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SCHOOL SIZE AND STUDENT ACHIEVEMENT

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ABSTRACT

This study examined whether a relationship between high school size and student achievement exists in Illinois public high schools in reading and math, as measured by the Prairie State Achievement Exam (PSAE), which is administered to all Illinois 11th-grade students. This study also examined whether the factors of socioeconomic status, English language learners status, special education rate, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment exhibited interaction effects that can be used to predict student achievement as measured by reading and mathematics performance on the PSAE. This study provides quantitative data that will aid educational leaders in school decision-making that can enhance student achievement. Findings of this study revealed a relationship does not exist between school size and student performance in reading. Of nine student and building characteristics investigated, eight had a significant ability to predict student performance on PSAE reading. Socioeconomic status was found to have the most significant effect, with student attendance having the second greatest effect. English language learner status had the third greatest impact. Findings of this study revealed a relationship does exist between school size and student performance in math. Large schools in the state of Illinois outperformed both small and medium schools in math. Of nine student and building characteristics investigated, seven had a significant ability to predict student performance on PSAE math. Socioeconomic status was found to have the most significant effect, with student attendance having the second greatest effect. Instructional expenditure per pupil had the third greatest impact. This study gives

educational leaders in small, medium, and large schools access to very specific information regarding the student and building characteristics that can best predict student performance in their schools.

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CHAPTER 1

INTRODUCTION

The American educational community's search for the most advantageous learning environment has intensified over the last three decades as federal educational reforms, aimed at improving student achievement and insuring equal access to quality learning environments, have forced educators to reevaluate all areas of public school educational practice. Multiple federal initiates have exhorted the American public to renew their focus on education. Federal initiatives have warned that world education has surpassed American education, have fought to erase the inequalities in education, have raised accountability, and have reformed the educational workplace to ensure student success in college and the workplace and as successful participants in a global society.

In 1983, President Ronald Reagan's National Commission on Excellence in Education sounded the educational alarm. *A Nation At Risk* declared in its opening lines the United States' "once unchallenged preeminence . . . is being overtaken by competitors throughout the world" (National Commission on Excellence in Education, 1983, p. 9). Calling for a renewed and more vigorous focus on the core subjects of English, mathematics, science, social studies, and computer science, the study found United States students were studying "homogenized, diluted, and diffused" (National Commission on Excellence in Education, 1983, p. 17) high school curricula and that 42% of students were taking general classes rather than college prep courses.

On April 26, 1983, in a rose garden ceremony, President Ronald Reagan took possession of the *A Nation at Risk* report (Toppo, 2008), which warned Americans the educational system was characterized by "a rising tide of mediocrity" (National Commission on Excellence, 1983, p. 1).

On January 8, 2002, President George W. Bush signed into law PL107-110, the *No Child Left Behind Act of 2001* (NCLB, 2001), which stressed accountability, flexibility, research-based reforms, and parental options such as school choice (U.S. Department of Education [USDOE], n.d.). In tandem with this educational reform act, Congress reauthorized the Elementary and Secondary Education Act (ESEA), the main federal law concerning education from kindergarten through high school (Brown-Nagin, 2012). First passed in 1965 as a part of President Lyndon B. Johnson's "war on poverty," ESEA was created to target the inequalities of education made apparent after the Civil Rights Act of 1964. ESEA, however, also revolutionized the federal government's participation in local schools by making school policy, a role which had previously been the almost sole domain of state and local governments.

President Barack Obama, on July 24, 2009, continued the use of federal power to make school policy when he unveiled yet another reform package designed to improve the educational system of the United States. *Race to the Top* spurred states to vie for portions of the $4.35 billion grant by instituting reform in their state ("Fact sheet," 2009). *Race to the Top,* part of the American Recovery and Reinvestment Act of 2009 (ARRA), focused on adopting standards and assessments designed to ensure student success in college and workplace after high school. It rewarded states that would build data systems to measure student growth and that would report this growth to teachers, principals, and parents. In addition, teacher performance and evaluations would be tied to student performance. Student achievement would be further enhanced through school choice options (USDOE, 2009).

These waves of educational reform exerted continuing pressures on America's public schools. With each major federal reform, mandates modified the role of educators and schools. *A Nation at Risk* placed Americans in confrontation with themselves, using an analogy of war to explain that our nation's laxness had allowed educational achievement to falter in a "unilateral educational disarmament" (National Commission on Excellence in Education, 1983, p. 9). Eighteen years later, President Bush roused Americans to defend the disadvantaged while instituting stringent measures of student achievement with accompanying consequences for not meeting benchmarks. As public schools sought to deal with the accountability requirements of NCLB, the 2009 *Race to the Top* placed further requirements on public education in an effort to ensure equal access to quality education for all students.

With the advent of these reform mandates that dictate accountability for student achievement as measured by standardized tests, it is natural that the search for optimal learning conditions would include considerations of school size. The current economic challenges in the United States have focused discussion on school size as well (Financial Crisis Inquiry Commission, 2011), particularly proposals for school consolidation, which pools funds and resources (Howley, Johnson, & Petrie, 2011; Lowen, Haley, & Burnett, 2010). Some states have used incentives to encourage consolidation while others including Alabama, Kentucky, Ohio, North Carolina, Tennessee, Virginia and West Virginia, have used disincentives against small schools, such as mandating minimum enrollments and refusing renovation of existing structures (Howley et al., 2011).

Arguments for school consolidation date back as early as the 1920s when education looked to business for models of efficiency (Strang, 1987). Economy of scale, the concept that the larger the firm (or school), the more productive and cost effective the environment, was

adapted for education (Howley & Howley, 2004). James Conant, an early proponent of consolidation, suggested that schools needed at least 400 K-12 students to be able to offer curriculum and opportunities necessary for student success (Howley et al., 2011). The concept of consolidation gained momentum between 1930 and 1960. Tens of thousands of one-teacher schools were systematically closed, creating new larger schools. In fact, between 1950 and 1980, the number of school districts in the United States fell from 83,642 to 15,987 (Kenny & Schmidt, 1994).

Research literature from the 1930s through the 1970s affirmed the concept of improving education by both reducing costs and improving educational quality through consolidation of small, one-teacher schools into larger units (Howley et al., 2011). Larger schools were touted as beneficial to student achievement as students were grouped by age. The larger student body enabled schools to offer specialized teachers and subject matter, to provide professional development and supervision, and to begin the trend of free transportation to and from school.

Following the aggressive consolidating of small schools and districts between 1930 and 1970, however, research that sought to find the optimal school size began to show mixed results (Gewertz, 2001). Irmsher (1997) found that the ideal size of school fell between 400 and 900 students. Lee and Smith (1997) argued that schools of 600-900 benefited most students, with a significant drop in student achievement showing up in schools less than 600 students and in schools over 2,100 students. Howley and Bickel's (1999) *Matthew Project* concluded that students from low socioeconomic backgrounds benefited from smaller schools as shown by higher scores on state-mandated standardized tests. This same study found that in contrast, students from higher socioeconomic backgrounds actually benefited from larger schools as shown by their high performance on state-mandated standardized tests. Stewart (2009), in a

study of student achievement in Texas, as measured by the Texas Assessment of Knowledge and Skills (TAKS) test, found that higher percentages of students in smaller rural schools passed all four parts of the 11th-grade TAKS test than in the larger urban and suburban schools. Texas policy-makers were urged not to rush into consolidations without further analysis of the downside of larger schools.

Review of literature suggests that by the 1980s maximum efficiencies had already been obtained in consolidation of smaller schools into larger units (Arnold, 2000; Howley et al., 2011; Lee & Smith, 1997; Purdy, 1997). Harvard President James Conant's once-popular belief that larger schools meant greater student opportunity and achievement was no longer widely supported. In fact, Raywid (1996a) suggested that deconsolidation was in order for many of the very large schools created by consolidation. Increased costs of transportation, supervision, management, and operation associated with larger schools were actually creating diseconomies of scale (Howley et al., 2011; Lee & Smith, 1997; Purdy, 1997). Today, research no longer supports the overall benefits of larger schools for all students (Howley & Bickel, 1999). Instead, Howley et al. (2011) argued that the consolidation strategy seems to have reached a point at which "diminished returns" (p. 8) should be expected. Not only does research now generally favor smaller size (Howley & Howley, 2004), but where once research highlighted the many benefits of larger schools current literature now reveals the many benefits of smaller schools (Cotton, 1996a). Economies of scale, a primary original reason for creating larger schools, can become a negative as well, as economies of scale have been found to diminish as the school size increases until finally the cost savings are negligible (Bickel, Howley, Williams, & Glascock, 2000b; Howley et al., 2011).

The mandated educational reforms of the last decades, however, have placed smaller schools, most of which are rural, in new situations that threaten their existence. The capacities of smaller rural schools have been strained by reforms often made with larger districts in mind (Howley et al., 2011; VonSchnase, 2011). Expanding academic course requirements with a call for more rigorous standards and an increased number of courses for high school graduation along with mandated state assessment programs have stretched the budgets of already financially impoverished schools (Arnold, 2004). Recruitment and retention of highly qualified staff proves to be difficult because smaller rural schools often offer lower salaries and fewer social opportunities for young teachers (Arnold, 2004; Stern, 1994). School choice becomes meaningless when no other choices exist nearby (Bishop, 2011). Statistics may even give an unrealistic picture of the small school because limited class size distorts statistical achievement data (National Center for Education Statistics, n.d.). Expanded services for special populations, such as early childhood and preschool readiness programs, homeless children, and special education students, also strain the budgets of smaller schools (Helge, 1990). Increasing levels of poverty and minority populations in smaller rural schools bring their own challenges for teachers who often are ill-equipped to deal with their culturally diverse students (Hawley & Nieto, 2010). Finally, declining student enrollment has become a challenge for many smaller and rural districts (County Schools Lose Students, 2012; Yan, 2006).

Today's large schools also face unique problems. Once seen as symbols of American efficiency, megaschools are now viewed by many as impersonal environments that encourage student alienation and crime (Allen, 2002). Howley (1994) noted the trend to layer multiple levels of specialization and management in the large and very large schools in the end made these organizations difficult to manage. For students such as the star athletes and top academic

achievers, large schools offer in-depth opportunities and plenty of interaction with staff, but many of the students in the middle drift through without being noticed (Hart, 2006). Meier (1995) found as many as 70-80% of students in large and very large schools belong to social groups without adults.

In an effort to establish interpersonal relationships that foster student achievement, some mega schools have been redesigned. One strategy is to allow students to work with the same teachers throughout their four years of high school, facilitating the chance for teacher-student relationships to grow (Hager, 2006; Irmsher, 1997; McKay, 2000; Raywid, 1996a, 1996b). Programs such as school within a school and looping have become popular strategies to reduce the negative effects of very large schools.

The early expectation that larger schools provide richer curricula has not always proven to be an actuality. Pittman and Haughwout (1987) explained "on the average a 100% increase in enrollment yields only a 17% increase in variety of offering" (p. 337). Researchers have also found in many instances only a small percentage of the student body actually avails themselves of the specialized curricular opportunities (Cotton, 1996b; Fowler, 1992). Yan's (2006) study of Pennsylvania schools did not support the concept that bigger schools offer more curricular options.

Students in large and very large schools also exhibit lower attendance rates than students in smaller schools, a characteristic often attributed to the lack of interpersonal connections and lack of student buy-in (Fowler & Walberg, 1991; Gregory, 1992; Howley, 1994). The rate of parental involvement is also traditionally lower in larger schools (Fowler, 1992). In terms of educational equity, it is clear students with lower socioeconomic status are adversely affected by large and very large school environments (Fowler, 1992; Howley, 1996).

Statement of Problem

Increasingly specific and powerful federal educational reforms in conjunction with the financial pressures of the current economic crisis place today's public schools in jeopardy as they are held to higher levels of accountability with shrinking levels of funding (Lowen et al., 2010). As educators search for environments that will lead to improved student achievement, school size has been considered (Stewart, 2009). Because economic crisis often stimulates support for consolidation as a means of increasing efficiency and cost savings, current interest in school size in relation to student achievement is not surprising (Howley et al., 2011). With educational leaders caught in the dilemma of trying to cut costs while also trying to improve student achievement, multiple states have turned to incentives and disincentives along with policy interventions to promote the possible solution of school and district consolidations (Howley et al., 2011).

Although researchers of the 1930s to the early 1970s touted the ability of larger schools to deliver quality and diverse curriculum while also cutting educational costs (Arnold, 2000; Bancroft, Barker, & Gump, 1964; Cotton, 1996a; Fowler & Walberg, 1991; Lee & Smith, 1997; Stewart, 2009; Weiss, Carolan, & Baker-Smith, 2010), current researchers contend the unique qualities of small schools can offer students an edge, providing not only quality education but also equally important social opportunities to be involved members of the organization. In other words, student engagement, which leads to higher student achievement and higher graduation rates, is facilitated by smaller schools (Weiss et al., 2010). On the other hand, Arnold (2004) stated that small size does not automatically increase learning, noting the various limitations placed on small and often rural schools by their location, economic circumstances, and difficulties in attracting highly qualified staff.

Facing these conflicting views of which school size best facilitates student achievement, schools are in need of more information. Small and mostly rural schools need information on which to base decisions about school restructuring such as consolidation brought on by mounting financial difficulties and dwindling student population (Arnold, 2000). Large schools facing problems of low graduation rates, student apathy, high dropout rate, and student violence (Howley et al., 2011) need information that can lead to solutions for these serious problems which impede student achievement.

Purpose of Study

The purpose of this study was to determine whether there exists a relationship between high school size and student achievement in Illinois public high schools in reading and math, as measured by the Prairie State Achievement Exam (PSAE), which is administered to all Illinois 11th-grade students. This study also examined the student and school characteristics of socioeconomic status (SES), English language learner (ELL), special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and school enrollment to determine their ability to predict PSAE reading performance or PSAE math performance.

Research Questions

The research questions for this study were as follows:

1. Are there significant differences on PSAE reading performance based on school size?
2. Are there significant differences on PSAE math performance based on school size?
3. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance?

4. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance?

Null Hypotheses

$H_0$1. There are no significant differences on PSAE reading performance based on school size.

$H_0$2. There are no significant differences on PSAE math performance based on school size.

$H_0$3. SES, ELL, special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance.

$H_0$4. SES, ELL, special education , mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance.

Significance of Study

The significance of this study lies in its ability to enable educational leaders and communities to make decisions about the future of their schools based on data. A better understanding of the impact of school size and the interaction effect of student and school characteristics on student achievement allows educational leaders and communities to make better informed decisions. This study benefits educational leaders and communities in smaller schools who make key decisions such as rejecting or choosing consolidation and benefits educational and community leaders in larger schools who are considering strategies to counter the negative effects of large size.

Definition of Terms

Attendance rate is the percentage of student attendance for a public high school as reported by the 2012 Illinois State Board of Education (ISBE) Data Analysis and Accountability Division Report Card.

English language learners (ELL) are defined as the percentage of students in a public high school for whom English is a second or learned language as reported by the 2012 ISBE Data and Accountability Division Report Card. English as a second language (ESL) and limited English proficiency (LEP) were formerly used to designate ELL students and are used as interchangeable terms with ELL.

High school designates a public school building that includes Grade 11.

Large school refers to the top one third of the 651 Illinois public high schools housing Grade 11 with student enrollments ranging from 1,110 to 4,522 students.

Medium school refers to the middle one third of the 651 Illinois public high schools housing Grade 11 with student enrollments ranging from 322 to 1,107.

Small school refers to the bottom one third of the 651 Illinois public high schools housing Grade 11 with student enrollments ranging from 34 to 319.

Socioeconomic status (SES) is defined as the percentage of free and reduced lunch students for a school as reported by the 2012 ISBE Data Analysis and Accountability Division Report Card.

Special education population is defined as the percentage of students in a public high school who are part of the special education program as reported by the 2012 ISBE Data Analysis and Accountability Division Report Card.

Student achievement is degree of success as measured on the PSAE by average scale score of students in each public high school as reported by the 2012 ISBE Data Analysis and Accountability Division Report Card.

Student enrollment indicates the number of students in a public high school as reported by the 2012 ISBE Data Analysis and Accountability Division Report Card.

Limitations

This study was limited by the effort exhibited in test taking by Grade 11 students in the state of Illinois. Also, this study relied on the ability of the Illinois PSAE to limit the amount of test measurement error found within the assessment. This study also relied on the accuracy of individual school self-reporting of SES, ELL population, special education population, mobility rate, dropout rate, class size, instructional expenditure per pupil, and attendance.

Delimitations

This investigation was limited to Illinois public high schools only. This investigation also limited student achievement to student performance on the standardized Illinois state test (PSAE). This test pool included Grade 11 students only. This study looked at student achievement in math and reading only. Furthermore, this study considered only the 2011-2012 PSAE results. All data used in this study are 2012 data as reported by the ISBE Data Analysis and Accountability Division Report Card.

Summary

This study is divided into five chapters. Chapter 1 provides the problem, the statement of the problem, purpose of the study, research questions, null hypotheses, definition of terms, significance of study, and limitations and delimitations. Chapter 2 presents a review of the related literature and is subdivided into school size: small, medium, large, SES, ELL, special

education, mobility, dropouts, class size, instructional expenditure per pupil, and attendance rate. Chapter 3 presents information about the methodology used during this study, including purpose of study, research questions, null hypotheses, description of the sample, data sources, data collection procedures, and method of analysis. Chapter 4 presents findings through the quantitative analyses of Hypotheses 1, 2, 3, and 4 as well as additional research questions 3a,3b, 3c, and 4a, 4b, 4c. Chapter 5 presents a summary of the findings, conclusions, implications, and recommendations for further research.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This review of literature examined related research that studied the relationship between school size and student achievement. This review also explored current research that looked at the relationship between SES, ELL status, special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and student academic achievement.

School Size

The relationship of school size and student achievement is of particular interest to educators in the United States as Americans have experienced evolving preferences in school size. In the early 20th century, many reformers saw the once honored and ubiquitous small rural schools as "ineffective, inefficient, and hindered by provincial attitudes and local politics" (Arnold, 2000, p. 3). Consolidation quickly became the dominant solution (Fowler & Walberg, 1991). Across America, school districts were merged to form larger consolidated districts (Kenny & Schmidt, 1994). Between 1930 and 2000, the number of U.S. school districts decreased by 91% while the number of U.S. students increased by 83% (National Center for Education Statistics, n.d.), indicating the new larger districts. Indiana's School Corporation Reorganization Act of 1959 saw districts fall from 900 to 400 in a 10-year span, slowing but continuing until in 2010 only 292 districts remained (Dokoupil, 2010; Zimmer, 2007). In

Illinois, this trend saw 1,008 districts in the 1983-84 school year narrowed to 866 districts by the 2011-2012 school year. At its height, between 1987 and 1995, an average of 10 Illinois school districts saw reorganization each year (ISBE, 2011b). These school reorganizations reflected the industrial philosophy that cost can be reduced by increasing the size of an organization or facility (Purdy, 1997) and also addressed concerns about education quality and lack of opportunity in small schools (Fowler & Walberg, 1991). These concerns had been called to national attention by James Bryant Conant in his landmark books *The American High School Today* in 1959 and *The Comprehensive High School: A Second Report to Interested Citizens* in 1967. Conant (1967) argued the enrollment of many American public high schools was "too small to allow diversified curriculum except at exorbitant cost" (p. 77) and proposed more comprehensive educational programs could be offered at lower costs and with higher quality in larger high schools.

Today following the consolidation rush in the latter half of the 20th century, small schools have once again found favor (VonSchnase, 2011). Small schools, however, face significant 21st century challenges, including increasing poverty rates, lack of funding, isolation, difficulty in attracting quality teachers, and high turnover rates of teachers and administrators as well as increased drop-out rates, increasingly low student attendance rates, and rising student mobility and homelessness (Arnold, 2000; VanSchnase, 2011). Large schools face their own problems of dangerous school environments, low graduation rates, low achievement rates for disadvantaged students, and large achievement gaps related to poverty, race, and gender (Bickel & Howley, 2000; Cotton, 1996b; Howley & Howley, 2004; Pittman & Haughwout, 1987; Raywid, 1999). Very large schools may also experience fiscal inefficiency (Howley et al., 2011).

Though a sizeable database researching the question of school size and its relationship to student achievement exists, consensus on issues of how to define degrees of school size (small, medium, large), optimal school size, or the effects of differing school size is elusive. Williams (1990), after reviewing 30 research studies on school size, stated no clear agreement existed on the dividing line between small and large schools. Finding the answer to "How small is small enough or how large is large enough?" has proven to be difficult for educators and researchers. The lack of agreement on optimal school size for maximum student benefit is obvious in the varying research findings. Bancroft et al. (1964) found a significant relationship between high school size and meaningful student involvement. Studying 13 eastern Kansas high schools with student populations ranging from 35 to 2,287 students, Bancroft et al. noted students in small schools participated in a wider variety of activities, held more positions of leadership, and had more positive self concepts than students from larger schools, all of which lead to higher student achievement. Garbarino (1980) concluded based on study results that high schools with more than 500 students were beneficial. Goodlad (1984) similarly argued for a student population of 500 to 600 as optimal. A much lower number, 250 students or fewer, was determined to be the best high school student enrollment size by Gregory and Smith (1987) and Sizer (1992).

A 1991 study of 293 New Jersey public high schools analyzed the effects of school size based on 18 school outcomes ranging from state-developed test scores to retention, suspensions, and post high school employment. These outcomes were regressed on 23 school characteristics, including SES, school size, and teacher characteristics. School size was negatively related to outcomes, suggesting smaller schools may be more efficient at supporting educational outcomes (Fowler & Walberg, 1991).

Meier (1995) found schools of 300 to 400 students to be optimal, citing seven reasons:

1. Governance (communication is easier)
2. Respect (student and teachers know each other well)
3. Simplicity (less bureaucracy)
4. Safety (strangers more easily identified/teachers respond more quickly to behavior)
5. Parent involvement (more likely)
6. Accountability (everyone's actions are obvious)
7. Belonging (every student, not just the academic and athletic stars is part of the school community. (p. 39)

Cotton (1996a) found the 600-900 student population was the optimal size school. In schools of this size, Cotton's (1996b) findings revealed higher rates of parental involvement, a stronger sense of staff and student efficacy, and greater student involvement in extracurricular activities in student bodies of this size. Cotton (1996a) argued although many small schools are rural, it is the smallness of schools that benefits students, not their settings.

Lee and Smith (1997), using math and reading scores from a nationally representative sample of U.S. high schools and controlling for prior academic ability as well as other characteristics such as social background, also investigated the relationship between high school size and student achievement. Their rigorous studies concluded high school enrollments of 600-900 students most benefited students. At the same time, they found although small schools were beneficial, schools could be too small. Their results showed students learned less in schools with fewer than 600 students. Raywid (1997) found students in these smaller schools were "much more likely to become involved, to make an effort, and to achieve" (p. 38). Irmsher (1997) indicated similarly that high schools of 400 to 900 students were more likely to support student success than larger schools, with findings of lower dropout rates, higher attendance rates, and

greater student participation in schools of this size. Arnold, Gaddy, and Dean's (2004) findings support Lee and Smith, noting small schools with student enrollment below 600 show lower overall academic achievement. On the other end of the spectrum, Lee and Smith found students in large high schools, especially those over 2,100, learned considerably less. Importantly their study also concluded school enrollment size had a greater effect on student populations with lower socioeconomic status and on student populations with high concentrations of minority populations. For both lower SES students and minority students, small schools held greater success.

Howley and Bickel (1999), in the well-known Matthew Project, extended school size and student achievement studies to the states of Georgia, Ohio, Texas, and Montana to analyze the relationship of school size and student achievement in a variety of settings. Like Cotton (1996a) and Lee and Smith's (1997) findings, the Matthew Project concluded student performance is characterized by an interaction effect between school size and student achievement with low SES students benefitting from small schools. They also found more affluent students benefited from larger schools. This finding was reiterated in Bickel and Howley's 2000 *Educational Policy Analysis* article "The Influence of Scale on School Performance: A Multi-level extension of the Matthew Principle." The Matthew Project report suggested an upper limit for high schools of 1,000 students but noted for very affluent communities the limit might be 1,500. In contrast, the findings also indicated some communities might necessitate a limit of 100 high school students to provide student success. In general, the report called for smaller schools for impoverished students. Like Lee and Smith (1997), who found a "one-best, everywhere, optimal school size is a figment" (p. 18), Howley and Bickel (1999) noted no one size was best for all students. Weiss et al. (2010) were later to echo this same finding.

In 1999, Nebraska legislative policy stood on the premise that small schools were less cost effective per student (Nebraska Alliance for Rural Education, 1999). The Nebraska school finance system held state funds should not subsidize small inefficient schools unless no consolidation option was available. Using data from the National Center for Education Statistics, Common Core of Data, and the Nebraska Department of Education for years 1991-1995 and data from the Nebraska Coordinating Commission for Postsecondary Education for 1990-1998, the Nebraska Alliance for Rural Nebraska undertook a series of reports to clarify the school size debate in Nebraska.

Findings revealed significant benefits in small schools and rebutted the assumptions per-student costs were greater in small schools. The Nebraska Alliance for Rural Education (1999) found high school completion and postsecondary enrollment figures increase as school size decreases, noting the following specific points:

1. The proportion of Nebraska students who graduate from high school without dropping out averages 97% in districts with less than 100 high school students, compared to the statewide average of 85 percent.
2. High school completion rates were lowest for schools with 600-999 high school students, averaging 80 percent.
3. Nebraska postsecondary institution enrollment rates were 73% for counties that average less than 70 high school students per district, compared to 64% for counties that average 600-999 high school students per district.
4. The percent of students who complete high school and enroll in a Nebraska college is 25% higher for counties with the smallest schools compared to those with the largest schools. (p. 1)

The study, partially funded by a grant from the Rural Challenge Policy Program, also found that higher school financial costs usually associated with smaller schools "virtually disappear" (Nebraska Alliance for Rural Education, 1999, p. 1) when social costs of non-graduates and positive societal impact of college educated citizens are taken into consideration

Bickel et al. (2000a), looking at high school size in relation to achievement equity and educational cost, found multiple interaction effects. They found as schools grew larger and socioeconomic status increased, the average student achievement fell. Economy of scale was also negatively related to school size after schools reached a very large size. In very large schools, school size was negatively associated with expenditure per pupil but their findings supported that small single unit schools were best at balancing expenditure per pupil.

In 2005, the Kentucky legislature directed that school size and its effect on student achievement be studied. Hager (2006) led staff in first reviewing research literature on the effect of school size and then analyzing Kentucky's 1,200 public schools for effects of school size on student achievement. Hager's review of current research found larger schools have a negative impact on learning, particularly for the disadvantaged. The Kentucky study results, however, contradicted existing research. High school student achievement was found to be higher among students in Kentucky's largest schools (1,801 and larger), although when comparing small schools (301-600) with somewhat larger schools (601-900), student achievement decreased as school size increased before eventually reaching its highest levels in the largest schools.

Wyse, Keesler, and Schneider (2008), in a study of over 12,000 high school students, analyzed the possible effect of small school size on student achievement in mathematics. Their findings indicated smaller school size did not necessarily equate to greater student mathematical achievement. They further found, like Howley and Bickel (1999), there was not one school size

that was most advantageous in providing maximum student mathematical achievement. Hardre, Sullivan, and Crowson (2009), in a study of 414 students in Grades 9-12, found these rural students showed positive motivational profiles for learning with the personal characteristics of goals and positive self image most strongly predicting student achievement.

Analyzing the effects of larger schools resulting from consolidation of earlier decades, Lowen et al. (2010) questioned whether benefits outweigh the challenges associated with bringing small schools together into larger units. Of particular concern was the undermining of principals' abilities to monitor teachers' efforts in the classroom and so to affect student achievement. Their findings led them to offer an incentive-based system that encourages teacher performance as a solution to this challenge.

In light of school reforms of the 1990s and early 2000s which raised concerns about larger educational units, Weiss et al. (2010) studied mathematics achievement and school size of 10,946 tenth graders. Weiss et al. (2010) found school size was highly related to student engagement, which indicates student success. Student bodies beyond 400, they found, experienced potentially harmful changes. Echoing earlier researchers, they noted, however, "group size affects different students differently, eliminating the ability to prescribe an ideal cohort or school size" (Weiss et al., 2010, p. 163). This supports earlier literature, which argued although interpersonal relationships are generally more positive in smaller schools (Lee, Smerdon, Alfeld-Liro, & Brown, 2000), this does not benefit all students equally. In fact, some students benefit from the anonymity of large schools (Weiss et al., 2010). Weiss et al. noted as well the search for the "right size" (p. 174) of school has yielded conflicting results which are inconsistent at best. Like the Matthew Project findings, the authors did not find consistent

benefits of smaller schools for all kinds of students and pointed out small schools "are not a one size fits all solution" (Weiss et al., 2010, p. 174).

A report prepared by Arnold (2004) for the Institute of Education Sciences agreed, noting small size does not automatically result in increased student achievement. Small schools, the report concluded, should focus on how to better use their small student enrollment number to increase student achievement, since many factors influence student achievement in addition to school size. Arnold (2004) listed a potential future research question as "What is the nature of the relationship between school size and student achievement?" (p. 4).

School size and student achievement issues raise questions around the world. In England and Wales, financial and educational quality concerns about small schools led Hopkins and Ellis (1991) to argue that many other factors such as teaching methods, curriculum, resource availability, and school leadership have greater impacts on student learning than school size.

Iatarola, Schwartz, Stiefel, and Chellman (2008) later supported this finding that student achievement benefits were not necessarily from school size but from a combination of other factors within the student population or the district. In Istanbul, school safety, a prerequisite to student achievement, was found to be less problematic in high schools of 500-1,000 students (Bakioglu & Geyin, 2009).

Small

Jimerson (2006) supported 10 reasons why schools that are small and rural produce academic achievement and social benefits:

1. There is greater participation in extra-curricular activities and this participation is linked to academic success.
2. Small schools are safer.

3. Kids feel they belong.
4. Small class size allows more individualized instruction.
5. Good teaching methods are easier to implement.
6. Teachers feel better about their work.
7. Mixed ability classes avoid condemning some students to low expectations.
8. Multi-age classes promote personalized learning and encourage positive social interactions.
9. Smaller districts usually mean less bureaucracy.
10. More grades in one school alleviate many problems of transitions to new schools. (p. 7)

Yet, small schools are facing a plethora of problems in today's world. Many small towns and rural communities are experiencing new immigration and settling of minority cultures within their communities (Villenas, 2001). The introduction of new cultures can bring tensions raised by differing views of many facets of life including the definitions of parenting and education itself, views which must be reconciled for optimal learning environments to exist (Yeo, 1999). Watts (2012) grew up as part of a Black minority in a small Kentucky town and later returned as a professor in his hometown community college. His experiences have led him to call for small towns to encourage and sustain minority students in education through developing a feeling of community within the educational setting, even if that feeling of inclusion does not exist in the community itself.

The necessity for bilingual education faces small schools and communities as well. As our nation becomes increasingly mobile and more global, and as federal initiatives require accountability for subgroups such as ethnic minorities, small town educators must build

programs that support bilingual education, which allows students to find their own place in the local-global landscape while also taking into account the special needs and challenges faced by small town communities (Ngai, 2002).

Social challenges also ripple through small-town student populations. Cronk and Sarvela (1997), in studying small-town and urban student use of cocaine, LSD, inhalants, binge drinking, cigarette smoking of a pack or more per day, and daily alcohol and marijuana use, found overall substance use had declined between 1976 and 1992. However, although urban students showed a higher rate of substance abuse in 1976, by 1992 small-town students had a higher prevalence of alcohol use and excessive cigarette use for both men and women. A 1999 study of 1,950 elementary school students, K-6 in seven different small-sized schools in southern Illinois found students who tried alcohol had eight times the risk of trying cigarettes, and students who tried chewing tobacco or snuff had a 4.4 times greater risk of trying cigarettes (Sarvela, Monge, Shannon, & Nawrot, 1999). The strongest predictor, however, was grade level, with those who had ever tried cigarettes rising sharply to 17.41% in sixth grade. Sarvela et al. (1999), analyzing existing data, found that rural men and women smoked tobacco significantly more than their urban peers. Rural White men also smoked more often than any other group while urban Black men showed the lowest tobacco use rate.

Services for students may be limited in small towns. In a survey of special education teachers across Kentucky, researchers found differences existed between delivery of service in urban districts and rural/small-town districts (Pennington, Horn, & Berrong, 2009). Although some small districts in the study were able to overcome the unique challenges of their small districts, the study indicated that a major obstacle for small districts is the lack of quality teachers. Administrators in rural and small towns experience difficulty in recruiting and

retaining qualified special education teachers, because quality teachers are drawn to employment in larger districts with more competitive salaries and community amenities (Lemke, 1995). In addition, the attrition rate in rural and small schools is extremely high, with Helge and Marrs (1981) reporting a special education teacher turnover rate of 30-50% in these schools. New teachers find it difficult, according to district administrators, to adjust to the more remote geographic locations and the sparse populations (Lemke, 1995). Often teachers are also met with challenges in fitting in or adjusting to community expectations

Small towns have been faced, too, with adaptation to changing sexual orientations. Isolated from urban culture, small town lesbian, gay, bisexual, and transgender populations may face rejection by the traditionally heteronormative cultures of small towns (Latchmore & Marple, 2005). In one small Nova Scotia community, Antigonish, a locally initiated, rural community development project opened dialogue for social change and acceptance, hosting the Lesbian, Gay, Bisexual, Transgender Community Safety Initiative. With funding from the National Crime Prevention Strategy, this project, which originated in local student activism, evolved into a program that eventually included service providers, the regional school board, community members, and students.

Small towns worldwide face many of the challenges plaguing American small towns and small rural educational systems. Small schools with enrollments of 200 or fewer students make up 45% of schools in Australia (Halsey, 2011). In 2009, a researcher studied these small schools in order to identify potential improvements for leadership in these schools given the importance Australia attaches to these small schools found in rural areas where the basics of life are produced (Stevens, 2009). Complications that must be addressed include a system in which small-school rural students who complete high school (Year 10 of study) must leave home to

enroll in Years 11 and 12 and continue these studies in a larger school in another more urban locality. These diverse findings on the relationship of rural location and school size and student achievement support why rural teachers in small schools see both motivational advantages and motivational disadvantages in small, rural high schools (Hardre, 2010).

As it does in the United States, hiring and retaining qualified teachers who can acclimate to the more isolated environments has presented challenges in Angola. Nsiangengo and Diasala (2009) suggested teacher education must prepare graduates for teaching in rural and small town schools. Angola has developed a network of schools, called Training Colleges for the Teachers of the Future, to train teachers to work specifically in small, rural schools. This not only speaks to the need for high-quality education for all children but also encourages the sustainability of healthy rural communities and educational systems.

Finland, too, is finding it difficult to staff small village schools (Karlberg-Granlund, 2011). Taking a unique look at what made teachers stay in these small schools that were threatened by closure, researchers Boylan and McSwan (1998) found that job satisfaction and an appreciation of the rural lifestyle and environment led teachers to remain in these small schools despite economic advantages in larger schools and districts.

Working toward implementation of *Curriculum for Excellence* in all schools, the Scottish Schools Act 2010 placed very specific boundaries on school size and student populations (Hepburn, 2011). Questioning the ability of small elementary schools to successfully execute *Curriculum for Excellence* and feeling students were at a disadvantage when having fewer peers, the Aberdeenshire Council set the following criteria within which schools must operate:

1. No child should be educated in a school with fewer than three contemporaries (within two school years in either direction).

2. No rolls of 19 or fewer, or at risk of falling below 19.
3. No journeys to school of more than 45 minutes.
4. No town school at below 66% of its capacity, within a town whose primary schools are at less than 75% capacity overall.
5. No school building whose condition or fitness for purpose is categorized level D (below standards). (Hepburn, 2011, p. 10)

Over the last 15 years during China's School Mapping Restructure (SMR), many small rural Chinese schools have closed or have been merged (Zhao & Parolin, 2011). This reorganization has placed rural students at new disadvantages. Not only do they now face longer transportation times, but their parents face added economic burdens. Researchers Zhao and Parolin (2011) argued that these small schools have a place in educating China's rural students and feel they should not only be retained but refurbished with quality services and facilities.

Corbett (2005), after teaching in small Canadian coastal communities through the 1980s and 1990s, analyzed what he called out-migration from these villages. Findings showed many youth, especially young men, chose to stay in these small villages without education beyond high school. Using an entrepreneurial spirit, most found success in family, economic, social, and cultural capital. Higher education, Corbett found, acted as a sorting out of those who would remain and those who would out-migrate. Diminishing job opportunities in the coastal regions and rising costs of living have raised new questions about the sustainability of the traditional lifestyle villagers have shared for generations. To combat the resistance that existed to higher education, Corbett urged graduates and residents to recognize that education could mean something other than leaving.

Swedish e-learning is revolutionizing delivery of higher education in Sweden (West, 2007). With innovative public policies and a comprehensive infrastructure, Sweden has shortened the distance from remote areas to educational centers. Between 1996-97 and 2005-06 the number of students enrolled in distance education grew from 28,400 to 82,300. In fact, nearly one in five Swedish students participated in online courses. Evolving from an early tradition of distance learning through correspondence courses, which were important, especially in rural areas, today's virtual classrooms have broadened access to higher education. Some courses are open to students worldwide, allowing global student and teacher interaction. Ireland, too, is looking to technology to shorten distances (McInerney, 2005). Teachers and students together have integrated technology and education, particularly at the elementary level in small communities.

Malaysia, finding urban students enjoyed greater benefits of technology than rural due to lack of rural infrastructures, launched a study of attitudes of secondary teachers towards computers in its rural areas as a precursor to introducing more technology and training for its teachers (Kian-Sam & Chee-Kiat, 2002). Canada has established a digital structure to better education its students in small schools in rural communities through access to virtual classroom opportunities (Stevens, 2006). Secondary students are able to enroll in advanced placement (AP) courses, which offer both high school and undergraduate credit. Other students study online from their remote communities. The introduction of e-learning in small rural Canadian schools has eased tensions in rural communities where declining enrollments have raised questions about school viability. Southwestern Nigeria struggles with equity of resources between its larger urban schools and smaller rural schools, finding that the larger urban schools were better

equipped with computers for use in teaching and learning than small rural schools (Aduwa-Ogiegbaen & Iyamu, 2009).

China's *Hong Kong Classroom Environment Scale*, given to 789 students from 18 schools in the Eastern coastal developed areas of China, found significant differences between larger urban schools and smaller schools, with large schools scoring better than middle-sized or county size (Sun & Xie, 2008). Pointing to isolation from new ideas, an imbalance in educational resources, loss of rural student enrollments, and lack of teacher quality in smaller rural schools, Li (2010) argued rural secondary schools in China must be moved to town in order to narrow the disparities and to improve equity of education for all students.

Medium

Like many small schools, the makeup of student bodies in medium-sized schools is changing as well (Myers & Forte, 2008). Wheaton Consolidated Unit School District 200, 25 miles west of Chicago, Illinois, has grown more diverse since 2003. In 2008, White student enrollment had fallen by 10% in the previous five years but African-American and Latino enrollments were up. The number of Asian students had grown as well.

The integration of multiple ethnicities into suburban schools in Hartford, Connecticut, has been hastened by the Connecticut Supreme Court's directive that racial and ethnic isolation in Hartford's schools must end (Parker & Stone, 2010). Although the state already hosts an Open Choice program that allows inner city students to transfer to more desirable suburban schools, its program is limited. In 2010, a total of 2,418 Hartford, Connecticut, students applied for transfer to suburban schools through the Open Choice program, while suburban Hartford schools made only 126 new student spots available. The Connecticut Supreme Court ruling sought to correct this inequity.

Looking for advantages or disadvantages of school settings, an early 1996 study by Keith, Keith, Quirk, Cohen-Rosenthal and Franzese analyzed both the levels and the effects of parental support and involvement in rural, suburban, and urban settings. Their findings suggested parents were no more or less involved in rural, urban, or suburban settings. In addition, parental involvement had the same effect on these small, medium, and large schools. Finally, Keith et al. found that students in rural, urban, and suburban settings showed similar levels of academic achievement at the eighth-grade and 10th-grade levels.

Flaxman (2003), noting a growing achievement gap existed in middle-income suburban schools, particularly in high-achieving schools, turned to recent research that had studied the experiences of racial and economically disparate students in suburban schools for answers. He noted that the R. F. Ferguson (2002) study of minority student achievement in suburban schools argued classroom practices should be altered in order to encourage low achieving students. Schools should also identify and provide interventions for specific skill and knowledge deficits of particular groups. The Ogbu (2003) study of Black American students in affluent suburban schools, however, pointed to minority students' lack of participation in opportunities available to them as a reflection of their identification with their marginal position in American society. Ogbu proposed altering schools' approaches by developing caring interventions designed to provide encouragement and support in altering students' self perceptions as a pathway to student successes.

Seeking explanations for the widening achievement gap between medium suburban and large urban settings, Brown, Anafara, and Roney (2004), in a study of high-performing suburban middle schools and low-performing, urban middle schools suggested contrasts between the two settings that impacted student achievement go beyond the traditional explanations of SES and

funding. Their findings suggested the factors of teacher efficacy, curriculum articulation, high expectations, instructional leadership and professional collegiality are also primary factors affecting student achievement.

Others have explored the disparity between student achievement in small rural schools and student achievement in medium suburban schools. Courrege (2012) pointed to the Carsey Institute of Durham, New Hampshire, study, entitled "Mathematics Achievement Gaps Between Suburban Students and Their Rural and Urban Peers Increase Over Time," which surveyed 22,000 children between 1998 and 2006. Looking at whether geographic location of schools impacts student achievement, the study found rural students had lower math achievement. The study found in addition to SES, parent education levels (usually lower in rural areas), lack of preschool experiences, and fewer resources for things such as teacher salary, teacher training, and technology were limiting factors in students' opportunities to learn math in rural locations.

These findings contradict Fan and Chen's (1998) study results, which showed students from rural schools performed as well as, if not better than, metropolitan students in math, science, reading, and social studies. This extensive study used a nationally representative study of 24,500 students in Grades 8, 10, and 12 in the four learning areas. Adjustments were made for SES and analyses were done separately for the ethnic groups of White, Black, Hispanic, and Asian. Comparisons were also divided by the four major geographic areas of the Northeast, Midwest, South, and West. Fan and Chen noted also that the concerns regarding disparities in student achievement in rural, suburban, and urban settings is an international issue with research studies comparing the student achievement from these settings being conducted in multiple nations including South Africa, Nigeria, Australia, India, and Peru.

Shifting demographics have also created problems. Growing numbers of minority students have entered student bodies in predominantly White, middle class, and well-funded suburban schools (Bancroft, 2009). This has led to the problem of mostly White teaching and administrative staffs working with minority populations whose behavior and learning differences they do not understand, and for which they are not trained to handle effectively (Chaney & DeGennaro, 2005). The explosion of ELL's entering suburban schools has made this problem an even greater challenge (Field, 2008).

Large

America's large schools have multiple roots. Conant's two books, *The American High School* in 1959 and *The Comprehensive High School: A Second Report to Interested Citizens* in 1967, accelerated the push for school consolidation, as he argued small schools could not keep up with the academic rigor required to complete in the world and, among other things, win the Russian and American space race (Cotton, 1996b; Pittman & Haughwout, 1987). Conant (1959) claimed that the small high schools that dot the American landscape were the number one problem in American education and advocated for their elimination. Conant's (1967) second book further popularized consolidation as a solution which would make the American education system more cost effective and supply its students with a wide and varied curriculum. In addition to consolidation, a baby boomer explosion of school-age population after World War II made it necessary for urban schools to grow much larger, very quickly. Further intensifying school size growth, just as baby boomers hit the classrooms, waves of immigrants also contributed to the rapid rise in urban school populations (Cotton, 1996b).

As the United States neared the late 20th century, the push for consolidation continued (Schoggen & Schoggen, 1988). Large schools served Americans' desire for efficiency,

economies of scale, and supported American's pervading idea that bigger was better (Allen, 2002). Densely populated cities such as Los Angeles and Miami developed high schools with enrollments as large as 5,000 students, as large, urban schools of one, two, or three thousand became common. This thrust of creating a network of large, urban high schools served to feed a national desire for specialization, depersonalization, and standardization in an effort to produce maximum human capital most efficiently. Few reform movements have succeeded so well (Lee & Smith, 1995).

In the late 20th century, however, the glory days of very large highs schools, which seemingly touted the Americanization process for producing citizen-workers (Allen, 2002), began to wane (Irmsher, 1997). McKenzie (1983) found size and cost analyses did not hold true. He provided research which established a U-shaped relationship between school size and average per-pupil costs. In this U-shape, per-pupil costs declined up to a point as enrollment increased, but saving minimized and then rose with further school growth. Later researchers blamed the added costs of multiple layers of administrators and staff necessary to educate, organize, and control large numbers of students for this eventual rise in cost (Gregory, 1992; Robertson, 1995).

Research, however, is inconsistent in its findings concerning student achievement and large urban school size. With about half finding there is no significant difference in large and small school student achievement and half finding small schools offer higher student achievement, Cotton (1996b) argued it is safe to say that small school achievement is at least equal to large school achievement. Rudy Crew (2010), past chancellor of New York City Schools and past superintendent of Miami-Dade County Schools, argued student achievement is much less affected by size than by instruction and finds large schools add value to student

achievement because they can offer wide ranges and greater breadth of curriculum and program options.

In 2000, Evanston Township High School, with an enrollment of 3,100 students, offered this breadth of curriculum with four years of Latin, German, Hebrew, and Japanese and two years of American sign language as well as the more common languages such as Spanish and French (Allen, 2002). Laura Cooper, assistant superintendent for curriculum and instruction, noted Evanston was diverse with a student population of 50% White, 39% Black, and 11% other minorities, with 25% low-income families (as cited in Allen, 2002). One key, Cooper pointed out, to making sure students do not become lost in all these choices is to limit choices (Allen, 2002). Courses that lacked rigor were deleted from course offerings, ensuring freshmen and sophomores were on track with core courses. Evanston also made this large school seem personal by establishing home bases where one teacher meets with the same group of 15 students each morning for the four years they are in high school.

Urban schools serve a disproportionate number of minority and poor students who are at greatest risk of academic failure (Wang, Haertel, & Walberg, 1998). These urban minority and poor students tend to have numerous factors that put them at risk for school failure, such as homelessness, neighborhoods characterized by crime, violence, drugs, and socio-cultural factors including discrimination and racial and language barriers (Holcomb-McCoy, 1998). Noquera (2001) pointed out racial and minority students in large urban schools often feel powerless and feel their language and cultural heritages are deficits. Special education programs are often overloaded with these disadvantaged students (D. L. Ferguson, Kozleski, & Smith, 2001). Urban schools also face a situation in which parents become adversarial rather than partners in their children's educations (Huang & Gibbs, 1992). The effects of socio-cultural-political forces that

face urban minority and disadvantaged students face are equally harmful to high-performing and low-performing students (Herbert, 1999).

Pittman and Haughwout (1987) found large high schools experienced higher dropout rates, finding that for every 400 student increase in the student body the dropout rate increased by 1%. Raywid (1996a), in her thorough examination of relevant literature and 22 schools-within-schools, found higher dropout rates in large schools were coupled with lack of student identify with the larger school and chronic low attendance rates. Meier (1995) pointed out although larger schools offer more specialized programs for disadvantaged or disabled students, the students are likely to feel distanced from the school community, further complicating the lack of commitment or identification with the school environment.

Violence, too, is a part of large urban school settings. Comparing crime at small high schools (300 or fewer students) with crime in larger schools (more than 1,000), the U.S. Department of Education found that large school campuses had 825% more violent crime, 394% more fights, and 378% more theft (Hart, 2006).

Large urban schools, though, can foster resilience in these students, helping them find academic and social success (Benard, 1991). Establishing caring and supportive adult relationships can build this resilience in students. High teacher and parent expectations, challenging educational curriculum, and enrichment programs such as Saturday and summer programs can work to create a sense of belief in an ability to succeed and in self (Herbert, 1999).

Benard (1991) noted multiple ways risk factors are reduced through these supportive relationships:

1. Children are less impacted by the effects of risks with which they have come in direct contact.

2. The danger of exposure to the risk is reduced or the risk itself is modified.
3. Children's self-efficacy and self-esteem are enhanced.
4. Children are provided with opportunities for meaningful involvement in their environments. (pp. 13-18)

Although students in large urban schools face multiple risk factors, research supports that students in high-poverty, high-minority schools can find academic success (Education Trust, 2001). The Education Trust (2001) identified 4,557 high-minority and/or high-poverty schools as high-performing. Common threads among these schools included high expectations, rigorous curriculum, extra support for students who needed it, and strong family/community/school partnerships. These partnerships build social capital, resources stored in human relationships, from which the families and students can draw to help the student find success (Epstein & Sanders, 2000).

Socioeconomic Status

Although much disagreement can be found among researchers concerning school size and student achievement, many find common ground in stating disadvantaged students benefit from small schools (Cotton, 1996a; Fowler & Walberg, 1991; Howley & Bickel, 1999; Lee & Smith, 1997).

Since the mid-1950s, large consolidated schools with thousands of students have become common (Irmsher, 1997). When these consolidations first took place, student populations in urban schools were largely middle-class students (Howley, 1994). Today, urban population patterns have changed, filling student populations in inner city schools with impoverished, disadvantaged students. Although Howley (1994) reported students from high SES benefit from larger schools, Lee and Smith (1997) found low-SES disadvantaged students along with minority

students are better served by small school size, and the projected economy of scale savings did not materialize because large schools required more layers of administrative and support staff, which ate up cost savings.

Fowler and Walberg (1991) found that the most consistent variable associated with the negative outcomes was low district SES. School size became the next most significant variable in this inverse relationship between school size and student outcomes. Beck and Shoffstall (2005), while studying school size and student achievement in an analysis of Grades 3-8 Illinois Standards Achievement Test scores, found SES characteristics showed a strong relationship with student scores. A combination of SES, ethnicity, and property values within districts explained 70% of variance in school outcomes. Lee and Smith (1997) noted school size was most important for the most socioeconomically disadvantaged, finding that student achievement declines substantially when the size of high school students attend is higher or lower than Lee and Smith's ideal of 600-900 students.

Matthew Project results (Howley & Bickel, 1999) showed small school size reduced the negative effects of poverty for all grade levels studied, for all analyses in the study, and for different sorts of achievement. Smaller school size reduced the negative effects of poverty with an average benefit between 30 and 50% reduction and as high as 67% reduction. Cotton (1996a), too, found the economically disadvantaged as well as minority students benefited most from small schools. Researchers Khattri, Riley, and Kane (1997) demonstrated poverty is pivotal in both urban and rural areas in placing students at risk of educational failure.

English Language Learners

ELL students make up the fastest growing segment of the U.S. public school population (National Clearing House for English Language Acquisition, 2007). As public school educators

experience this increase in diversity, they are also encountering the intensified federal accountability for student academic achievement under the No Child Left Behind Act of 2001. Public school educators are now held accountable for the academic performance not only of the general student population but alsofor subpopulations, including this burgeoning ELL student population (Brooks & Thurston, 2010).

Guaranteeing ELL students have equal access to quality education, however, challenges our educational system. The 2005 National Assessment of Educational Progress (NAEP) report revealed only 29% of ELL students in Grade 8 scored at or above the basic level in reading and math (NAEP, 2005). Creating a program that successfully educates ELLs has required self-examination by educators. The feeling *good teaching is good teaching* perpetuates the perception that what works for one student will work for another, dismissing the need for culturally relevant instruction (Gay, 2010; Ladson-Billings, 2009). Perez and Holmes (2010) noted culturally and linguistically diverse students need instruction that addresses four major areas in order to gain English language skills: sociocultural, linguistic, academic, and cognitive dimensions. Much of the difficulty lies in ELL students facing the dual tasks of accessing and learning content-area-specific curriculum while also mastering linguistic strategies, academic vocabulary, and structures of the English language (Laija-Rodriguez, Ochoa, & Parker, 2006; Mercer & Rueda, 1991).

Researchers have also noted ELL students vary widely in their level of English proficiency, requiring that each learner's level of English proficiency be a consideration in making educational plans for language acquisition (Krashen & Terrell, 1983; Perez & Holmes, 2010). This involves acknowledgment and understanding of sociocultural factors in the ELL student's life, such as

1. How has the student been socialized to literacy based on culture/family background?
2. What type of resources and literary experiences has the student had within the home?
3. How is language perceived/defined, and how does this fit the teacher/school's definition? (Herrera, Perez, & Escamilla, 2010, p. 21)

Answers to these questions can be used to develop instruction that will lead to literacy skills and experiences that can build a bridge between the student's current knowledge and the goals of English language building and engagement in content-area curriculum. Other problems facing ELL students include backgrounds of limited formal education and interrupted schooling (Perez & Holmes, 2010). These backgrounds can lead to lack of student engagement in learning. Perez noted teacher and student engagement is vital in creating a learning environment that motivates the ELL student. Students must feel safe in expressing ideas or opinions in the classroom. This includes both those students with very little educational background as well as those who bring with them valuable formal and informal academic experiences. Preassessment is one measure that can enhance teachers' understanding of student needs, and this in turn allows teachers to find the optimal starting point and methods of instruction. Preassessment also enables teachers to facilitate student connecting of prior knowledge and experiences to current learning.

Educators are faced, too, with determining if student difficulties stem from learning disabilities or from their limited comprehension of the English language (Gersten & Woodward, 1994). In many instances, in locations experiencing large numbers of recent immigrants, classroom teachers feel overwhelmed and have quickly turned to special education programs for support. Mercer and Rueda (1991) pointed out both students and teachers experience difficulties

in coping with the enormity of obstacles facing ELL students, sometimes leading to inaccurate placement of ELL students in special education classes.

Research-based strategies, however, can be effectively implemented to successfully support ELL student learning. Huerta and Jackson (2010) noted educators must keep in mind that even if ELL students cannot read or write English very well, they can all think. Promoting literacy in written and spoken language allows teachers to lead students into deeper understanding and encourages the development of higher order thinking in curriculum content areas.

School professionals, though, need access to research-based information. A deficit of research hampers educators working to support ELLs (Brooks & Thurston, 2010). As the culturally and linguistically diverse student population in U.S. public schools continues to increase dramatically, the need for finding ways to close the achievement gap that exists between ELLs and native English speakers grows. This urgency is driven home by the fact that in 2007 21% of children between the ages of 5 and 17 spoke a language other than English in their homes (Brooks & Thurston, 2010).

Researchers Gass and Alvarez-Torres (2005) found language acquisition is supported by classroom conversations. This supports Vygotsky's (1978) findings that language is learned through interaction with more knowledgeable peers or experts. Lyster and Izquierdo (2009) also found the interaction between language learners and native language speakers builds language. The process of language learners talking in a second language, then modifying what they say when the listener does not understand them, helps language learners build native-like speech patterns and expressions of thought. The connection between classroom interaction and improved reading comprehension is also supported in the findings of Kamps et al. (2008).

Group size during instruction impacts ELL engagement as well. Brooks and Thurston (2010) found ELL students were most likely to be engaged in learning during small group and one-to-one instruction. They also noted teachers should use more student collaboration and less whole group instruction to raise the level of active student engagement in the classroom.

As both urban and rural student populations become more ethnically diverse (Strange, Johnson, Showalter, & Klein, 2012), Hawley and Nieto (2010) noted teachers may be faced with teaching situations for which they are ill-prepared. Cultural diversity affects how students respond to instruction, and this diversity places varying lens over student perceptions of education in general. Professional development sensitizing teachers to diverse cultural and language needs is essential (Ferguson, 2002). Of particular challenge in small rural school districts with growing ELL student populations is that this professional development may not be available or welcomed (Yeo, 1999).

Special Education Population

Although special education services existed pre-1960s, few public high schools took note of students of normal intellectual abilities who had the same educational opportunities as classmates yet did not find academic success (Zigmond et al., 1995). Often these students displayed behavioral manifestations such as hyperactivity and distractibility, behaviors which later became associated with learning disabilities. In 1975, however, with passage of the Education for All Handicapped Children Act (*Thirty-five years of progress*, 2010), serving learning disabled students became a provision of special education services. The Individuals with Disabilities Education Act of 1990 ("Building the legacy") further enhanced services for students with disabilities.

Many questions surround the issue of identifying the best learning environment for special education students. Early trends favored programs that provided services in special education settings, usually resource rooms (Zigmond et al., 1995). More recent delivery models have favored placement of special education students in general education classrooms, limiting placement in separate classes or separate resource rooms (Holloway, 2001). No consensus, though, has been reached on which placement has the most beneficial effect on special education students (Fore, Hagan-Burke, Burke, Boon, & Smith, 2008).

A large body of research in the 1980s and 1990s supported that inclusive placement was advantageous for learning disabled students (Baker, Wang, & Walberg, 1995; Carlberg & Kavale, 1980; Madden & Slavin, 1983; Magiati, Dockrell, & Logotheti, 2002). Banerji and Dailey (1995) studied specific learning disabled students in Grades 2-5 in a southeastern school. Findings suggested the SLD students made gains comparable to that of their normally achieving peers, but in addition teachers noted improved student self-esteem and motivation. Stigma was also reduced because the SLD students were not isolated from peers. A 1998 study by Waldron and McLeskey investigated the effects of inclusion delivery of services on math and reading achievement, focusing on inclusive and pullout special education programs. Their findings indicated students in the inclusive program made significantly more progress in reading and comparable progress in math than their general education peers. Additionally, more students with mild SLD in the inclusive setting scored reading achievement comparable to their non-disabled peers than students with SLD in the resource settings.

Others have disagreed. Holloway (2001) found inclusive placement was not necessarily advantageous for special education students. Multiple other researchers (Ross & Stevens, 2003;

van Hover & Yeager, 2003; M.P. Weiss & Lloyd, 2003) also found certain elements of inclusive settings in general education classrooms are not beneficial to students with SLDs.

Some studies have suggested no difference is produced by placement of services (Affleck, Madge, Adams, & Lavenbraun, 1988; Fore et al., 2008; Manset & Semmel, 1997). Zigmond (2003) argued evidence of placement of service making significant differences in student achievement is inconclusive. Zigmond, instead, suggested that asking *where* students should receive their educational services may not be the correct question to ask, noting a basic conflict exists between this question and students' right to be placed in the least restrictive environment. Zigmond argued for individualized decisions.

Hawkins (2007) conducted a longitudinal study in Rhode Island of the years 2001-2004 and looked at academic achievement of students with special needs in low performing schools. Findings revealed many of these schools were raising academic scores of this subgroup with individualized education programs, despite being deemed low performing or in need of improvement. The study gathered practices that successful schools had used to improve academic achievement, including

1. Using inclusive strategies that engage students with special needs in general classrooms.
2. Establishing common, high expectations for all learners, with a focus on achievement.
3. Providing professional development to all staff members in research-based best practices.
4. Employing a highly qualified staff that is trained, committed, and responsive to student needs.
5. Having teams of teachers frequently analyze student work.

6. Using multiple forms of assessment.
7. Differentiated instructional practices to address student needs.
8. Increasing instructional time in literacy.
9. Involving parents in student learning.
10. Creating safe learning environments that incorporate incentive for success. (Hawkins, 2007, p. 63)

A three-wave strategy for improving student success for students with learning disabilities was advanced by Elkins (2007). This approach combined resources into high-quality classroom teaching, early interventions, and ongoing support for students who continue to have difficulties. This Australian plan closely mirrors current movements in the United States, which demand rigorous standards, highly qualified teachers, data driven decision-making, sustained educational reform, and innovation ("Fact sheet," 2009).

Engaging in learning in the classroom offers challenges, because students at risk for reading difficulties often do not engage in instruction (Seo, Brownell, Bishop, & Dingle, 2008). Haynes and Jenkins (1986), however, found when special education teachers engaged special education students in direct, intensive instruction that included sufficient feedback, students made academic gains, whether in inclusive general classrooms or special education classrooms. In another strategy, a Massachusetts high school launched an academic tutorial program that used academic guidance from regular classroom teachers to support students with mild learning problems (Mowschenson & Weintraub, 2009). The program proved effective in motivating these special needs students.

Although under NCLB all students with disabilities fall into one category, educational researchers have argued many differences exist within this subgroup (Wei, Blackorby, &

Schiller, 2011). While reading achievement in all disability categories was found to increase with age, the rate of growth decreased with age. The average reading achievement level differed by disability category. Although all disability groups showed improvement over time, the rate of improvement was slower for students with speech or hearing impairments or autism. Wei et al. (2011) argued that placing all students with disabilities under one subgroup in NCLB does not fairly evaluate student improvement because the students across different disabilities reach targeted proficiencies at different rates.

In the state of Illinois, achievement gaps between IEP students with disabilities and their general education peers is striking. On the 2011 PSAE, disabled students with IEPs scored as reflected in Table 1. Table 2 presents PSAE 2011 scores achieved by general education students.

Table 1

2011 PSAE Achievement Scores for Disabled Students with IEPs

Subject	Meets/Exceeds Level %
Reading	15.6%
Math	12.1%
Science	13.6%

Table 2

2011 PSAE Achievement Scores for General Education Students

Subject	Meets/Exceeds Level %
Reading	51.1%
Math	51.31%
Science	49.2%

Mobility Rate

Investigating the relationship between geographic mobility of students from one region or school district to another and student achievement in Louisiana schools, Engec (2006) found as the mobility of students increased their academic performance decreased. Comparing mobile students' scores to nonmobile students' scores, nonmobile students' scores were significantly higher. Students who moved only once during the year scored significantly higher than students who had moved two or more times in a year. Suspension rates also accelerated for students who had experienced multiple school changes within a year. Out-of-school suspension rates were highest for students who had enrolled in school four or more times within the school year and lowest for students who did not change schools.

Looking at the causes of mobility, Schafft (2006) found although many assume residential mobility is voluntary, for large numbers of students the move signals economic distress and/or family upheaval. As a means to slow mobility, counseling for parents is recommended, aimed at advising parents of the long-term consequences of frequent mobility on their children's academic success.

Students who are highly mobile may suffer psychologically, socially, as well as academically. Psychologically, mobile students face the continuing challenge of coping with a new school environment. Socially, mobile students must adjust to new peers and new social expectations (Rumberger, 2003). Mobile students are also less likely to participate in extracurricular activities. Haveman and Wolfe (1994) and Rumberger (2003) found the strongest impact of student mobility is on high school graduation. Multiple residential changes at any grade level significantly increased the chances of dropping out (Rumberger, 2003).

Mobility not only harms the students who change schools but can also harm the classrooms and schools where they attend. In a California study, Rumberger, Larson, Ream, and Palardy (1999) found nonmobile students scored significantly lower in high schools that had high student mobility rates. School personnel participating in the study described the effect of student mobility as the "chaos factor" (Rumberger et al., 1999, p. 12), which impacted classroom learning activities. Teachers in this California study noted teaching in classrooms with constant student turnover was difficult and disruptive. One teacher pointed out, "We start on a project, and prepare for the project by putting them in the appropriate groups. When a kid leaves in the middle, we have to adjust the whole group. It is very tiring and time consuming" (as cited in Rumberger et al., 1999, p. 13). Smith, Smith, and Bryk found in a 1998 Chicago study schools with high rates of student mobility were plagued with slower paced instructions as a result of the interruptive nature of student mobility. Academically, no school has the student long enough to have a positive academic effect (Rumberger, 2003).

Administratively, schools are burdened with the time and money spent processing students as they enter and exit schools (Rumberger, 2003). Other administrative costs include replacing textbooks and school materials that mobile students fail to return when they move on. Curriculum planning becomes difficult (Audette & Algozzine, 2000). Grade retention and high school dropout risks add to these challenges (Rumberger & Larson, 1998). Inconsistent exposure to curriculum leads to lower student achievement (Kerbow, 1996). One of the greatest implications of high student mobility rates is that a negative correlation has been found between school-level mobility rate and achievement for schools that met adequate yearly progress (Thompson, Meyers, & Oshima, 2011).

Dropout Rate

Graduation from high school is known to improve students' adult lives and future life options (Kienzi & Kena, 2006). In addition to personal risks, community and societal repercussions of students dropping out of high school make the dropout rate a significant educational problem facing the United States today (Nowicki, Duke, Sisney, Stricker, & Tyler, 2004). Multiple causes for students leaving high school before graduation have been identified, and research has focused on the identification of these risk factors so schools may focus resources on children who may be at risk of dropping out of school (Bowers, 2010). Bowers (2010) in a longitudinal risk perspective study, found dropout risk factors can be identified in Grade 7 with the most hazardous years being Grades 8-11 (includes the year before transition to high school and the year when a student can legally drop out of school).

Although much has been studied in order to reduce the dropout rate, significant numbers continue to be at risk of leaving high school prematurely. Nowicki et al. (2004) have found the uneven distribution of dropouts across the United States can by associated with five demographic indicators: poverty, race or ethnicity, family configuration, parental education, and limited English proficiency. Bowers (2010) would add retention to this list, finding retention at any grade level was found to have a highly negative influence on student graduation. Teacher-assigned grades were also found to be a strong predictor.

Finn and Rock (1997) proposed that interventions must support students becoming more engaged in school. In a major study of 1,800 minority and low-income students, findings supported that the greater engagement of students in learning the greater their academic resilience. This resiliency was associated with lower dropout rates. Two personality variables, locus of control and self-esteem, were among the most important factors in student engagement.

Students with external locus of control (belief in luck, fate, and the power of others governing one's success) showed lower academic achievement and higher dropout rates. Students with higher levels of self-esteem and with internal locus of control ("I am responsible for my successes and the failures I experience.") were significantly more successful in high school and experienced lower dropout rates.

A report by the Consortium on Chicago School Research at the University of Chicago (2005) found freshman-year course credits and failures can be used to predict likelihood of student graduation from high school. Monitoring of freshman grades, especially the first semester of freshman year, was found to be valuable because many opportunities for improvement still exist at that point in a student's high school career.

Using case histories, Hernandez (2010) investigated the impact of standardized testing on certain racial, ethnic, and social classes of students. Findings included that family history had great influence on school success, especially when parents spoke languages other than English at home. Students' senses of personal identity played important roles as well in student success or lack of success leading to dropping out of high school. Finally, past school experiences were found to play a role in why students disliked school and eventually dropped out. Hernandez concluded the traditional educational system may not be appropriate for all students and argued for the need of alternative pedagogy, which will allow all students to experience maximized learning experiences.

The relationship of school and community characteristics in association with high school student dropout rates was explored by Alspaugh (1998) in a sample that included 428 Missouri school districts. His findings included that the size of an attendance center, or school, was associated with student dropout rates. He found as school size increased, student dropout rates

also increased. Larger schools had higher dropout rates than small schools. Pittman and Haughwout (1987), who found a relationship between school size and school climate, suggested increasing dropout rates associated with large schools were also associated with the deterioration of school climate, which was an outgrowth of large school size.

Like Pittman and Haughwout (1987), Werblow and Duesbery (2009) explored the ways school size influences student achievement and the dropout rate. They too found small schools were beneficial, with students in smaller school less likely to drop out than students in large high schools.

Average Class Size

Many believe small class size impacts the level of student achievement (Rockoff, 2009). Research investigating this relationship, however, has often had mixed results (Rockoff, 2009; Scheck, Kinicki, & Webster, 1994; Wobmann, 2006/2007). In a study of student behavior in small classes, Finn, Pannozzo, and Achilles (2003) found small class sizes were influential in supporting student achievement because student behavior became more engaged in small classrooms. Academic engagement behaviors, such as being off task or showing disruptive inattentive behavior, were minimized in small classes. On the other hand, social engagement behaviors, such as positive student interactions with teachers and fellow students, were fostered by small class size. The actual physical conditions of small classes were even found to be more conducive to learning. Prout (2000) found the air quality falls to below acceptable standards by midday in large classes but is stable and adequate in small classes. The increased cohesiveness seen in small classes contributes, as well, to student feelings of safety, a prerequisite of student learning (Finn et al., 2003).

In a study of 400 students in 10th-grade, from both rural and urban areas, small class size was found to play an important role in supporting and enhancing student performance at the secondary school level (Atta, Jamil, Ayaz, Shah, & Shah, 2011). Researchers found small class size facilitated student participation in activities such as discussion, question-and-answer sessions, and giving and receiving feedback. Atta et al.'s 2011 study, which included only male 10th-grade students in District Dera Ismail Khan, Pakistan, schools, recommended parents choose schools with small class sizes to enhance their students' academic success.

In a study of university students, Scheck et al. (1994) investigated the effect of class size on students and on teachers. Student feelings about large classes, they found, were directly related to past experiences with large class size. Students' positive feelings, then, had a positive effect on the extent to which teachers exhibited positive behaviors of consideration. Large class size in general, though, was found to inhibit teacher behavior. Their findings suggest it takes a certain type of teacher to successfully teach large classes.

Studying elementary and secondary class size in relation to student achievement, Shin and Chung (2009) found student achievement is higher in small classes than large classes, with the effects of small class size being larger in elementary schools than in secondary schools. The study showed small class size was generally positive except in 10th grade. Overall results of their study showed small classes to be positive but mixed.

Interviewing teachers in 40-90 minute interviews in noninstructional settings in their schools and interviewing administrators in 45-120 minute interviews in their offices or their homes, Graue, Hatch, Rao, and Oen (2007) learned that implementing small class sizes successfully requires administrative planning and allocation of resources. Small classes, they found, allowed teachers an opportunity to create environments that nurtured student

achievement. Interestingly, their study found that changes moving toward small classes will not come as a natural outgrowth of the knowledge that small classes enhance student learning. Instead, class size reduction must be supported by planning and professional development which allows teachers and administrators to develop new practices geared to smaller groups.

Bonesronning (2003) investigated the impact of class size on student achievement in Norway. This was appropriate because Norway's scattered population created a school system in which 40% of primary and lower secondary (Grades 8-10) schools are so small that children of different ages are taught in the same classroom (Ministry of Education and Research, 2011). In fact, in many instances primary grades and lower secondary grades are combined in the same school. Bonesronning's results revealed a significant negative association between student achievement growth and class size existed. However, a lack of association existed in the Norwegian system between class size and students' SES.

Interestingly, the results of this study, which drew its sample from the five regions of Norway, showed male students experienced significant positive effects from being in small classes. The achievements of female students, though, were unaffected by class size. Students whose parents were less educated experienced significant negative class size effect while students whose parents were highly educated were unaffected by class size. A second part of the study investigated class size effect and student effort. Bonesronning (2003) found class size effects seemed to be conditional on student effort.

Using the West African School Certificate Examinations as a measure of student achievement, a study by Owoeye and Yara (2011) investigated achievement in 50 secondary schools, both urban and rural, between 1990 and 1997. Contrary to the findings of others, data showed there was no significant difference in achievement of students in small or large classes in

urban schools. Neither was a significant difference found among performance of students in small, rural, or large rural classes. In what appears as a contradiction of its findings, the authors recommended policies be formulated that establish maximum classroom size at 30. This policy, it was hoped, would force the government to build classrooms for schools. The study also urged the parent-teacher associations and charitable organizations to implore the government to build more classrooms to improve student performance.

Instructional Expense per Pupil

The American public school system is one in which the wealth of a district shapes the schools within that district (Slavin, 1999). Wealthy districts are able to spend many times more than disadvantaged districts because a district's funding relies primarily on local property taxes (L. Henry, personal communication, December 12, 2012). A study of 89 large Columbus, Ohio, elementary schools (Condron & Roscigno, 2003) looked not only at the effects of spending but at the most important functions of spending. The most important function of monetary spending, Condron and Roscigno maintained, is for instruction, which includes teacher salaries, books, and classroom instructional materials. In the Columbus, Ohio, district they studied, nearly 60% of its overall budget was appropriated for these expenditures. One of the manners in which instructional spending matters is the attraction and retention of qualified staff. Higher salaries and better benefits make this possible. Maintenance of school buildings also has an impact on student achievement. Unhealthy and unsanitary conditions such as cracked walls, leaky roofs, and run-down restroom facilities distract students from learning (Kozol, 1991). These physically uncomfortable environments hinder student achievement. Quality teachers and welcoming environments contribute to better attendance rates and stronger student engagement in learning (Condron & Roscigno, 2003). Kozol (1991) noted research has documented disengagement,

particularly in inner city areas, caused by inferior physical school settings. Condron and Roscigno's (2003) findings concluded higher spending promotes student achievement.

Reviewing existing data, Greenwald, Hedges, and Laines's (1996) look at the effect of school resources on student achievement in math and science concluded that increasing educational spending is positively related to student achievement. Drawing information from the 1988 National Education Longitudinal Survey and the 1988 annual U.S. Census Bureau Survey of Local Government Finances for School Systems, Greenwald et al. also found that educational spending must be used in part to hire more educated and highly qualified teachers. The teachers alone, though, were not enough. These teachers must use effective teaching strategies, emphasizing higher order thinking and inquiry skills. This study suggests that memorization of facts should be de-emphasized with concentrated efforts to make subject matter relevant.

How money is spent on students makes a difference since not all spending leads to increased student achievement (Wenglinsky, 1997). Using per pupil expenditures on instruction and central office administration, teacher and student ratios, teacher education, school social environment, and student academic achievement, Wenglinsky tested four hypotheses resulting in a finding that greater per pupil expenditures for instruction and the administration of school districts are associated with student achievement. Wenglinsky found instructional spending is also associated with higher levels of teachers' education. Second, he found spending for central office administration was also associated with teacher-student ratios. Third, it was found teacher-student ratios are related to school social environment. Finally, Wenglinsky noted school environment is associated with higher student achievement in mathematics.

In an international study covering 41 countries, 15-year-olds completed a questionnaire and tests in math, reading, and science (Chiu & Khoo, 2005). Multilevel regression analyses

revealed students scored higher in all subjects when they had more resources in their countries, families, or schools. In particular, students in areas of unequal distribution of resources or unequal distribution of qualified teachers scored lower, with inequities favoring affluent students and schools. Studying the effects of resources, inequality, and privilege bias, Chiu and Khoo (2005) suggested equal opportunity is associated with higher student achievement.

Attendance Rate

Large school size dampens student commitment and desire to become involved in school activities, which in turn hurts school attendance and results in large schools showing lower attendance rates and thus lowering student achievement (Lindsay, 1982). Pittman and Haughwout (1987) argued students in large schools do not identify with school, become chronic absentees, and so have lower achievement rates. In an exploratory study, after controlling for poverty, Khattri et al. (1997) found absenteeism was a greater problem in urban schools. This held true when comparing high-poverty urban schools with high-poverty rural schools. Cotton (1996a) found conversely small schools have higher attendance rates. Students moving from large to small schools even showed improved attendance (Fowler, 1992; Fowler & Walberg, 1991; Rutter, 1988). Research supports that higher attendance rates are associated with smaller schools (Pittman & Haughwout, 1987).

In a study in Ohio of fourth-, sixth-, ninth-, and 12th-graders' attendance, Roby (2004) found a statistically significant relationship existed between student attendance and student achievement. Ninth-grade attendance and student achievement showed the strongest positive relationship. This study also found students in buildings with higher test scores had higher rates of attendance. In a continuation of the study, Roby (2004) investigated attendance rates and student achievement in the six largest school districts in Ohio: Cleveland, Cincinnati, Columbus,

Dayton, Akron, and Toledo. Six elementary schools from each district were chosen. Although the findings for the Cleveland and Columbus districts were not significant, the top three achieving schools in each of the other districts also had higher attendance averages. Using all public schools in Ohio in the school year 1999, Roby also studied lost student learning time. This final study showed that a one-percent attendance drop annually resulted in 3,600 fewer total instructional hours.

Gottfried (2009) also found a relationship between student attendance and student achievement. Distinguishing between excused and unexcused absences, Gottfried found a positive relationship existed between higher proportions of excused absences and higher reading and math test scores. Having higher proportions of unexcused absences placed students at academic risk, especially in math performance. This suggests student absences should be monitored for excused and unexcused.

Although support for consistent attendance is important for all students, it is particularly significant for students who are highly mobile (Hinz, Kapp, & Snapp, 2003). These students may more quickly experience lack of academic success and increased frustrations, both of which lead to increased absenteeism. As Braun and Sellers (2012) noted, strategies such as daily quizzes may encourage good attendance. The Minneapolis Public Schools addressed the problem of low student attendance by implementing a system-wide program geared to supporting student attendance (Hinz et al., 2003). Although an aggressive attendance rate of 95% was set as a goal and multiple programs were implemented to support student attendance, in the 1999-2000 school year, only 47% met this goal. Twenty-five percent of the 48,000 district K-12 student body fell below the 88% attendance mark, which placed them at risk for academic failure. This

punctuates the importance of strong student attendance rates and the difficulties involved in working to support them.

CHAPTER 3

METHODOLOGY

Purpose of the Study

The purpose of this quantitative study was to determine whether a relationship exists between school size and student achievement. This study examined whether a relationship exists based on student performance in reading and mathematics on the PSAE. This study also examined whether the factors of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading or math performance.

Research Questions

The research questions for this study were as follows:

1. Are there significant differences on PSAE reading performance based on school size?
2. Are there significant differences on PSAE math performance based on school size?
3. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance?
4. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance?

Null Hypotheses

$H_0$1. There are no significant differences on PSAE reading performance based on school size.

$H_0$2. There are no significant differences on PSAE math performance based on school size.

$H_0$3. SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance.

$H_0$4. SES, ELL, special education, mobility rate, dropout rate, class size, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance.

Description of the Sample

Data were collected on all public high schools in Illinois that housed Grade 11 for this study. This was a total of 651 public high schools. The study used average scale scores for the reading and mathematics portions of the 2012 PSAE from each Illinois public high school housing Grade 11 found on the ISBE website. The range of scores on the PSAE scales is 120 to 200, with an increment of 1. The target means and standard deviations of the PSAE score scale are 160 and 15, respectively (ISBE, 2011a). Data on SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per student, attendance rate, and school enrollment size reflected information collected from the ISBE Data Analysis and Accountability Division Report Card. All data reflect the 2011-2012 school year.

Data Sources

For this study, the average building scale scores for reading and for mathematics on the 2012 PSAE for each Illinois public high school building was collected from the ISBE Data Analysis and Accountability Division Report Card. Data on SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment school size were also collected from the 2012 ISBE Data Analysis Division Report Card for each Illinois public high school housing Grade 11. Data were double checked for accuracy.

Data Collection Procedures

On December 12, 2012, the institutional review board determined this study was exempt from review. PSAE average scale scores for reading and mathematics for each Illinois public high school were then collected from the ISBE Data Analysis and Accountability Division Report Card. SES percentages, ELL percentages, special education percentages, mobility rates, dropout rates, class size, instructional expenditure per pupil, attendance rates, and school enrollment were also collected from ISBE. Data were moved into SPSS for analysis. Schools were identified in the database for purposes of dividing schools into size groupings.

Method of Analysis

The first null hypothesis examined whether a relationship exists between school size and student achievement on the reading portion of the PSAE and was tested using a one-way ANOVA. The one-way ANOVA best fit the first null because it provided statistical evidence of potential differences within reading standardized performance on the PSAE while factoring in the multiple school size categories. The second null hypothesis examined whether a relationship existed between school size and student achievement on the mathematics portion of the PSAE

and was also tested using a one-way ANOVA. The one-way ANOVA best fit the second null because it provided statistical evidence of potential differences within math standardized performance on the PSAE while factoring in the multiple school size categories.

A stepwise multiple regression was then used to examine if the factors of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predicted student achievement in reading for Null Hypothesis 3. A second stepwise multiple regression was then used to examine if the factors of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predicted student achievement in mathematics for Null Hypothesis 4. These stepwise multiple regression tests were used to determine if any of these factors could be used to predict success in student achievement as measured by the PSAE standardized test performance for reading or mathematics. Stepwise multiple regression was chosen because it first added one variable that could explain most variance in the criterion variable then added one at a time until no more significant variances were found with the addition of another factor. Stepwise multiple regression also gave data which showed how strong of a correlation exists and the amount of variance that can be explained in the criterion variable by the predictors. The stepwise multiple regression showed the adjusted amount of variance that can be explained in the criterion variable by the set of predictors when sample size and number of predictors are utilized to produce a more conservative estimate. In addition, by looking at beta weights that were produced through the analysis, the impact on standardized performance was rank ordered. The beta weights standardized results through the use of *z* scores. Scores were then compared. Output allowed the impact on reading performance and on

math performance for every one-unit increase in a predictor, holding all other predictor variables constant to be determined.

Further Questions as a Result of Statistical Analysis of Research Questions 3 and 4

Statistical analysis of Research Questions 3 and 4 led to further examination of the ability of student and building characteristics to predict student performance in reading and in math in small, medium, and large schools. Auxiliary research questions were formed in order to determine if the impact of these factors on the whole sample held true for each individual school size. Six follow-up research questions were posed:

3a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, Instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in small schools?

3b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in medium schools?

3c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in large schools?

4a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in small schools?

4b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in medium schools?

4c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in large schools?

The following null hypotheses were tested.

$H_0$3a. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in small schools.

$H_0$3b. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in medium schools.

$H_0$3c. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in large schools.

$H_0$4a. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance in small schools.

$H_0$4b. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance in medium schools.

$H_0$4c. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance in large schools.

Method of Analysis of Further Research Questions

Stepwise multiple regressions were used to examine each of the Null Hypotheses 3a, 3b, and 3c to determine if student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predicted student achievement in reading could be used to predict student performance in reading in each individual school size setting of small (34-319 students), medium (322-1,107 students), and large (1,110-4,522).

Stepwise multiple regressions were then used to examine each of the Null Hypotheses 4a, 4b, and 4c to determine if student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predicted student achievement in reading could be used to predict student performance in math in each individual school size setting of small (34-319 students), medium (322-1,107 students), and large (1,110-4,522).

Stepwise multiple regressions were chosen because they first added one variable that could explain most variance in the criterion variable then added one at a time until no more

significant variance were found with the addition of another factor. Stepwise multiple regression also yielded data which revealed how strong of a correlation exists and the amount of variance that can be explained in the criterion variable by the predictors. By examining beta weights that were produced through the analyses, the impact on standardized performance was rank ordered.

Summary

In the current atmosphere of financial challenges and intensified school accountability through federal initiatives such as *No Child Left Behind* and *Race to the Top*, schools need informational data upon which to base decisions that impact student achievement. This study examined whether school size impacts student learning. This study also examined whether the factors of socio-economic SES, ELL status, special education rate, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment exhibit interaction effects that can be used to predict student achievement as measured by reading and mathematics performance on the PSAE. Statistical analysis of Research Question 3 and Research Question 4 led to further examination of the ability of student and building characteristics to predict student performance in reading and in math in small, medium, and large schools. This study provides quantitative data that will aid educational leaders in school decision-making that can enhance student achievement.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

Research Questions

The research questions investigated for this study include the following:

1. Are there significant differences on PSAE reading performance based on school size?
2. Are there significant differences on PSAE math performance based on school size?
3. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance?
4. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance?

Further Research Questions

3a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in small schools?

3b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict

a significant amount of variance in PSAE reading performance in medium schools?

3c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in large schools?

4a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in small schools?

4b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in medium schools?

4c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in large schools?

Presentation of Study Sample

For this study, data were gathered from the ISBE Data Analysis and Accountability Division Report Card. PSAE average scale scores were gathered in reading and in math for each Illinois public school containing Grade 11. In addition, data were collected concerning the student and school characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment.

Schools were first divided by school enrollment into three equal groups that were named small, medium, and large. Small school student enrollments ranged from 34-319 students. Medium school enrollments ranged from 322-1,107 students. Large school student enrollments

ranged from 1,110-4,522 students. The total pool of 651 schools contained 217 small schools (*N* = 217, 33.33%), 217 medium schools (*N* = 217, 33.33%), and 217 large schools (*N* = 217, 33.33%).

The whole sample of 651 schools was divided into three major descriptive areas: assessment, student characteristics, and building characteristics. The number of schools in each category reflects the number of schools that reported data in that specific category. Assessment data contains the number of schools reporting data in reading and math performance, a minimum and maximum score in both reading and math performance, and a mean score and standard deviation for both reading and math. Whole sample student characteristics included SES, ELL, special education, mobility rate, and dropout rate. Descriptive student data contained the number of schools reporting data in each category, a minimum and maximum range of data, a mean score and standard deviation. Building characteristics included average class size, instructional expenses per pupil, attendance rate, and school enrollment. Descriptive building data contained the number of schools reporting data in each category, a minimum and maximum range of data, a mean score and standard deviation. Data are found in Table 3.

Table 3

Sample Descriptive Data (Whole Sample)

	N	Minimum	Maximum	Mean	*SD*
Reading Performance	649	136.00	179.00	154.10	6.23
Math Performance	649	132.00	182.00	154.60	7.14
Avg Class Size	648	4.20	32.50	17.12	4.56
Inst Exp Per Pupil	646	3716.00	12667.00	6591.65	1711.90
Attendance Rate	651	58.00	99.30	92.21	5.15
School Enrollment	651	34.00	4522.00	935.11	900.97
SES percent	651	2.20	100.00	42.23	25.01
ELL percent	651	.00	26.60	1.73	3.68
Sp. Ed. Percent	651	.00	36.40	14.33	5.31
Mobility Rate	651	.00	176.50	14.17	13.79
Dropout Rate	651	.00	25.00	2.34	2.48

When examining descriptive data for the whole sample, it became apparent that wide statistical ranges existed. Minimum and maximum scores for PSAE reading and math performance showed a 43 and 50 point range, respectively. Student characteristics were also found to have sizable ranges in their minimum and maximum numbers. SES, for example, exhibited a 97.80% difference between minimum and maximum numbers. Dropout rates ranged from zero students to one fourth of student enrollment. Minimum and maximum average instructional expenses per pupil showed a sizable difference of $8, 951. Finally, school enrollment numbers showed a wide statistic range with a 4,488 student difference between the

minimum and maximum enrollments. These large differences underscore the variances in Illinois schools and suggest caution should be used in drawing conclusions with a broad stroke about all schools.

Descriptives for Small Schools

The descriptives for small schools are divided into three major descriptive areas: assessment, student characteristics, and building characteristics. The number of schools in each category reflects the number of schools that reported data in that specific category. Assessment data contains the number of schools reporting data in assessment, a minimum and maximum score in both reading and math performance, and a mean score and standard deviation for both reading and math. Small school student characteristics included SES, ELL, special education, mobility rate, and dropout rate. Building characteristics included average class size, instructional expenses per pupil, attendance rate, and school enrollment. Descriptive small school building data contained the number of schools reporting data in each category, a minimum and maximum range of data, a mean score and standard deviation. This information can be found in Table 4.

Table 4

Sample Descriptives for Small Schools

	N	Minimum	Maximum	Mean	*SD*
Reading Performance	215	136.00	164.00	154.01	4.93
Math Performance	215	132.00	165.00	153.74	5.44
Avg Class Size	217	4.20	23.80	12.96	3.25
Inst Exp Per Pupil	217	3785.00	11613.00	5891.78	1211.58
Attendance Rate	217	68.50	97.60	93.27	3.94
School Enrollment	217	34.00	319.00	184.39	72.36
SES percent	217	4.80	100.00	39.40	19.57
ELL percent	217	.00	19.00	.33	1.78
Sp. Ed. Percent	217	.00	34.20	15.29	5.64
Mobility Rate	217	.00	137.40	14.55	13.54
Dropout Rate	217	.00	25.00	2.24	2.76

An examination of small school descriptive data revealed the minimum small school scores fell at the bottom of all scores and maximum small school scores fell short of maximum scores for all schools. Small schools also had the highest maximum dropout rate compared to medium schools and large schools. Instructional expenditures per pupil in small schools nearly mirror the whole sample instructional expenditures per pupil. Small schools had the lowest maximum attendance rate compared to medium schools and large schools. This information can be found in Tables 4, 5, and 6.

Descriptives for Medium Schools

The descriptives for medium schools is divided into three major descriptive areas: assessment, student characteristics, and building characteristics. The number of schools in each category reflects the number of schools which reported data in that specific category. Assessment data contains the number of schools reporting data in those specific categories, a minimum and maximum score in both reading and math performance, and a mean score and standard deviation for both reading and math. Medium school student characteristics included SES, ELL, special education, mobility rate, and dropout rate. Building characteristics included average class size, instructional expenses per pupil, attendance rate, and school enrollment. Descriptive medium school building data contained the number of schools reporting data in each category, a minimum and maximum range of data, and a mean score and standard deviation. This information can be found in Table 5.

Table 5

Sample Descriptives for Medium Schools

	N	Minimum	Maximum	Mean	*SD*
Reading Performance	217	136.00	179.00	153.68	6.74
Math Performance	217	135.00	182.00	153.74	7.41
Avg Class Size	217	9.80	32.50	17.70	3.41
Inst Exp Per Pupil	217	3716.00	11171.00	6258.50	1513.92
Attendance Rate	217	58.00	99.30	91.64	6.24
School Enrollment	217	322.00	1107.00	591.07	214.04
SES percent	217	4.60	99.80	45.17	26.74
ELL percent	217	.00	26.60	1.48	3.61
Sp. Ed. Percent	217	.20	36.40	14.02	6.20
Mobility Rate	217	.60	176.50	15.67	17.17
Dropout Rate	217	.00	17.00	2.62	2.70

Examining medium school descriptive data, it was noted that like small schools, minimum reading and math scores for medium schools fell very near the whole sample minimum scores. Medium school maximum reading and math scores were equal to the whole sample group maximum scores and were above small school maximum scores. Medium school maximum ELL rate, special education rate, and student mobility rate were higher than small schools or large schools. Medium schools also had the largest maximum average class size and the highest attendance rate compared to small schools and large schools. This information can be found in Tables 4, 5, and 6.

Descriptives for Large Schools

The descriptives for large schools are divided into three major descriptive areas: assessment, student characteristics, and building characteristics. The number of schools in each category reflects the number of schools which reported data in that specific category. Assessment data contained the number of schools reporting data in assessment, a minimum and maximum score in both reading and math performance, and a mean score and standard deviation for both reading and math. Large school student characteristics included SES, ELL, special education status, mobility rate, and dropout rate. Building characteristics included average class size, instructional expenses per pupil, attendance rate, and school enrollment. Descriptive large school building data contained the number of schools reporting in each category, a minimum and maximum range of data, and a mean score and standard deviation. This information can be found in Table 6.

Table 6

Sample Descriptives for Large Schools

	N	Minimum	Maximum	Mean	*SD*
Reading Performance	217	140.00	173.00	154.62	6.82
Math Performance	217	138.00	176.00	156.34	8.02
Avg Class Size	217	9.10	28.40	20.73	3.10
Inst Exp Per Pupil	217	4315.00	12667.00	7639.08	1837.18
Attendance Rate	217	67.70	98.70	91.73	4.84
School Enrollment	217	1110.00	4522.00	2036.55	703.56
SES percent	217	2.20	96.50	42.11	27.72
LEP percent	217	.00	22.10	3.40	4.45
Sp. Ed. Percent	217	2.00	23.50	13.66	3.60
Mobility Rate	217	1.50	63.50	12.26	9.33
Dropout Rate	217	.00	10.90	2.15	1.86

Large schools had lower maximum SES percentage, special education percentage, mobility rate, and dropout rate than small schools or medium schools. This information can be found in Tables 4, 5, and 6.

Hypotheses Testing

The following null hypotheses were tested.

$H_0$1. There are no significant differences on PSAE reading performance based on school size.

$H_0$2. There are no significant differences on PSAE math performance based on school size.

$H_0$3. SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance.

$H_0$4. SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance.

Hypotheses Testing of Further Research Questions

$H_0$3a. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in small schools.

$H_0$3b. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in medium schools.

$H_0$3c. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE reading performance in large schools.

$H_0$4a. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate,

and/or school enrollment do not predict a significant amount of variance in PSAE math performance in small schools.

$H_0$4b. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance in medium schools.

$H_0$4c. Socioeconomic status (SES), English language learner (ELL), special education status, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and/or school enrollment do not predict a significant amount of variance in PSAE math performance in large schools.

Reading Performance Based on School Size

The assumption of independence was not violated because no school was in multiple groups. The assumption of homogeneity of variances was violated with a significant Levene of $F(2,646) = 15.59$, $p < .001$. The ANOVA test could still be used because it was robust to violations of this assumption. Normality was not violated as skew and kurtosis were within acceptable ranges of + to -1.

The first null hypothesis was examined to determine whether differences existed between school size and student achievement on the reading portion of the PSAE. This null hypothesis was tested using a one-way ANOVA, a good fit because it provided statistical evidence of potential differences within reading standardized performance on the PSAE. No significant differences among the three school sizes in reading performance were found as seen in Table 7.

Table 7

Sample Inferential for Reading Performance

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	96.022	2	48.011	1.237	.291
Within Groups	25066.854	646	38.803		
Total	25162.875	648			

Math Performance Based on School Size

The assumption of independence was not violated because no school was in multiple groups. The assumption of homogeneity of variances was violated with a significant Levene of $F(2,646) = 18.53$, $p < .001$. The ANOVA test was still used because this test was robust to violations of this assumption. Normality was not violated as skew and kurtosis were within acceptable ranges of + to -1.

The second null hypothesis was examined to determine whether a difference exists between school size and student achievement on the math portion of the PSAE. This null hypothesis was also tested using a one-way ANOVA, again a good fit because it provided statistical evidence of potential differences within math standardized performance on the PSAE. Significant differences among the three school size groups in math performance were found. This information may be found in Table 8.

Table 8

Sample Inferential for Math Performance – Between Groups

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between groups	973.39	2	486.70	9.81	.000
Within groups	3263.84	646	49.63		
Total	33037.23	648			

Note. $p < .001$

Finding significant differences among the three school size groups in math performance, a Tukey HSD post-hoc was run to determine where the significant difference lay among the three groups. The mean difference in math score between small school and large school was -2.60 and between medium and large school was -2.60. The mean difference in math score between small and medium school was .001. Results revealed large schools significantly outperformed both small and medium schools in math performance, with both values at the $p < .001$ level.

Student and Building Characteristics as Predictors for Standardized Reading Assessment Scores

A stepwise multiple regression was used to examine the third null hypothesis to determine if any of the student and building characteristics could be used to predict student performance in reading. The stepwise multiple regression first added one variable that could explain the most variance in the criterion variable (reading performance) then added one at a time until no more significant variance addition was occurring within the model. Stepwise multiple regression would also show how strong of a correlation exists and the amount of variance that can be explained in the criterion variable by the predictors.

The assumptions for stepwise multiple regression were examined to ensure accurate results. To investigate the assumption of linearity, the scatterplot of residuals was examined. Because all residuals fell within the 95% confidence bands around zero (between +2 and -2), this assumption was met. To ensure the predictors within the test were not too strongly intercorrelated, the assumption of no multicollinearity was tested. Tolerance levels for all predictors fell above the .2 minimum that is needed for this assumption, with tolerance levels ranging from a low of .355 to a high of .702.

The assumption of independence was met because examination of the plot of residuals revealed no systematic pattern. Examination of the distribution of residuals on the normal probability plot revealed the assumption had been met because overall normality of the residuals was observed. A constant scatter of residuals among all values of X for this regression indicated the assumption of homogeneity of variance of residuals was met.

The multiple correlation coefficient showed the correlation between the set of predictor variables and the criterion variable. The multiple correlation coefficient of .878 showed a strong correlation between predictors and criterion. The coefficient of multiple determination represented the amount of variance in the criterion variable (reading performance), which could be explained by the set of predictors (student and building characteristics). The coefficient of multiple determination (R^2) value of .771 indicated 77.1% of the variance in the reading scores could be explained by the student and building characteristics. The adjusted R^2 of .768 gave an unbiased estimate of R^2 by making corrections based on the number of predictors relative to the sample size. The difference of .003 between the R^2 (.771) and the adjusted R^2 (.768) was the amount of shrinkage in the model. The standard error of the estimate demonstrated the level of variability around the line of best fit within the regression model, indicating the amount of

variability in the points around the regression line. This model had a standard error of the estimate of 2.97 indicating this model had a standard deviation of 2.97 units of reading scores in terms of the distance of the residuals from the regression line (prediction line).

This stepwise multiple regression revealed that the predictors (student and school characteristics) have the ability to predict reading performance. An ANOVA was completed to test the significance of R^2 within the model. The ANOVA was significant. This indicated a linear relationship existed between student and school characteristics and reading performance. Results showed student and building characteristics can be used to predict reading performance. This information can be found in Table 9.

Table 9

ANOVA Model statistics for Criterion Variable (PSAE Reading Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	18688.79	9	2076.53	235.83	.000
Residual	5556.16	631	8.91		
Total	24244.94	640			

Note. $p < .001$

The ANOVA revealed there was a significant predictor. Examination of the coefficients in the stepwise multiple regressions identified which predictors were significant predictors of reading performance. Eight significant predictors of reading performance were found: SES, ELL, special education, mobility rate, average class size, instructional expenditure per pupil, attendance rate, and school enrollment. The dropout rate was not a significant predictor of reading performance. This information is presented in Table 10.

Table 10

Unstandardized and Standardized Partial Regressions Coefficients for Reading Performance

Predictors	B	*SE*	*β*	*t*	Sig.
SES	-.13	.007	-.533	-18.26	.000*
ELL	-.22	.040	-.130	-5.76	.000*
Sp. Ed.	-.13	.030	-.110	-4.76	.000*
Mobility	-.05	.010	-.120	-4.29	.000*
Dropout Rate	-.04	.060	-.020	-.74	.462
Class Size	.07	.040	.050	2.05	.041**
Inst. Expense per Pupil	.00^	.000	.100	4.47	.000*
Attendance Rate	.26	.040	.220	6.77	.000*
School Enrollment	.00^	.000	.060	2.06	.040**

Note. $*p < .001$ $**p < .05$ ^finding included unit increases but because data was truncated, it was not visible. The metric was so large that one unit of change was not apparent.

Unstandardized partial regression coefficients indicated the amount of predicted change in reading scores with a one unit increase in the predictor, holding other predictors constant. Reading scores were predicted to change .00 units with a one unit increase in instructional expenditure per pupil and school enrollment. This information is found in Table 8.

The standardized partial regression coefficient (β weight) for each predictor allowed one to measure the impact of each standard on reading performance in standardized units through the use of *z*-scores. This allows the researcher to rank order predictors using absolute value (no negative or positive). Predictors in rank order are SES, attendance rate, ELL, mobility rate, special education rate, instructional expenditure per pupil, school enrollment, and class size.

This information may be found in Table 8.

Student and Building Characteristics as Predictors for Standardized Math Assessment Scores

A stepwise multiple regression was used to examine the fourth null hypothesis to determine if any of the student and building characteristics could be used to predict student performance in math. The stepwise multiple regression first added one variable that could explain the most variance in the criterion variable (math performance) then added one at a time until no more significant variance addition was occurring within the model. Stepwise multiple regression would also show how strong of a correlation exists and the amount of variance that can be explained in the criterion variable by the predictors.

The assumptions for stepwise multiple regression were examined to ensure accurate results. To investigate the assumption of linearity, the scatterplot of residuals was examined. Because all residuals fell within the 95% confidence bands around zero (between +2 or -2), this assumption was met. To ensure the predictors within the test were not too strongly intercorrelated, the assumption of no multicollinearity was tested. Tolerance levels for all predictors fell above the .2 minimum that is needed for this assumption with tolerance levels ranging from a low of .355 to a high of .702.

The assumption of independence was met because examination of the plot of residuals revealed no systematic pattern. Examination of the distribution of residuals on the normal probability plot revealed the assumption had been met since overall normality of the residuals was observed. A constant scatter of residuals among all values of X for this regression indicated the assumption of homogeneity of variance of residuals was met.

The multiple correlation coefficient showed the correlation between the set of predictor

variables and the criterion variable. The multiple correlation coefficient of .88 showed a strong correlation between predictors and criterion. The coefficient of multiple determination represented the amount of variance in the criterion variable (reading performance) which was explained by the set of predictors (student and building characteristics). The coefficient of multiple determination (R^2) value of .778 indicated 78% of the variance in the reading scores could be explained by the student and building characteristics. The adjusted R^2 of .775 gave an unbiased estimate of R^2 by making corrections based on the number of predictors relative to the sample size. The difference of .003 between the R^2 (.778) and the adjusted R^2 (.775) was the amount of shrinkage in the model. The standard error of estimate demonstrated the level of variability around the line of best fit within the regression model, indicating the amount of variability in the points around the regression line. This model had a standard error of the estimate of 3.35 indicating this model had a standard deviation of 3.35 units of math scores in terms of the distance of the residuals from the regression line (prediction line).

This stepwise multiple regression revealed the predictors (student and school characteristics) have the ability to predict math performance. An ANOVA was completed to test the significance of R^2 within the model. The ANOVA was significant. This indicated a linear relationship exists between student and school characteristics and math performance. Results, then, showed student and building characteristics can be used to predict math performance. This information is presented in Table 11.

Table 11

ANOVA Model Statistics for Criterion Variable (PSAE Math Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	24871.13	9	2763.46	245.58	.000
Residual	7100.49	631	11.25		
Total	31971.62	640			

Note. $p < .001$

The ANOVA revealed there was a significant predictor. Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of math performance. Seven significant predictors of math performance were detected: SES, special education, mobility rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment. English language learner and dropout rate were the only independent variables that were not a significant predictor of math performance. This information is reflected in Table 12.

Table 12

Unstandardized and Standardized Partial Regressions Coefficients for Reading Performance

Predictors	B	*SE*	β	*t*	Sig.
SES	-.16	.01	-.55	-19.24	.000*
ELL	-.08	.04	-.04	-1.78	.075
Sp. Ed.	-.15	.03	-.11	-4.98	.000*
Mobility	-.05	.01	-.09	-3.36	.001**
Dropout Rate	-.04	.06	-.02	-.64	.520
Class Size	.11	.04	.07	2.83	.005***
Inst. Expense per Pupil	.00^	.00	.17	7.32	.000*
Attendance Rate	.34	.04	.25	7.82	.000*
School Enrollment	.00^	.00	.11	3.96	.000*

Note. *$p < .001$; **$p = .001$; ***$p = .005$ ^ findings include increases but because data were truncated, it is not visible. The metric was so large that one unit of change was not apparent.

Unstandardized partial regression coefficients indicated the amount of predicted change in reading scores with a one unit increase in the predictor, holding other predictors constant. Math scores were predicted to change .00 with a one unit increase in instructional expenses per pupil and with a one unit increase in school enrollment. This information can be found in Table 12.

The standardized partial regression coefficient (β weight) for each predictor allows one to measure the impact of each predictor on math performance in standardized units through the use of *z*-scores. This allows the researcher to rank order predictors using absolute value (no negative or positive). Impacts in rank order were as follows: SES, attendance rate, instructional

expenditure per pupil, special education, school enrollment, mobility rate, and class size. This information is seen in Table 12.

Small Schools: Student and Building Characteristics as Predictors for Standardized Reading Assessment Scores

A stepwise multiple regression was used to examine Null Hypothesis 3a to determine if any of the student and building characteristics could be used to predict student performance in reading in small schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict reading performance in small schools. An ANOVA was significant, $F(9,203) + 43.59$, $p < .001$. This information is reflected in Table 13.

Table 13

ANOVA Model Statistics for Criterion Variable (PSAE Reading Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	3422.22	9	380.25	43.59	.000
Residual	1770.74	203	8.72		
Total	5192.96	212			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of reading performance in small schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on reading scores in small schools are rank ordered as follows: (1) SES, (2) student attendance, (3) student mobility, and (4) ELL. These

data may be found in Table 19.

Medium Schools: Student and Building Characteristics as Predictors for Standardized Reading Assessment Scores

A stepwise multiple regression was used to examine Null Hypothesis 3b to determine if any of the student and building characteristics could be used to predict student performance in reading in medium schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict reading performance in medium schools. An ANOVA was significant, $F(9,205) = 96.01$, $p < .001$. This information is presented in Table 14.

Table 14

ANOVA Model Statistics for Criterion Variable (PSAE Reading Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	7348.45	9	816.500	96.01	.000
Residual	1743.30	205	8.504		
Total	9091.75	214			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of reading performance in medium schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on reading scores in medium schools are rank ordered as follows: (1) SES, (2) student attendance, (3) special education, (4) ELL, (5) student mobility, and (6) school enrollment. These data may be found in Table 19.

Large Schools: Student and Building Characteristics as Predictors for Standardized Reading Assessment Scores

A stepwise multiple regression was used to examine the Null Hypothesis 3c to determine if any of the student and building characteristics could be used to predict student performance in reading in large schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict reading performance in large schools. An ANOVA was significant, $F(9,203) = 117.78$, $p < .001$. This information is contained in Table 15.

Table 15

ANOVA Model Statistics for Criterion Variable (PSAE Reading Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	8221.31	9	913.48	117.78	.000
Residual	1574.44	203	7.76		
Total	9795.75	202			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of reading performance in large schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on reading scores in large schools are rank ordered as follows: (1) SES, (2) special education 3) expenditure per pupil, (4) ELL, and (4) dropout rate. These data may be found in Table 19.

Small Schools: Student and Building Characteristics as Predictors for Standardized Math Assessment Scores

A stepwise multiple regression was used to examine Null Hypothesis 4a to determine if any of the student and building characteristics could be used to predict student performance in math in small schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict math performance in small schools. An ANOVA was significant, $F(9,203) = 41.49$, $p < .001$. This information is presented in Table 16.

Table 16

ANOVA Model Statistics for Criterion Variable (PSAE Math Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	4105.59	9	456.18	41.49	.000
Residual	2232.22	203	11.00		
Total	6337.81	212			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of math performance in small schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on math scores in small schools are rank ordered as follows: (1) SES, (2) student attendance, (3) expenditure per pupil, and (4) special education. This data may be found in Table 19.

Medium Schools: Student and Building Characteristics as Predictors for Standardized Math Assessment Scores

A stepwise multiple regression was used to examine Null Hypothesis 4b to determine if any of the student and building characteristics could be used to predict student performance in math in medium schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict math performance in medium schools. An ANOVA was significant, $F(9,205) = 88.22$, $p < .001$. This information is presented in Table 17.

Table 17

ANOVA Model Statistics for Criterion Variable (PSAE Reading Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	8728.05	9	969.780	88.22	.000
Residual	2253.44	205	10.992		
Total	10981.49	214			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of math performance in medium schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on math scores in medium schools are rank ordered as follows: (1) SES, (2) student attendance, (3) mobility, (4) special education and (5) school enrollment. These data may be found in Table 19.

Large Schools: Student and Building Characteristics as Predictors for Standardized Math Assessment Scores

A stepwise multiple regression was used to examine Null Hypothesis 4c to determine if any of the student and building characteristics could be used to predict student performance in math in large schools. The assumptions for linearity, no multicollinearity, and independence were examined to ensure accurate results. This stepwise multiple regression revealed the predictors have the ability to predict math performance in large schools. An ANOVA was significant, $F(9,203) = 131.24$, $p < .001$. This information is reflected in Table 18.

Table 18

ANOVA Model Statistics for Criterion Variable (PSAE Math Performance)

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	11522.82	9	1280.31	131.24	.000
Residual	1980.34	203	9.76		
Total	13503.16	212			

Note. $p < .001$

Examination of the coefficients in the stepwise multiple regression can identify which predictors are significant predictors of math performance in large schools. Examination of standardized coefficients can rank order the predictors. Findings for student and building characteristics which have a significant impact on math scores in large schools are rank ordered by standardized partial regression coefficient as follows: (1) SES, (2) expenditure per pupil, (3) special education, 4) student attendance, (5) dropout rate, and (6) student enrollment. These data may be found in Table 19.

Comparisons show multiple findings. SES has the greatest impact as a predictor of student performance in reading and in math in any school size setting. Not only is it the number one predictor of student performance, but β weights indicate its impact far surpasses any other predictor. The second strongest predictor of student success across both subjects and all school sizes is student attendance. Reading performance in large schools is the exception in this predictor. The findings of SES and student attendance as the student and building characteristics which have the greatest impact on student performance inform educational leaders that strategies aimed at improving student performance in any school must be focused on methods to mitigate the effects of low SES and low student attendance.

Instructional expenditure per pupil has the third greatest impact as a predicator of student performance. Because instructional expenditure per pupil ranks second as a predictor of math performance in large schools and ranks third in math performance in all school sizes, in reading in large schools and in math in small schools, instructional expenditure per pupil functions as a powerful predictor of student performance. Given the economic atmosphere in the United States, this may be alarming to educators. In Illinois, to help balance the state budget, Governor Quinn reduced General State Aid (GSA) from 100% GSA in 2010-2011 school year to 95% proration in the 2011-2012 school year, and down to 89.2% in the current 2012-2013 school year (N. Tracy, personal communication, January 31, 2013). The Governor's projection for the 2013-2014 school year is 80% GSA. Fiscal crises such as these face schools across the nation, creating a discomfiting conflict between fiscal reality and educational needs.

Special education rates play a third predictive role in student performance, acting with significant impact in all categories except reading performance in small schools. Although not the top predictor, student mobility plays a role in five of the eight categories, indicating its

strength as a predictor. ELL is a significant predictor in all reading categories and in all school settings: small, medium, and large. Although student enrollment is a significant predictor in five categories, it ranks last or very low in each. This information is reflected in Table 19.

Table 19

Overall Findings for Impact of Student and School Characteristics

	Overall RDING	Overall MATH	Rding Small Schools	Rding in Medium Schools	Rding in Large Schools	Math in Small Schools	Math in Medium Schools	Math in Large Schools
1	SES	SES	SES	SES	SES	SES	SES	SES
2	Attend.	Attend.	Attend.	Attend.	Sp. Ed.	Attend.	Attend.	Inst. Exp.
3	ELL	Inst. Exp.	Mobility	Sp. Ed.	Inst. Exp.	Inst. Exp.	Mobility	Sp. Ed.
4	Mobility	Sp. Ed.	ELL	ELL	ELL	Sp. Ed.	Sp. Ed.	Attend.
5	Sp. Ed.	Enroll		Mobility	Dropout*		Enroll	Dropout*
6	Inst. Exp.	Mobility		Enroll				Enroll
7	Enroll	Class size**						
8	Class size**							

Note. *In overall findings for impact of student and school characteristics, dropout rate was not a significant predictor of reading or math performance. Investigation of segregated data reveals it has a significant impact (although it ranks as the last or next to last as a predictor) on reading and math scores in large schools. This leads one to ask what creates this interaction between dropout rate and large schools .

**Class size ranked last as a predictor of student performance in reading and math performance in overall findings. However, class size is not found to be a significant indicator in segregated data.

Comparing student characteristics as predictors to building characteristics as predictors, it was noted 26 of the identified predictors are student characteristics, 26/45 = 58% of predictors. Building characteristics account for 19 predictors, which results in 19/45 = 42%. Student characteristics, then, are identified as having greater impact as predictors than building characteristics. This information is reflected in Table 19.

Summary

Quantitative data were used in this chapter to investigate four research questions. Findings for Research Question 1 established significant differences in PSAE reading performance did not exist in relation to school size. Findings for Research Question 2 established significant differences in PSAE math performance existed in relation to school size. A Tukey HSD indicated large schools significantly outperformed both small and medium schools in math performance with $p < .001$. School sizes were defined as division of the 651 Illinois public highschools containing Grade 11 into three equal groups of 217 each. Small school enrollments ranged from 34-319 students, medium from 322-1107 students, and large school from 1110-4522 students.

Investigation of Research Question 3 used stepwise multiple regression to demonstrate student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment predict a significant amount of variance in PSAE reading performance. Analysis revealed SES had the greatest impact, attendance rate had the second greatest impact, with ELL third. Other predictors were ranked as follows from greatest to least impact: mobility rate, special education instructional expenditure per pupil, school enrollment, and last class size. The dropout rate did not have a significant impact with $p > .05$.

Investigation of Research Question 4 used stepwise multiple regression to find that student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment do predict a significant amount of variance in PSAE math performance. Analysis revealed SES had the greatest impact, attendance rate the second greatest impact, with instructional expenditure per pupil third. Other predictors were ranked as follows from greatest to least impact: special education school enrollment, mobility rate, and class size. ELL and the dropout rate did not have a significant impact with $p > .05$.

Statistical analyses of Research Question 3 and Research Question 4 prompted further investigation of the impact of student and building characteristics on student performance in reading and math in small, medium, and large schools. Statistical analysis of Research Question 3a found that the student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment do predict a significant amount of variance in PSAE reading performance in small schools. Top predictors were rank ordered as follows: (1) SES, (2) student attendance, (3) student mobility, and (4) ELL.

Investigation of Research Question 3b found that the student and building characteristics do predict a significant amount of variance in PSAE reading performance in medium schools. Findings are rank ordered as follows: (1) SES, (2) student attendance, (3) special education, (4) ELL, (5) student mobility, and (6) school enrollment.

Analysis of Research Question 3c revealed the predictors have the ability to predict reading performance in large schools. Findings are rank ordered as follows: (1) SES, (2) special education, 3) expenditure per pupil, (4) ELL, and (4) dropout rate.

Investigation of Research Question 4a revealed the predictors have the ability to predict student performance in math in small schools and can be rank ordered as follows: (1) SES, (2) student attendance, (3) expenditure per pupil, and (4) special education.

Investigation of Research Question 4b revealed the predictors have the ability to predict student performance in math in medium schools and can be rank ordered as follows: (1) SES, (2) student attendance, (3) mobility, (4) special education, and (5) school enrollment.

Analysis of Research Question 4c revealed the predictors have the ability to predict math performance in large schools and are rank ordered as follows: (1) SES, (2) expenditure per pupil, (3) special education, (4) student attendance, (5) dropout rate, and (6) student enrollment.

CHAPTER 5

RESULTS, IMPLICATIONS, AND RECOMMENDATIONS

The final chapter of this study is divided into six sections: summary, results, discussion, conclusions, recommendations for further research, and beyond this study. The summary section addresses the purpose of this study, why PSAE reading and math performance was chosen as a measure of student performance for this study, and who benefits from this study. The results section provides a summary of the data previously presented in Chapter 4. The discussion section interprets the results and searches for explanations for the results. The conclusions section provides insight into efforts to improve student achievement. Finally, the recommendations for further study and beyond this study sections provide suggestions for additional foci of study that would enhance and further delineate efforts to increase student performance in all school sizes.

Summary

The purpose of this study was to determine if a relationship exists between school size and student achievement in reading or in math. This study also investigated whether the student characteristics of SES, ELL, special education status, mobility rate, and dropout rate or the school building characteristics of class size, instructional expenditure per pupil, attendance rate, and school enrollment could act as predictors of student performance in reading or math. The statistical analysis of Research Question 3 and Research Question 4 led to additional research

questions which investigated the ability of the student characteristics of SES, ELL, special education status, mobility rate, and dropout rate or the school building characteristics of class size, instructional expenditure per pupil, attendance rate, and school enrollment to act as predictors of student performance in reading or math in small, medium, or large schools.

This study investigated the following research questions:

1. Are there significant differences on PSAE reading performance based on school size?
2. Are there significant differences on PSAE math performance based on school size?
3. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance?
4. Do SES, ELL, special education, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance?

Further research questions:

3a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in small schools?

3b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in medium schools?

3c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE reading performance in large schools?

4a. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in small schools?

4b. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in medium schools?

4c. Do SES, ELL, special education status, mobility rate, dropout rate, class size, instructional expense per pupil, attendance rate, and/or school enrollment predict a significant amount of variance in PSAE math performance in large schools?

The PSAE was chosen as a measure of student performance because every Grade 11 student in the state of Illinois is required to take this exam in order to graduate. Choosing the PSAE allowed me to look at the reading and math performance of all 11th grade students in Illinois, giving a creditable sample of students of varying abilities. Every public highschool in Illinois with Grade 11 was included to create a whole sample which included schools of multiple sizes varying from very small to very large.

This study will benefit educational and community leaders who seek to create learning environments which will encourage and support student learning and performance. This study gives educational leaders in small, medium, and large schools access to very specific information regarding the student and building characteristics that can best predict student performance in their schools. This study will provide information for educational leaders and community

leaders who seek to raise student achievement by making informed decisions concerning school size options and the interactions of student and building characteristics in relation to student performance and school size.

Results

Findings for this study were delineated in Chapter 4. This study focused on the relationship between school size and student performance as well as the interaction effect of nine student and building characteristics with student performance and with school size.

Research Question 1 was answered by investigating the differences between student performance in reading and school size through an ANOVA. This investigation revealed no significant differences existed in reading performance between school sizes. Research Question 2 was answered by investigating the differences between student performance in math and school size through an ANOVA. Student performance in math across the three school sizes was found to be significantly different. A Tukey HSD post-hoc investigation found large schools outperformed small and medium schools.

Research Question 3 was answered through the use of a stepwise multiple regression. Of nine student and building characteristics investigated, eight had a significant ability to predict student performance on PSAE reading. SES, attendance rate, and ELL were found to have the three most significant effects.

Research Question 4 was answered through the use of a stepwise multiple regression. Of nine student and building characteristics investigated, seven had a significant ability to predict student performance on PSAE math. SES, attendance rate, and instructional expenditure per pupil were found to have the three most significant effects.

Statistical analysis of Research Question 3 and Research Question 4 prompted further

investigation of the impact of student and building characteristics on student performance in reading and in math in small, medium and large schools. Analysis of additional Research Questions 3a, 3b, and 3c found that the student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment do predict a significant amount of variance in PSAE reading performance in small schools, medium schools and large schools.

Small school top three reading performance predictors were rank ordered as follows: (1) SES, (2) student attendance, and (3) student mobility. Medium school top three reading performance predictors were rank ordered as follows: (1) SES, (2) student attendance, and (3) special education. Large school top three reading performance predictors were rank ordered as follows: (1) SES, (2) special education and 3) expenditure per pupil.

Analysis of additional Research Questions 4a, 4b, and 4c found that the student and building characteristics of SES, ELL, special education, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school enrollment do predict a significant amount of variance in PSAE math performance in small schools, medium schools and large schools.

Small school top three predictors of math performance were rank ordered as follows: (1) SES, (2) student attendance, and (3) expenditure per pupil. Medium school top three predictors of math performance were rank ordered as follows: (1) SES, (2) student attendance, and (3) mobility. Large school top three predictors of math performance were rank ordered as follows: (1) SES, (2) expenditure per pupil, and 3) special education.

Discussion

Findings of this study revealed a significant relationship does not exist between school size and student performance in reading. Eight student and building characteristics, however, were found to significantly impact student reading performance. Of these significant characteristics, four involve student factors that seem outside the control of teachers and schools. The high rank of the predictors SES, ELL, mobility rate, and special education among predictors of reading performance, however, indicates educators must find ways to focus on these characteristics and to seek methods to mitigate their negative influences. Curriculum content and delivery, teaching strategies, classroom environment, teacher influence, and school climate are only some of the areas that could be investigated in looking for educational methods to successfully thwart the negative impact of these factors. Specifically, educational leaders must ask what strategies can be used to overcome the negative impact of low SES and what efforts must be made to advance language acquisition for newcomers to the English language. Educators must overcome the negative effects of student mobility despite the fact educators cannot change the rates of student mobility. Finally, research must seek out new educational strategies that will support special education student performance.

Findings of this study reveal a relationship does exist between school size and student performance in math with large schools outperforming small and medium schools in math. Although current literature suggests small and medium schools in many cases are better able to provide environments that nurture student engagement which leads to student achievement (Bancroft et al., 1964; Bickel et al., 2000a; Cotton, 1996a; Finn & Rock, 1997; Fowler & Walberg, 1991; Goodlad, 1984; Hager, 2006; Hardre et al., 2009; Irmsher, 1997; Jimerson, 2006; Lee & Smith, 1997; Meier, 1995; Raywid, 1997; VonSchnase, 2011; Weiss et al., 2010), this

study revealed large schools in the state of Illinois outperformed their counterparts in math. A follow-up study could be used to investigate why students in large schools across the state of Illinois showed stronger student performance in math than students in small and medium schools. Are specialized programs of study or the larger schools' ability to attract specialized and high quality teachers the attributes of larger schools that lead to greater student learning (Allen, 2002; Benard, 1991; Conant, 1967; Education Trust, 2001; Epstein & Sanders, 2000; Herbert, 1999)? Does access to adequate funds play a role (Boylan & McSwan, 1998)? Is there a positive influence in being part of large student populations (Weiss et al., 2010)? Further research is needed to answer these questions.

In addition, this study found that impact of student and building characteristics do not remain static across school sizes. This information will guide educational leaders as they customize strategies to increase student learning in their own school environments.

Conclusions

The educational reforms of *A Nation at Risk*, *No Child Left Behind*, and *Race to the Top* require that educational leaders find the most effective means of enhancing student performance. The financial crisis facing education today complicates this goal. This study has found school size does not significantly impact student performance in reading. School size, however, is found to significantly impact student performance in math with large schools achieving stronger student performance than small or medium schools.

Investigation of the impact of nine factors on individual school sizes found SES to be the single most significant indicator of student performance. Although school leadership cannot change the level of student SES, with knowledge of its importance in predicting student achievement, leaders can work to implement strategies to minimize the detrimental effects of low

SES. With SES ranked as the number one predictor of student performance in reading and math in all school sizes (small, medium, and large), it is imperative that educators develop strategies to support students whose low SES backgrounds place them at risk. Educators, for example, may need to assist students in basic physical needs such as food and appropriate clothing before learning can take place. Educators may need to create opportunities for basic life experiences such as students being comfortable with magazines or books and seeing them as valuable parts of the home. Most importantly, as Charlotte Danielson exhorts in *Enhancing Professional Practice: A Framework for Teaching,* educators must make personal connections with students that build an "environment of respect and rapport" in the classroom (Danielson, 2007, p. 64). This environment will allow teachers to see the world from students' perspectives and to create classroom and school environments in which students feel valued and safe (Jimerson, 2006).

Student attendance rate as the second most powerful overall predictor and as second most powerful predictor in four of the six school types for both reading and math, impels educational leaders to find ways to support consistent student attendance. Finn and Rock (1997) argue greater engagement of students in learning creates what they termed *academic resilience*, the ability to survive many of the risk factors that face today's students. Fostering student engagement in learning can in turn lead to more consistent student attendance (Werblow & Duesbery, 2009).

Finally, noting all nine indicators are found to be predictors of student performance in reading and math in at least some school type, this study reveals that leaders must take a holistic look at their schools. Efforts to raise student achievement by focusing on one area only will likely have minimal success in improving student performance. Student characteristics and

building characteristics including school size combine to create a school and classroom environment which encourages or inhibits student learning.

Recommendations for Further Study

Further recommended study includes the need to investigate why school size significantly impacts student performance in math with large schools outscoring small and medium schools. In addition, further study is required to investigate why school size significantly impacts student math performance but not student reading performance. Is teacher quality a factor? Is professional development a factor? Does teacher to student ratio have a significant impact? Do resources interact with school size to enhance math performance? What elements are at work in the large school that specifically encourage student performance in math? What elements that encourage student achievement in math may be missing from medium and small schools?

This researcher proposes findings for characteristics which impact individual building sizes be further explored. A follow-up study should investigate why student and building characteristics' status as significant predictors of student performance do not remain static across all school types.

Follow-up qualitative study could yield valuable results in an investigation of why significant predictors of student performance in reading and math change as school size changes. Finally, further study should include investigation of why certain factors exert greater influence on student achievement so this knowledge may be used to enhance student performance.

Follow-up quantitative study that investigates more than one year of data would be useful. A study of multiple areas of the United States is needed to investigate if the results of school size impact on reading and math performance in Illinois schools hold true for all areas of the United States or if regional differences exist in student achievement in relationship to school

size. Further study could investigate if these same results would hold true for junior high and elementary student performance.

Future studies could also more specifically pinpoint the interaction effects between SES, ELL, special education rate, mobility rate, dropout rate, class size, instructional expenditure per pupil, attendance rate, and school size. The conflicting findings of significant predictors for small, medium, and large schools suggests educational leaders should investigate customization of strategies to raise student performance based on the factors which have significant impact in their particular school size.

Beyond This Study

Further investigation of the impact of specific student and building characteristics on student performance in each school size can enable educational leaders to create individualized and more effective strategies to support improvement of student performance in schools of all sizes. Seeking one ideal learning environment may limit educational possibilities. Educators need to focus on optimizing student performance within the boundaries of current school situations, in other words, creating effective learning environments out of all school sizes. By further investigating the specific factors which impact student performance at each building size, educational leaders can optimize their own schools, no matter the size. Rather than focusing on the search for one ideal school size, educational leaders will have the power to transform their own schools, whether small, medium, or large, into effective optimal learning environments.

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