correlation	.308	.299	.286	.296
	Significance (2-tailed)	.016*	.019*	.026*	.021*
	N	61	61	61	61
SAT Mathematics scores	Pearson Correlation	.267*	.260	.260	.233
	Significance (2-tailed)	.038*	.043*	.043*	.070
	N	61	61	61	61
SAT Combined scores	Pearson Correlation	.295*	.288	.278	.272
	Significance (2-tailed)	.021*	.024*	.030*	.034*
	N	61	61	61	61

*$p < .05$

Table E2. Bivariate Correlations (Initial Data)

		Language Arts & Social Studies Average Class Size	Mathematics & Science Average Class Size	Language Arts & Mathematics Average Class Size	Core Subjects Average Class Size	School Size
SAT Verbal scores	Pearson Correlation	.316	.299	.312	.315	.302
	Significance (2-tailed)	.013*	.019*	.014*	.013*	.018*
	N	61	61	61	61	61
SAT Mathematics scores	Pearson Correlation	.261	.267	.271	.270	.323
	Significance (2-tailed)	.042*	.038*	.034*	.035*	.011*
	N	61	61	61	61	61
SAT Combined scores	Pearson Correlation	.296	.290	.301	.300	.325
	Significance (2-tailed)	.020*	.023*	.019*	.019*	.011*
	N	61	61	61	61	61

*$p < .05$

Table E3. Bivariate Correlations (Initial Data)

		Percentage of Students Receiving Financial Aid	Percentage of Minority Students	Average Years of Experience of Faculty	Percentage of Faculty with Advanced Education
SAT Verbal scores	Pearson Correlation	.122	-.475	.304	.298
	Significance (2-tailed)	.353	.000	.018	.025
	N	60	60	60	56
SAT Mathematics scores	Pearson Correlation	.060	-.407	.399	.444
	Significance (2-tailed)	.651	.001	.002	.001
	N	60	60	60	56
SAT Combined scores	Pearson Correlation	.098	-.459	.365	.388
	Significance (2-tailed)	.457	.000	.004	.003
	N	60	60	60	56

Table E4. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA

	VERSAT	MATHSAT	COMSAT
LA	.3394	.2855	.3220
	(57)	(57)	(57)
	P= .009	P= .028	P= .013
MATH	.3262	.2720	.3094
	(57)	(57)	(57)
	P= .012	P= .037	P= .017
SCI	.3145	.2745	.3009
	(57)	(57)	(57)
	P= .015	P= .035	P= .021
SOCSTU	.3376	.2539	.3054
	(57)	(57)	(57)
	P= .009	P= .052	P= .019
LASSAVG	.3546	.2816	.3282
	(57)	(57)	(57)
	P= .006	P= .031	P= .011
MATSCIAV	.3282	.2802	.3127
	(57)	(57)	(57)
	P= .011	P= .032	P= .016
LAMATHAV	.3419	.2864	.3243
	(57)	(57)	(57)
	P= .008	P= .028	P= .012
CSCLAVG	.3495	.2878	.3281
	(57)	(57)	(57)
	P= .007	P= .027	P= .011
SCHSIZE	.3181	.3332	.3388
	(57)	(57)	(57)
	P= .014	P= .010	P= .009

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E5. Partial Correlations (Initial Data)
Controlling for percentage of minority students

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR

	VERSAT	MATHSAT	COMSAT
LA	.1299	.1111	.1217
	(57)	(57)	(57)
	P= .327	P= .402	P= .358
MATH	.1484	.1286	.1424
	(57)	(57)	(57)
	P= .262	P= .332	P= .282
SCI	.1434	.1376	.1403
	(57)	(57)	(57)
	P= .279	P= .299	P= .289
SOCSTU	.0940	.0541	.0736
	(57)	(57)	(57)
	P= .479	P= .684	P= .579
LASSAVG	.1176	.0859	.1021
	(57)	(57)	(57)
	P= .375	P= .518	P= .442
MATSCIAV	.1500	.1372	.1454
	(57)	(57)	(57)
	P= .257	P= .300	P= .272
LAMATHAV	.1444	.1244	.1371
	(57)	(57)	(57)
	P= .275	P= .348	P= .300
CSCLAVG	.1382	.1157	.1281
	(57)	(57)	(57)
	P= .296	P= .383	P= .334
SCHSIZE	.3275	.3363	.3479
	(57)	(57)	(57)
	P= .011*	P= .009*	P= .007*

(Coefficient / (D.F.) / 2-tailed Significance)
*$p < .05$

Table E6. Partial Correlations (Initial Data)
Controlling for average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	.2616	.2047	.2401
	(57)	(57)	(57)
	P= .045*	P= .120	P= .067
MATH	.2665	.2118	.2480
	(57)	(57)	(57)
	P= .041*	P= .107	P= .058
SCI	.2711	.2318	.2568
	(57)	(57)	(57)
	P= .038*	P= .077	P= .050
SOCSTU	.2565	.1738	.2224
	(57)	(57)	(57)
	P= .050	P= .188	P= .090
LASSAVG	.2715	.1974	.2419
	(57)	(57)	(57)
	P= .038*	P= .134	P= .065
MATSCIAV	.2758	.2278	.2590
	(57)	(57)	(57)
	P= .035*	P= .083	P= .048*
LAMATHAV	.2719	.2145	.2514
	(57)	(57)	(57)
	P= .037*	P= .103	P= .055
CSCLAVG	.2800	.2178	.2564
	(57)	(57)	(57)
	P= .032*	P= .098	P= .050
SCHSIZE	.3025	.3253	.3275
	(57)	(57)	(57)
	P= .020*	P= .012*	P= .011*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E7. Partial Correlations (Initial Data)
Controlling for percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.3129	.2885	.3116
	(53)	(53)	(53)
	P= .020*	P= .033*	P= .021*
MATH	.2627	.2186	.2503
	(53)	(53)	(53)
	P= .053	P= .109	P= .065
SCI	.2813	.2605	.2768
	(53)	(53)	(53)
	P= .037*	P= .055	P= .041*
SOCSTU	.3022	.2518	.2886
	(53)	(53)	(53)
	P= .025*	P= .064	P= .033*
LASSAVG	.3246	.2842	.3163
	(53)	(53)	(53)
	P= .016*	P= .035*	P= .019*
MATSCIAV	.2798	.2468	.2712
	(53)	(53)	(53)
	P= .039*	P= .069	P= .045*
LAMATHAV	.2963	.2609	.2892
	(53)	(53)	(53)
	P= .028*	P= .054	P= .032*
CSCLAVG	.3093	.2717	.3006
	(53)	(53)	(53)
	P= .022*	P= .045*	P= .026*
SCHSIZE	.2232	.2356	.2390
	(53)	(53)	(53)
	P= .101	P= .083	P= .079

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E8. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid and percentage of minority students

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR

	VERSAT	MATHSAT	COMSAT
LA	.1626	.1276	.1481
	(55)	(55)	(55)
	P= .227	P= .344	P= .272
MATH	.1761	.1370	.1618
	(55)	(55)	(55)
	P= .190	P= .309	P= .229
SCI	.1722	.1497	.1621
	(55)	(55)	(55)
	P= .200	P= .266	P= .228
SOCSTU	.1354	.0688	.1036
	(55)	(55)	(55)
	P= .315	P= .611	P= .443
LASSAVG	.1575	.1028	.1325
	(55)	(55)	(55)
	P= .242	P= .447	P= .326
MATSCIAV	.1792	.1479	.1667
	(55)	(55)	(55)
	P= .182	P= .272	P= .215
LAMATHAV	.1752	.1369	.1603
	(55)	(55)	(55)
	P= .192	P= .310	P= .234
CSCLAVG	.1736	.1300	.1547
	(55)	(55)	(55)
	P= .196	P= .335	P= .251
SCHSIZE	.3450	.3461	.3626
	(55)	(55)	(55)
	P= .009*	P= .008*	P= .006*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E9. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	.2857	.2120	.2573
	(55)	(55)	(55)
	P= .031*	P= .113	P= .053
MATH	.2986	.2302	.2751
	(55)	(55)	(55)
	P= .024*	P= .085	P= .038*
SCI	.2980	.2446	.2782
	(55)	(55)	(55)
	P= .024*	P= .067	P= .036*
SOCSTU	.2979	.1939	.2556
	(55)	(55)	(55)
	P= .024*	P= .148	P= .055
LASSAVG	.3066	.2123	.2690
	(55)	(55)	(55)
	P= .020*	P= .113	P= .043*
MATSCIAV	.3059	.2437	.2837
	(55)	(55)	(55)
	P= .021*	P= .068	P= .032*
LAMATHAV	.3001	.2272	.2735
	(55)	(55)	(55)
	P= .023*	P= .089	P= .040*
CSCLAVG	.3133	.2337	.2829
	(55)	(55)	(55)
	P= .018*	P= .080	P= .033*
SCHSIZE	.3118	.3272	.3339
	(55)	(55)	(55)
	P= .018*	P= .013*	P= .011*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E10. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.3461	.2972	.3348
	(51)	(51)	(51)
	P= .011*	P= .031*	P= .014*
MATH	.3038	.2391	.2837
	(51)	(51)	(51)
	P= .027*	P= .085	P= .040*
SCI	.3235	.2767	.3086
	(51)	(51)	(51)
	P= .018*	P= .045*	P= .025*
SOCSTU	.3573	.2784	.3328
	(51)	(51)	(51)
	P= .009*	P= .044*	P= .015*
LASSAVG	.3725	.3040	.3532
	(51)	(51)	(51)
	P= .006*	P= .027*	P= .009*
MATSCIAV	.3228	.2657	.3049
	(51)	(51)	(51)
	P= .018*	P= .055	P= .026*
LAMATHAV	.3344	.2758	.3181
	(51)	(51)	(51)
	P= .014*	P= .046*	P= .020*
CSCLAVG	.3563	.2919	.3372
	(51)	(51)	(51)
	P= .009*	P= .034*	P= .014*
SCHSIZE	.2331	.2299	.2420
	(51)	(51)	(51)
	P= .093	P= .098	P= .081

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E11. Partial Correlations (Initial Data)
Controlling for percentage of minority students and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	.0796	.0398	.0580
	(55)	(55)	(55)
	P= .556	P= .769	P= .668
MATH	.1102	.0705	.0925
	(55)	(55)	(55)
	P= .415	P= .602	P= .494
SCI	.1207	.0999	.1088
	(55)	(55)	(55)
	P= .371	P= .459	P= .420
SOCSTU	.0470	-.0189	.0109
	(55)	(55)	(55)
	P= .728	P= .889	P= .936
LASSAVG	.0662	.0093	.0352
	(55)	(55)	(55)
	P= .624	P= .945	P= .795
MATSCIAV	.1191	.0883	.1040
	(55)	(55)	(55)
	P= .378	P= .514	P= .442
LAMATHAV	.0987	.0576	.0785
	(55)	(55)	(55)
	P= .465	P= .671	P= .562
CSCLAVG	.0962	.0518	.0729
	(55)	(55)	(55)
	P= .476	P= .702	P= .590
SCHSIZE	.3216	.3329	.3448
	(55)	(55)	(55)
	P= .015*	P= .011*	P= .009*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E12. Partial Correlations (Initial Data)
Controlling for percentage of minority students and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.1183	.1146	.1187
	(51)	(51)	(51)
	P= .399	P= .414	P= .397
MATH	.0903	.0602	.0770
	(51)	(51)	(51)
	P= .520	P= .668	P= .584
SCI	.1095	.1076	.1061
	(51)	(51)	(51)
	P= .435	P= .443	P= .450
SOCSTU	.0807	.0483	.0655
	(51)	(51)	(51)
	P= .566	P= .731	P= .641
LASSAVG	.1060	.0858	.0976
	(51)	(51)	(51)
	P= .450	P= .541	P= .487
MATSCIAV	.1034	.0873	.0949
	(51)	(51)	(51)
	P= .461	P= .534	P= .499
LAMATHAV	.1078	.0898	.1008
	(51)	(51)	(51)
	P= .442	P= .523	P= .473
CSCLAVG	.1076	.0890	.0989
	(51)	(51)	(51)
	P= .443	P= .526	P= .481
SCHSIZE	.2458	.2515	.2622
	(51)	(51)	(51)
	P= .076	P= .069	P= .058

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E13. Partial Correlations (Initial Data)
Controlling for average years of experience of faculty and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.2896	.2579	.2842
	(51)	(51)	(51)
	P= .035*	P= .062	P= .039*
MATH	.2608	.2105	.2461
	(51)	(51)	(51)
	P= .059	P= .130	P= .076
SCI	.2979	.2734	.2930
	(51)	(51)	(51)
	P= .030*	P= .048*	P= .033*
SOCSTU	.2851	.2226	.2655
	(51)	(51)	(51)
	P= .039*	P= .109	P= .055
LASSAVG	.3036	.2528	.2899
	(51)	(51)	(51)
	P= .027*	P= .068	P= .035*
MATSCIAV	.2873	.2491	.2773
	(51)	(51)	(51)
	P= .037*	P= .072	P= .044*
LAMATHAV	.2829	.2405	.2725
	(51)	(51)	(51)
	P= .040*	P= .083	P= .048*
CSCLAVG	.3016	.2563	.2896
	(51)	(51)	(51)
	P= .028*	P= .064	P= .035*
SCHSIZE	.2508	.2721	.2729
	(51)	(51)	(51)
	P= .070	P= .049*	P= .048*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E14. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	.1018	.0409	.0711
	(53)	(53)	(53)
	P= .460	P= .767	P= .606
MATH	.1429	.0861	.1187
	(53)	(53)	(53)
	P= .298	P= .532	P= .388
SCI	.1475	.1095	.1286
	(53)	(53)	(53)
	P= .283	P= .426	P= .349
SOCSTU	.0873	-.0065	.0397
	(53)	(53)	(53)
	P= .526	P= .963	P= .774
LASSAVG	.1001	.0170	.0581
	(53)	(53)	(53)
	P= .467	P= .902	P= .674
MATSCIAV	.1496	.1013	.1275
	(53)	(53)	(53)
	P= .276	P= .462	P= .353
LAMATHAV	.1271	.0664	.0988
	(53)	(53)	(53)
	P= .355	P= .630	P= .473
CSCLAVG	.1295	.0629	.0971
	(53)	(53)	(53)
	P= .346	P= .648	P= .481
SCHSIZE	.3330	.3344	.3523
	(53)	(53)	(53)
	P= .013*	P= .013*	P= .008*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E15. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.1507	.1153	.1377
	(49)	(49)	(49)
	P= .291	P= .421	P= .335
MATH	.1312	.0748	.1077
	(49)	(49)	(49)
	P= .359	P= .602	P= .452
SCI	.1496	.1154	.1328
	(49)	(49)	(49)
	P= .295	P= .420	P= .353
SOCSTU	.1353	.0642	.1047
	(49)	(49)	(49)
	P= .344	P= .654	P= .465
LASSAVG	.1542	.0960	.1303
	(49)	(49)	(49)
	P= .280	P= .503	P= .362
MATSCIAV	.1455	.0988	.1247
	(49)	(49)	(49)
	P= .308	P= .490	P= .383
LAMATHAV	.1458	.0978	.1267
	(49)	(49)	(49)
	P= .307	P= .495	P= .376
CSCLAVG	.1543	.1005	.1314
	(49)	(49)	(49)
	P= .280	P= .483	P= .358
SCHSIZE	.2565	.2440	.2647
	(49)	(49)	(49)
	P= .069	P= .084	P= .060

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E16. Partial Correlations (Initial Data)
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.0943	.0787	.0873
	(49)	(49)	(49)
	P= .510	P= .583	P= .543
MATH	.0856	.0466	.0679
	(49)	(49)	(49)
	P= .551	P= .746	P= .636
SCI	.1193	.1128	.1143
	(49)	(49)	(49)
	P= .405	P= .431	P= .425
SOCSTU	.0588	.0087	.0336
	(49)	(49)	(49)
	P= .682	P= .952	P= .815
LASSAVG	.0815	.0452	.0637
	(49)	(49)	(49)
	P= .570	P= .753	P= .657
MATSCIAV	.1060	.0828	.0944
	(49)	(49)	(49)
	P= .459	P= .564	P= .510
LAMATHAV	.0929	.0643	.0800
	(49)	(49)	(49)
	P= .517	P= .654	P= .577
CSCLAVG	.0966	.0663	.0816
	(49)	(49)	(49)
	P= .500	P= .644	P= .569
SCHSIZE	.2653	.2806	.2886
	(49)	(49)	(49)
	P= .060	P= .046*	P= .040*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table E17. Partial Correlations (Initial Data)
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	.1204	.0695	.0982
	(47)	(47)	(47)
	P= .410	P= .635	P= .502
MATH	.1326	.0705	.1072
	(47)	(47)	(47)
	P= .364	P= .630	P= .463
SCI	.1632	.1257	.1461
	(47)	(47)	(47)
	P= .263	P= .390	P= .317
SOCSTU	.1160	.0281	.0766
	(47)	(47)	(47)
	P= .427	P= .848	P= .601
LASSAVG	.1277	.0519	.0940
	(47)	(47)	(47)
	P= .382	P= .723	P= .520
MATSCIAV	.1532	.1017	.1312
	(47)	(47)	(47)
	P= .293	P= .487	P= .369
LAMATHAV	.1309	.0723	.1062
	(47)	(47)	(47)
	P= .370	P= .622	P= .467
CSCLAVG	.1449	.0801	.1166
	(47)	(47)	(47)
	P= .321	P= .584	P= .425
SCHSIZE	.2721	.2678	.2867
	(47)	(47)	(47)
	P= .059	P= .063	P= .046*

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

APPENDIX F

INFERENTIAL STATISTICS OF THE DATA WITH REMOVED OUTLIERS

Table F1. Bivariate Correlations (Data with Removed Outliers)

		Language Arts Average Class Size	Mathematics Average Class Size	Science Average Class Size	Social Studies Average Class Size
SAT Verbal scores	Pearson Correlation	-.209	-.190	-.209	-.095
	Significance (2-tailed)	.184	.228	.185	.551
	N	42	42	42	42
SAT Mathematics scores	Pearson Correlation	-.168	-.138	-.100	-.126
	Significance (2-tailed)	.286	.384	.528	.425
	N	42	42	42	42
SAT Combined scores	Pearson Correlation	-.200	-.169	-.167	-.117
	Significance (2-tailed)	.205	.284	.290	.460
	N	42	42	42	42

Table F2. Bivariate Correlations (Data with Removed Outliers)

		Language Arts & Social Studies Average Class Size	Mathematics & Science Average Class Size	Language Arts & Mathematics Average Class Size	Core Subjects Average Class Size	School Size
SAT Verbal scores	Pearson Correlation	-.160	-.210	-.214	-.195	.153
	Significance (2-tailed)	.311	.181	.173	.216	.334
	N	42	42	42	42	42
SAT Mathematics scores	Pearson Correlation	-.160	-.125	-.164	-.149	.240
	Significance (2-tailed)	.312	.431	.300	.345	.126
	N	42	42	42	42	42
SAT Combined scores	Pearson Correlation	-.169	-.177	-.198	-.182	.207
	Significance (2-tailed)	.283	.261	.210	.248	.189
	N	42	42	42	42	42

Table F3. Bivariate Correlations (Data with Removed Outliers)

		Percentage of Students Receiving Financial Aid	Percentage of Minority Students	Average Years of Experience of Faculty	Percentage of Faculty with Advanced Education
SAT Verbal scores	Pearson Correlation	.047	.254	.301	.253
	Significance (2-tailed)	.773	.104	.056	.115
	N	41	42	41	40
SAT Mathematics scores	Pearson Correlation	-.059	.335	.403	.412
	Significance (2-tailed)	.715	.030	.009	.008
	N	41	42	41	40
SAT Combined scores	Pearson Correlation	.001	.290	.382	.362
	Significance (2-tailed)	.997	.063	.014	.022
	N	41	42	41	40

Table F4. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA

	VERSAT	MATHSAT	COMSAT
LA	-.2161	-.2252	-.2287
	(38)	(38)	(38)
	P= .181	P= .162	P= .156
MATH	-.1897	-.1849	-.1910
	(38)	(38)	(38)
	P= .241	P= .253	P= .238
SCI	-.2087	-.1393	-.1849
	(38)	(38)	(38)
	P= .196	P= .391	P= .253
SOCSTU	-.0829	-.1779	-.1346
	(38)	(38)	(38)
	P= .611	P= .272	P= .408
LASSAVG	-.1599	-.2254	-.1993
	(38)	(38)	(38)
	P= .324	P= .162	P= .218
MATSCIAV	-.2120	-.1716	-.1997
	(38)	(38)	(38)
	P= .189	P= .290	P= .217
LAMATHAV	-.2184	-.2202	-.2254
	(38)	(38)	(38)
	P= .176	P= .172	P= .162
CSCLAVG	-.1989	-.2097	-.2121
	(38)	(38)	(38)
	P= .218	P= .194	P= .189
SCHSIZE	.1584	.2372	.2089
	(38)	(38)	(38)
	P= .329	P= .140	P= .196

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F5. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of minority students

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR

	VERSAT	MATHSAT	COMSAT
LA	-.2089	-.1686	-.2001
	(39)	(39)	(39)
	P= .190	P= .292	P= .210
MATH	-.2139	-.1694	-.1967
	(39)	(39)	(39)
	P= .179	P= .290	P= .218
SCI	-.2235	-.1168	-.1836
	(39)	(39)	(39)
	P= .160	P= .467	P= .250
SOCSTU	-.0601	-.0833	-.0791
	(39)	(39)	(39)
	P= .709	P= .605	P= .623
LASSAVG	-.1392	-.1336	-.1465
	(39)	(39)	(39)
	P= .386	P= .405	P= .361
MATSCIAV	-.2307	-.1500	-.2003
	(39)	(39)	(39)
	P= .147	P= .349	P= .209
LAMATHAV	-.2269	-.1814	-.2128
	(39)	(39)	(39)
	P= .154	P= .256	P= .182
CSCLAVG	-.1946	-.1487	-.1821
	(39)	(39)	(39)
	P= .223	P= .354	P= .254
SCHSIZE	.1080	.1877	.1593
	(39)	(39)	(39)
	P= .502	P= .240	P= .320

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F6. Partial Correlations (Data with Removed Outliers)
Controlling for average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	-.2638	-.2415	-.2717
	(38)	(38)	(38)
	P= .100	P= .133	P= .090
MATH	-.2262	-.1974	-.2229
	(38)	(38)	(38)
	P= .160	P= .222	P= .167
SCI	-.2070	-.1067	-.1724
	(38)	(38)	(38)
	P= .200	P= .512	P= .287
SOCSTU	-.1385	-.1996	-.1815
	(38)	(38)	(38)
	P= .394	P= .217	P= .262
LASSAVG	-.2140	-.2407	-.2443
	(38)	(38)	(38)
	P= .185	P= .135	P= .129
MATSCIAV	-.2278	-.1591	-.2076
	(38)	(38)	(38)
	P= .157	P= .327	P= .199
LAMATHAV	-.2616	-.2341	-.2639
	(38)	(38)	(38)
	P= .103	P= .146	P= .100
CSCLAVG	-.2311	-.2087	-.2361
	(38)	(38)	(38)
	P= .151	P= .196	P= .142
SCHSIZE	.1450	.2289	.1976
	(38)	(38)	(38)
	P= .372	P= .155	P= .222

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F7. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1377	-.0606	-.1070
	(37)	(37)	(37)
	P= .403	P= .714	P= .517
MATH	-.1869	-.1377	-.1726
	(37)	(37)	(37)
	P= .254	P= .403	P= .293
SCI	-.1868	-.0563	-.1387
	(37)	(37)	(37)
	P= .255	P= .733	P= .400
SOCSTU	-.0289	-.0280	-.0295
	(37)	(37)	(37)
	P= .862	P= .865	P= .859
LASSAVG	-.0854	-.0470	-.0707
	(37)	(37)	(37)
	P= .605	P= .776	P= .669
MATSCIAV	-.1978	-.1010	-.1641
	(37)	(37)	(37)
	P= .227	P= .541	P= .318
LAMATHAV	-.1731	-.1063	-.1493
	(37)	(37)	(37)
	P= .292	P= .520	P= .364
CSCLAVG	-.1482	-.0774	-.1228
	(37)	(37)	(37)
	P= .368	P= .639	P= .456
SCHSIZE	.1397	.2186	.1846
	(37)	(37)	(37)
	P= .396	P= .181	P= .261

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F8. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid and percentage of minority students

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR

	VERSAT	MATHSAT	COMSAT
LA	-.2513	-.2821	-.2730
	(37)	(37)	(37)
	P= .123	P= .082	P= .093
MATH	-.2408	-.2627	-.2532
	(37)	(37)	(37)
	P= .140	P= .106	P= .120
SCI	-.2540	-.2039	-.2390
	(37)	(37)	(37)
	P= .119	P= .213	P= .143
SOCSTU	-.0719	-.1704	-.1246
	(37)	(37)	(37)
	P= .663	P= .300	P= .450
LASSAVG	-.1696	-.2478	-.2139
	(37)	(37)	(37)
	P= .302	P= .128	P= .191
MATSCIAV	-.2635	-.2474	-.2617
	(37)	(37)	(37)
	P= .105	P= .129	P= .108
LAMATHAV	-.2659	-.2941	-.2840
	(37)	(37)	(37)
	P= .102	P= .069	P= .080
CSCLAVG	-.2317	-.2627	-.2533
	(37)	(37)	(37)
	P= .156	P= .106	P= .120
SCHSIZE	.1073	.1714	.1520
	(37)	(37)	(37)
	P= .515	P= .297	P= .356

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F9. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	-.2918	-.3255	-.3264
	(36)	(36)	(36)
	P= .075	P= .046*	P= .046*
MATH	-.2081	-.2214	-.2219
	(36)	(36)	(36)
	P= .210	P= .181	P= .181
SCI	-.1990	-.1375	-.1808
	(36)	(36)	(36)
	P= .231	P= .410	P= .277
SOCSTU	-.1217	-.2457	-.1925
	(36)	(36)	(36)
	P= .467	P= .137	P= .247
LASSAVG	-.2218	-.3182	-.2844
	(36)	(36)	(36)
	P= .181	P= .052	P= .084
MATSCIAV	-.2162	-.1901	-.2136
	(36)	(36)	(36)
	P= .192	P= .253	P= .198
LAMATHAV	-.2652	-.2897	-.2904
	(36)	(36)	(36)
	P= .108	P= .078	P= .077
CSCLAVG	-.2309	-.2655	-.2612
	(36)	(36)	(36)
	P= .163	P= .107	P= .113
SCHSIZE	.1460	.2219	.1951
	(36)	(36)	(36)
	P= .382	P= .181	P= .241

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F10. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1521	-.1445	-.1536
	(35)	(35)	(35)
	P= .369	P= .393	P= .364
MATH	-.1824	-.1883	-.1924
	(35)	(35)	(35)
	P= .280	P= .264	P= .254
SCI	-.1941	-.1151	-.1702
	(35)	(35)	(35)
	P= .250	P= .498	P= .314
SOCSTU	-.0073	-.0763	-.0384
	(35)	(35)	(35)
	P= .966	P= .654	P= .821
LASSAVG	-.0806	-.1208	-.1012
	(35)	(35)	(35)
	P= .635	P= .476	P= .551
MATSCIAV	-.2016	-.1607	-.1935
	(35)	(35)	(35)
	P= .232	P= .342	P= .251
LAMATHAV	-.1799	-.1793	-.1863
	(35)	(35)	(35)
	P= .287	P= .288	P= .270
CSCLAVG	-.1511	-.1494	-.1572
	(35)	(35)	(35)
	P= .372	P= .378	P= .353
SCHSIZE	.1344	.1976	.1712
	(35)	(35)	(35)
	P= .428	P= .241	P= .311

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F11. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of minority students and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	-.2582	-.2355	-.2664
	(37)	(37)	(37)
	P= .113	P= .149	P= .101
MATH	-.2351	-.2100	-.2331
	(37)	(37)	(37)
	P= .150	P= .199	P= .153
SCI	-.2094	-.1079	-.1747
	(37)	(37)	(37)
	P= .201	P= .513	P= .287
SOCSTU	-.1006	-.1537	-.1421
	(37)	(37)	(37)
	P= .542	P= .350	P= .388
LASSAVG	-.1887	-.2099	-.2180
	(37)	(37)	(37)
	P= .250	P= .200	P= .183
MATSCIAV	-.2337	-.1663	-.2141
	(37)	(37)	(37)
	P= .152	P= .312	P= .191
LAMATHAV	-.2634	-.2378	-.2666
	(37)	(37)	(37)
	P= .105	P= .145	P= .101
CSCLAVG	-.2205	-.1958	-.2252
	(37)	(37)	(37)
	P= .177	P= .232	P= .168
SCHSIZE	.1151	.1947	.1671
	(37)	(37)	(37)
	P= .485	P= .235	P= .309

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F12. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of minority students and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1395	-.0606	-.1084
	(36)	(36)	(36)
	P= .404	P= .718	P= .517
MATH	-.2005	-.1563	-.1883
	(36)	(36)	(36)
	P= .227	P= .349	P= .258
SCI	-.1970	-.0654	-.1493
	(36)	(36)	(36)
	P= .236	P= .696	P= .371
SOCSTU	.0011	.0128	.0045
	(36)	(36)	(36)
	P= .995	P= .939	P= .979
LASSAVG	-.0681	-.0220	-.0507
	(36)	(36)	(36)
	P= .685	P= .896	P= .763
MATSCIAV	-.2103	-.1154	-.1779
	(36)	(36)	(36)
	P= .205	P= .490	P= .285
LAMATHAV	-.1814	-.1164	-.1586
	(36)	(36)	(36)
	P= .276	P= .487	P= .341
CSCLAVG	-.1457	-.0720	-.1197
	(36)	(36)	(36)
	P= .383	P= .667	P= .474
SCHSIZE	.1114	.1869	.1551
	(36)	(36)	(36)
	P= .506	P= .261	P= .353

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F13. Partial Correlations (Data with Removed Outliers)
Controlling for average years of experience of faculty and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1967	-.1368	-.1829
	(35)	(35)	(35)
	P= .243	P= .419	P= .279
MATH	-.2108	-.1813	-.2107
	(35)	(35)	(35)
	P= .210	P= .283	P= .211
SCI	-.1790	-.0526	-.1347
	(35)	(35)	(35)
	P= .289	P= .757	P= .427
SOCSTU	-.0796	-.1087	-.1012
	(35)	(35)	(35)
	P= .640	P= .522	P= .551
LASSAVG	-.1461	-.1344	-.1525
	(35)	(35)	(35)
	P= .388	P= .428	P= .367
MATSCIAV	-.2057	-.1219	-.1816
	(35)	(35)	(35)
	P= .222	P= .472	P= .282
LAMATHAV	-.2158	-.1689	-.2086
	(35)	(35)	(35)
	P= .200	P= .318	P= .215
CSCLAVG	-.1825	-.1328	-.1732
	(35)	(35)	(35)
	P= .280	P= .433	P= .305
SCHSIZE	.1531	.2358	.2019
	(35)	(35)	(35)
	P= .366	P= .160	P= .231

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F14. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid, percentage of minority students, and average years of experience of faculty

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR AVGEXFAC

	VERSAT	MATHSAT	COMSAT
LA	-.3139	-.3642	-.3541
	(35)	(35)	(35)
	P= .058	P= .027*	P= .032*
MATH	-.2413	-.2743	-.2617
	(35)	(35)	(35)
	P= .150	P= .100	P= .118
SCI	-.2268	-.1786	-.2132
	(35)	(35)	(35)
	P= .177	P= .290	P= .205
SOCSTU	-.1047	-.2277	-.1753
	(35)	(35)	(35)
	P= .537	P= .175	P= .299
LASSAVG	-.2210	-.3244	-.2859
	(35)	(35)	(35)
	P= .189	P= .050*	P= .086
MATSCIAV	-.2487	-.2400	-.2521
	(35)	(35)	(35)
	P= .138	P= .152	P= .132
LAMATHAV	-.2956	-.3397	-.3275
	(35)	(35)	(35)
	P= .076	P= .040*	P= .048*
CSCLAVG	-.2476	-.2953	-.2823
	(35)	(35)	(35)
	P= .140	P= .076	P= .090
SCHSIZE	.1132	.1779	.1590
	(35)	(35)	(35)
	P= .505	P= .292	P= .347

(Coefficient / (D.F.) / 2-tailed Significance)
*$p \leq .05$

Table F15. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid, percentage of minority students, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1866	-.2004	-.1962
	(34)	(34)	(34)
	P= .276	P= .241	P= .251
MATH	-.2235	-.2558	-.2435
	(34)	(34)	(34)
	P= .190	P= .132	P= .152
SCI	-.2327	-.1722	-.2166
	(34)	(34)	(34)
	P= .172	P= .315	P= .204
SOCSTU	-.0006	-.0714	-.0319
	(34)	(34)	(34)
	P= .997	P= .679	P= .853
LASSAVG	-.0930	-.1450	-.1178
	(34)	(34)	(34)
	P= .589	P= .399	P= .494
MATSCIAV	-.2444	-.2274	-.2458
	(34)	(34)	(34)
	P= .151	P= .182	P= .148
LAMATHAV	-.2207	-.2459	-.2369
	(34)	(34)	(34)
	P= .196	P= .148	P= .164
CSCLAVG	-.1804	-.1978	-.1938
	(34)	(34)	(34)
	P= .292	P= .248	P= .257
SCHSIZE	.0986	.1505	.1309
	(34)	(34)	(34)
	P= .567	P= .381	P= .447

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F16. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTMINOR AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.1925	-.1305	-.1783
	(34)	(34)	(34)
	P= .261	P= .448	P= .298
MATH	-.2141	-.1868	-.2149
	(34)	(34)	(34)
	P= .210	P= .275	P= .208
SCI	-.1785	-.0483	-.1333
	(34)	(34)	(34)
	P= .298	P= .780	P= .438
SOCSTU	-.0415	-.0597	-.0604
	(34)	(34)	(34)
	P= .810	P= .730	P= .726
LASSAVG	-.1212	-.1014	-.1257
	(34)	(34)	(34)
	P= .481	P= .556	P= .465
MATSCIAV	-.2071	-.1224	-.1830
	(34)	(34)	(34)
	P= .226	P= .477	P= .286
LAMATHAV	-.2154	-.1687	-.2085
	(34)	(34)	(34)
	P= .207	P= .325	P= .222
CSCLAVG	-.1703	-.1159	-.1600
	(34)	(34)	(34)
	P= .321	P= .501	P= .351
SCHSIZE	.1324	.2134	.1812
	(34)	(34)	(34)
	P= .442	P= .211	P= .290

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05

Table F17. Partial Correlations (Data with Removed Outliers)
Controlling for percentage of students receiving financial aid, percentage of minority students, average years of experience of faculty, and percentage of faculty with advanced education

P A R T I A L C O R R E L A T I O N C O E F F I C I E N T S

Controlling for.. PCTFA PCTMINOR AVGEXFAC EDUCLEVE

	VERSAT	MATHSAT	COMSAT
LA	-.2518	-.2893	-.2823
	(32)	(32)	(32)
	P= .151	P= .097	P= .106
MATH	-.2190	-.2624	-.2464
	(32)	(32)	(32)
	P= .213	P= .134	P= .160
SCI	-.1999	-.1366	-.1824
	(32)	(32)	(32)
	P= .257	P= .441	P= .302
SOCSTU	-.0360	-.1336	-.0861
	(32)	(32)	(32)
	P= .840	P= .451	P= .628
LASSAVG	-.1479	-.2289	-.1951
	(32)	(32)	(32)
	P= .404	P= .193	P= .269
MATSCIAV	-.2239	-.2119	-.2286
	(32)	(32)	(32)
	P= .203	P= .229	P= .193
LAMATHAV	-.2493	-.2924	-.2800
	(32)	(32)	(32)
	P= .155	P= .093	P= .109
CSCLAVG	-.1951	-.2298	-.2216
	(32)	(32)	(32)
	P= .269	P= .191	P= .208
SCHSIZE	.1152	.1720	.1519
	(32)	(32)	(32)
	P= .517	P= .331	P= .391

(Coefficient / (D.F.) / 2-tailed Significance)
*p < .05