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The Appropriateness of Consolidation in Illinois: a Study of the Impact of Poverty, District Type, and Size on Expenditures and Achievement

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THE APPROPRIATENESS OF CONSOLIDATION IN ILLINOIS: A STUDY OF THE IMPACT OF POVERTY, DISTRICT TYPE, AND SIZE ON EXPENDITURES AND ACHIEVEMENT

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ABSTRACT

This study examined whether or not enrollment, poverty rate, and district type could be used to predict cost and achievement, as measured on the Illinois Standards Achievement Test and Prairie State Achievement Exam, at the building and district levels within the state of Illinois. This study provides quantitative data that will aid educational leaders and policy makers in making decisions related to the appropriateness of consolidation as related to the factors of enrollment, poverty rate, and district type. This study revealed that these factors have varying relationships with the outcomes. All were significant predictors at some level. The most influential predictor, however, was always poverty rate in outcomes where it was a significant predictor, which included all outcomes related to student achievement. Enrollment, in cases where it was a significant predictor, was typically the predictor that had the least impact on the outcome. District type was often a significant predictor, with an indicated increase of scores in elementary districts as opposed to unit districts and an increased cost for elementary and high school districts as opposed to unit districts.

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INTRODUCTION

Discussion of the Problem

Governor Pat Quinn of Illinois recently proposed to reduce the number of school districts in the State of Illinois from 868 to 300 ("School Consolidation," 2011). His reasoning behind this proposal was that by doing so, the state would see a savings of $100 million in administrative costs alone. Although logic such as this, on its surface, may seem reasonable, it has been found that, in fact, there is a limit to cost-effectiveness. Boyd and Ulm (2006) found that "conventional wisdom suggests that elementary schools with total student populations of 400-600 students are the most efficient and cost effective" (p. 112). Others have found that district size has a less pronounced impact on cost effectiveness than has been commonly believed (Coulson, 2007). Duncombe and Yinger (2010) concluded that the economies of scale seen from consolidation to larger districts decline as the districts become larger.

Of additional import in the discussion, but lacking in Governor Quinn's rhetoric, is the issue of student achievement. The No Child Left Behind Act of 2001 (NCLB) required that all states develop plans to incrementally increase student achievement through 2014 when all children were expected to meet or exceed standards in both mathematics and reading (No Child Left Behind Act, 2002). Conant (1959) concluded that high schools should have graduating classes of at least 100, which would make a minimum size of 400 to 500 students, in order to

offer the curriculum required to adequately prepare students for college attendance, which is a secondary goal of NCLB. Further, Duncombe and Yinger (2010) stated that consolidation increases the cost required to improve some outcomes beyond scores on state tests, such as graduation and attendance rates.

It is clear that, in this current environment of education, the issues of achievement, cost, and size cannot be separated. It may sound politically correct to state that schools are not cost effective because they are too small and that money could be saved or better spent by consolidating to larger districts, but the question should be asked as to whether or not the research supports such a claim.

Statement of the Problem

Educators are faced today with many challenges. Many of these stem from requirements under laws such as NCLB or other state and federal mandates. Often, politicians who are faced with the economic challenges of the time or a potential reelection campaign will make statements such as the one made by Governor Quinn of Illinois in order to appear that they are addressing the issues. These statements, however, often can do more harm to education than good. A system now exists that penalizes schools for failure to meet federal- and state-mandated academic goals, and it is possible that a forced consolidation of districts may make it more difficult for schools to achieve these goals, contributing to the downfall of ever more districts and schools. At the federal level, this system requires that certain monies provided by the federal government, such as Title I funds, be spent in particular areas such as providing supplemental education services, diverting those funds from local control of what district leaders see as most important. At the state level, penalties are sometimes as severe as a state takeover by removing

the local school board and firing those personnel that the state deems are most related to the issue causing the failure.

That is not to say, however, that there is no way to find some economies of scale within some districts and schools that will not negatively impact student achievement. Conant (1959) stated that high schools should serve at least 400 students, yet some still exist that are smaller. This raises the question as to whether or not a balance can exist between student achievement and cost of providing an education based upon the size of a school or district.

Research regarding school size has been mixed. As previously stated, Conant (1959) stated that high schools should serve at least 400 students. His study was based upon what he concluded to be a comprehensive curriculum and not student achievement. An additional problem with his study was that Conant primarily included schools that already had an enrollment of over 400 students. Gregory and Smith (1987) concluded that high schools smaller than 250 were better able to build communities within themselves with a result of increased student achievement. Gregory (2000) stated that since Conant's report was written, high schools had increased in average size from 321 in 1959 to 777 in 1998, yet the criticisms that schools were not able to be effective have increased. Haller, Monk, Spotted Bear, Griffith, and Pamela (1990) concluded a large percentage of high schools that graduated between 25 and 49 students a year were able to offer the same seven-course sequence in mathematics as larger schools. In regard to subgroups as required by NCLB, recent research (Howley, Johnson, & Petrie, 2011) supports a belief that consolidations in areas of low economic status reduces performance, as low-income students benefit from smaller school settings.

Similarly, recent research regarding school costs has indicated that schools are getting too large. Howley et al. (2011) believed that the maximum savings has already been achieved from

school consolidation. According to Patterson (2006), consolidation has not been able to achieve the goals that have been set, namely improved fiscal efficiency and increased student achievement.

A better understanding of how these three factors are interrelated will allow decision makers, including board members, administrators, and politicians, to make better decisions regarding school consolidations. Although there may not be an ideal school or district size, there may be a range of size within which schools and districts can be more efficient and achieve greater results.

A further question could be raised regarding the effectiveness of a dual-district system such as exists in Illinois. The state of Illinois allows a school district to be one of three different types. An elementary district serves students in Grades pre-kindergarten or kindergarten through 8. A high school district serves students in Grades 9 to 12. A unit district, however, serves all grade levels. Research is not available regarding the effectiveness or fiscal efficiency of such a system, but some concerns could be raised. Because each of these districts has its own superintendent, it is possible that a lack of efficient use of financial resources exists in areas where several elementary districts feed into a high school district and potentially could be combined into a single unit district. Of course, the question of appropriate size of the newly formed districts must also be addressed if it is determined that this system is not effective.

Purpose of this Study

This quantitative study examined the impact that several factors have on the expenditures and the student achievement level of districts and school buildings in Illinois. The factors considered were size, poverty rate, and district type. Per pupil instructional expenditures were examined at the school level and per pupil operational expenditures were examined at the district

level. This was done to allow consideration of the cost of factors such as transportation and district administrative costs when considering district size while eliminating these district level costs when considering school size. The results of this study provide decision makers with the additional information needed to determine when and if school or district consolidation is appropriate.

Research Questions

In order to study the appropriateness of consolidation in Illinois, the study posed the following nine questions:

1. Do elementary school size, poverty rate, and district type predict per pupil instructional expenditures?
2. Do high school size, poverty rate, and district type predict per pupil instructional expenditures?
3. Do district size, poverty rate, and district type predict per pupil operational expenditures?
4. Do elementary school size, poverty rate, and district type predict the average Illinois Standards Achievement Test (ISAT) math scale score achieved in each tested grade level served?
5. Do elementary school size, poverty rate, and district type predict the average ISAT reading scale score achieved in each tested grade level served?
6. Do high school size, poverty rate, and district type predict the average Prairie State Achievement Exam (PSAE) math scale score achieved?
7. Do high school size, poverty rate, and district type predict the average PSAE reading scale score achieved?

8. Do district size, poverty rate, and district type predict the average *z*-score for mathematics on the state tests across all tested grade levels?
9. Do district size, poverty rate, and district type predict the average *z*-score for reading on the state tests across all tested grade levels?

Null Hypotheses

$H_0$1. Elementary school size, poverty rate, and district type do not predict per pupil instructional expenditures.

$H_0$2. High school size, poverty rate, and district type do not predict per pupil instructional expenditures.

$H_0$3. District size, poverty rate, and district type do not predict per pupil operational expenditures.

$H_0$4. Elementary school size, poverty rate, and district type do not predict the average ISAT math scale score achieved in each tested grade level served.

$H_0$5. Elementary school size, poverty rate, and district type do not predict the average ISAT reading scale score achieved in each tested grade level served.

$H_0$6. High school size, poverty rate, and district type do not predict the average PSAE math scale score achieved.

$H_0$7. High school size, poverty rate, and district type do not predict the average PSAE reading scale score achieved.

$H_0$8. District size, poverty rate, and district type do not predict the average *z*-score for mathematics on the state tests across all tested grade levels.

$H_0$9. District size, poverty rate, and district type do not predict the average *z*-score for reading on the state tests across all tested grade levels.

Definitions

Student achievement refers to the student performance level on the appropriate state test given at the grade level of the students.

Per pupil instructional expenditures refers to the total amount of instructional expenditures divided by the average daily attendance. Instruction includes all activities necessary for the teaching of students. These expenses include teaching that occurs in the school setting and in alternate settings. It includes all expenses related to teaching, including instructional aides, but not those related to teaching such as transportation.

Per pupil operational expenditures refers to the total amount spent by a district on all services, including instruction, transportation, and administration, divided by the district's average daily attendance.

District size refers to the number of students enrolled in the district.

School size refers to the number of students enrolled in a particular school building.

District type refers to the dual district system used in Illinois. Districts can be elementary (PK/K-8), high school (9-12), or unit (PK/K-12).

Poverty rate refers to the percentage of students in a school or district who participate in the national free/reduced lunch program.

Consolidation refers to either the choice by a district to combine two or more buildings into fewer buildings or combining two or more districts into a single district, possibly of a different type.

The *Illinois Standards Achievement Test (ISAT)* is the test given in Illinois to all elementary students in Grades three through eight. In these grades, both mathematics and reading tests are administered. In Grades 4 and 7, an additional test is administered for science.

The *Prairie State Achievement Examination (PSAE)* is the test given in Illinois to all students in Grade 11. This test is administered in the areas of mathematics, reading, and science.

Limitations

There was a possibility that cost data are slightly skewed due to regional differences throughout the state. This study did not attempt to adjust for these regional differences. There were also other variables that potentially impacted student achievement such as home situation, education level of parents, and education level of the teachers in the building. These potential confounding variables were not considered as research studies measuring the impact of many of them already exist.

Delimitations

The study considered only schools within the state of Illinois. This was being done to eliminate the issues of differences in state tests. Illinois administers tests for grades three through eight and a combination of the ACT and WorkKeys in Grade 11. Not all states test in Grade 11, so other states will not be considered. Additionally, Illinois is one of only a handful of states that still has a dual district system.

This study did not include schools within the city of Chicago public school system. The sheer number of schools within the system would likely override any findings that were significant in the rest of the state. Additionally, many aspects of Chicago public schools work differently than the rest of the state, including governance and several portions of the school code.

Summary

This quantitative study examined the impact school or district size, district type, and poverty rate have on the dual outcomes of student achievement on the math and reading

assessments given by the state and the per pupil expenditures. The results of this examination were used to develop a set of recommendations as to when districts and schools should consolidate.

The study is organized into five chapters. The first chapter discusses the issues of school and district size as it relates to student achievement and economies of scale and details the purpose of the study. The second chapter provides a review of the literature related to the study. Chapter 3 details the research methodology to be used, including the research questions and the null hypotheses to be tested. It also identifies the data source and how the data will be collected. The fourth chapter gives a detailed quantitative analysis of the nine null hypotheses. Chapter 5 provides a summary of the findings of the research study, the conclusions that are drawn and their meaning for education, and recommendations for future study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This review of literature will examine the writings and studies that exist to examine the relationships between school size, student achievement, and school cost. This review will also examine some peripheral topics such as consolidation and other variables that impact achievement.

Consolidation

Consolidation is an area that concerns all three of the variables of school size, student achievement, and school cost. It has deep roots that have, over time, been intended to decrease cost and, in some arguments, increase student achievement. The indisputable outcome has always been increased school or district size. Research regarding the impact of consolidation on achievement and cost has been divided. Research in this area is also limited (Rooney & Augenblick, 2009). Rooney and Augenblick (2009) stated "many of the studies on district size and consolidation are advocacy pieces that were commissioned by parties that support or oppose consolidation" (p. 9). Empirical studies on the topic are, therefore, somewhat limited and occasionally have methodology or design issues that tend to skew results. Many opinion pieces exist; however, some are reasonable in their arguments, but little evidence is offered to support the opinion (Rooney & Augenblick, 2009).

The consolidation (or urbanization) movement has its beginnings with Horace Mann (Rosenfeld & Sher, 1977). Mann saw consolidation as a way to centralize control of schools away from property owners to government. Although Mann's consolidation efforts did not get much traction, others continued to push for the idea of consolidation until states started to mandate it. There were several goals behind consolidation, which include centralization of administration and power, a way to create a more professional educational environment, and cost savings. It was also supported through the fear that increased immigration would cause education at local levels to fall into the hands of immigrants who were uneducated and did not hold American values. In the latter decade of the 19th century, several states passed consolidation laws. Some of these provided incentives for consolidation, and some even offered state aid only to those districts that had consolidated beyond the one-room schoolhouse. With consolidation came a need to provide transportation. The cost of transportation quickly overrode any cost savings that might have been seen otherwise.

States had varying success with consolidation (Rosenfeld & Sher, 1977). In Indiana, for example, between 1906 and 1920, the number of districts that had consolidated rose from 361 to 1,040. From 1902 to 1920, the number of children who needed transportation to attend school went from 2,599 to 62,490. During this same time, there was a 20-fold increase in the cost of transportation as the cost rose from $100,000 to nearly $2,000,000. An evaluation of one county in Indiana, however, revealed that attendance had also increased during this time (Rosenfeld & Sher, 1977). Another measure indicating the success of consolidation was the fact that the athletic teams in consolidated schools were winning more championships. Given these gains, however, there were still losses through increasing costs and declining enrollments (Rosenfeld & Sher, 1977), so the promises of consolidation were not fulfilled. By contrast, in Iowa the

movement occurred much differently. In 1858, Iowa districts had been legislatively mandated to form township districts, reducing the number of districts from 3,500 to 900. Due to public opposition, however, this decision was reversed in 1872 and districts were allowed to subdivide into more than 9,000 districts in the state.

During the depression, the consolidation movement was able to procure mixed results (Rosenfeld & Sher, 1977). In many places, the increased cost of building consolidated schools was seen as too much of a burden on local taxpayers. In others, schools were not able to financially keep their doors open. States such as West Virginia were forced to eliminate the current school system and create a system of 55 county units. Arkansas eliminated its county boards and placed the authority to oversee schools in the county courts. By the turn of the next decade, however, the consolidation movement had greatly slowed down(Rosenfeld & Sher, 1977). With the events occurring in Germany, Italy, and Japan leading up to World War II, Americans were becoming averse to government control and much more interested in retaining local control. Even previously strong supporters of consolidation such as the American Association of School Administrators began speaking against consolidation.

By the end of World War II, the movement had regained momentum due to a report generated by the first White House Conference on Rural Education (Rosenfeld & Sher, 1977). The tact of consolidation, however, was changed. Reformers now focused their efforts on district reorganization instead of school consolidation, partly to address the problem of increasing transportation costs from a larger geographic area. Instead, the idea became to consolidate districts, and not schools. Illinois stands as a good example of the results of these efforts (Rosenfeld & Sher, 1977). In 1945, Illinois had around 11,000 school districts, but by 1955, it had only slightly over 2,000. Across the nation, the number of districts was cut in half

between 1950 and 1960 and then again by 1970, so the number of districts fell from 83,718 to 17,995. None of this, however, stopped the closings and consolidations of schools. It was, however, now up to each individual district to determine when schools should be closed. In 1959, three top educators stated that over 85 percent of the nations school districts were too small to provide a quality educational program (Rosenfeld & Sher, 1977). By 1970, only 2,000 one-teacher schools still existed and the number of elementary schools was down to 66,000. There had been 128,000 elementary schools in 1950.

Table 1 shows the trends in the data regarding the number of schools in the nation and the impact of consolidation on the number of districts and schools in the nation.

Table 1

Number of Districts and Schools from 1869 to 2010

Year	Districts	Total Schools	Elementary Schools	Secondary Schools
1869-70	*	116,312	*	*
1879-80	*	178,122	*	*
1889-90	*	224,526	*	*
1899-00	*	248,279	*	*
1909-10	*	265,474	*	*
1919-20	*	271,319	*	*
1929-30	*	248,117	238,306	23,930
1939-40	117,108	226,762	*	*
1949-50	83,718	*	128,225	24,542
1959-60	40,520	*	91,853	25,784
1965-66	26,983	99,813	73,216	26,597
1970-71	17,995	*	65,800	25,352
1975-76	16,376	88,597	63,242	25,330
1979-80	15,944	87,004	*	*
1984-85	*	84,007	58,827	23,916
1989-90	15,367	83,425	60,699	23,461
1994-95	14,772	86,221	63,572	23,668
1999-00	14,928	92,012	68,173	26,407
2004-05	14,205	96,513	71,556	29,017
2009-10	13,629	98,817	72,870	30,381

Note. * indicates data not available. Adapted from National Center for Education Statistics, 2011.

For the first century of consolidation (Sher & Tompkins, 1977), consolidation was seen as a means to fix the problems that were a natural part of rural education and to reduce costs. Issues such as ideal size were debated, but no one challenged the concept that "bigger is better" (Sher & Tompkins, 1977, p. 44). It was often just believed consolidation saved money, regardless of the size of the resulting school or district. The objections that were raised tended to center around the concept of local control and the idea that communities would lose their identity if they lost their school. Other issues such as the lasting, quality relationships that could be built between students, teachers, and communities were often overlooked in favor of the dream of achieving some economy of scale.

Sher and Tompkins (1977) further stated that given the amount of consolidation that has occurred and the popularity of the idea, it is commonly believed that research supports it overwhelmingly; research, however, does not. The research in the area of consolidation is incomplete and inconclusive. An additional problem arises in that much of the research that existed at the time of Sher and Tompkins' writing had issues with methodology.

One example of research with a methodology issue is Conant's study in 1959. Conant's study has often been used as a model for consolidation of schools, but when examining the research that was conducted, it was unavoidable that Conant reached the conclusion he did–in order to provide a comprehensive educational program, high schools should have graduating classes of at least 100 students. In order to reach this conclusion, Conant studied 103 high schools. In 1960, there were 25,784 high schools in the United States (National Center for Educational Statistics, 2011). Conant studied less than 1% of the number of high schools in the nation at the time. Additionally, Conant stated before even conducting his research what his

results were. Conant stated the schools he visited were schools with graduating classes considerably larger than 100 students, and this was done by choice. The schools he selected included only three smaller schools that did not meet his criterion of having at least 100 students per graduating class, and the schools were not selected randomly, as most were selected because they did meet this criterion and were convenient for him to visit. Sher and Tompkins (1977) further questioned Conant's analysis of his results in showing that the three smaller schools were near or above the mean scores given on the 15 indicators. They, therefore, outscored many of the larger schools.

Concerning economies of scale, Sher and Tompkins (1977) pointed out that research in this area often ignores factors that would offset the savings that might be earned. For example, two districts that consolidate may see savings in many areas such as building operations, administration, and staff but would also likely see an increase in transportation costs. These increased costs of transportation were often not included in research, skewing the results in favor of economy of scale when perhaps none existed. Additionally, Coulson (2007) pointed to the need to conduct state-specific studies before implementing a wide spread consolidation policy due to previous results not being consistent across states.

Within the State of Illinois, consolidation has a somewhat shorter history ("Illinois School History," n.d.; Phillips, Day, & Bogle, n.d.). In 1909, the Illinois General Assembly allowed the consolidation of two school districts by requiring a majority vote of the citizens within each district. This same year, they also enacted law requiring any district without a high school to pay the tuition to a high school for any parents who were unable to pay. Within two years of the passage of the consolidation law, 60 consolidations had occurred. Transportation was the largest issue when consolidating school districts, so in 1939, the General Assembly

appropriated aid for transportation for the first time ("Illinois School History," n.d.). In 1942, Illinois had over 12,000 public school districts, which was more than any other state ("Illinois School History," n.d.). Three years later, the citizens of Illinois voted to reduce the number of districts to 2,000. By 1950, the number of district had reduced to 4,480. Five years later, it was reduced to 2,242. It was not until the following decade that the goal of under 2,000 was reached when in 1963, there were 1,430 districts and by 1966, the number had been reduced to 1,340. When Governor Quinn made his statement in 2011, there were 868 districts. By July 1, 2012, Illinois had reduced the number of districts to 861. Of these districts, the majority are rural districts. In 2008-2009, 32% of all schools in the nation were rural, 14% were in towns, 28% in suburbs, and 26% in urban settings (Aud et al., 2011).

An additional impediment to consolidation within Illinois throughout much of this history has been the dual district system maintained within the state (Philips et al., n.d.). Illinois maintains three types of districts. Elementary districts serve students through Grade 8. High school districts serve students in Grades 9-12. Unit districts, however, can serve all students through Grade 12. Before 1945, all three district types were able to tax at the same rate and were eligible for state aid at the same rate. This, of course, meant that unit districts were forced to serve more grade levels with less money because the tax rates were not differentiated. Unit districts served a span of 13 grades, usually had more students, and had the same tax rate limitation. Additionally, high school districts and elementary districts always overlap, providing a larger tax base for the same thirteen grade span. State aid reimbursements are calculated based partially upon the local availability of funds and the districts use of those available funds. This proved detrimental to funding a unit district. In 1945, however, the General Assembly increased the rates at which unit districts were able to tax, allowing these districts to more fully access

what dual districts had already been able to access (“Illinois School History,” n.d.). Additionally, the limiting rate for access to more state aid was lowered for unit districts, allowing these districts easier access to more state aid. These changes increased the overall appeal of unit district formation and led to the drastic reduction in the number of school districts between 1945 and 1950.

Methods of District Consolidation in Illinois

Under current Illinois law, there are eight methods by which school districts can be reorganized into different units of government (Philips et al., n.d.). School district conversion (“Illinois School Code”, 2006) allows for unit districts to reorganize into dual district systems. This conversion may also begin with some high school districts included. It requires each elementary district created to encompass all territory within a unit district and the aggregate territory of all new high school districts to contain all of the territory of the converted high school and unit districts. It is noted that this form of reorganization is the only one which allows more districts to exist after reorganization. Combined school district formation (“Illinois School Code”, 2006) allows any two districts of the same type that are contiguous to combine to form a new district of the same type. Additionally, this law allows for two or more elementary districts which are within or “substantially coterminous” with a high school district to collectively combine into a new elementary district, regardless of whether or not they are contiguous. Unit district formation (“Illinois School Code”, 2006) allows the formation of a unit district from territories that are contiguous, may be part of an existing unit district, but not part of a unit district that will continue to exist. Partial elementary unit district formation (“Illinois School Code”, 2006) allows the creation of unit districts that serve some remaining elementary districts for high school purposes only. Boundary change (“Illinois School Code”, 2007) allows for

multiple methods of reorganization. Annexation allows a portion of one district to be included into a neighboring district. Annexation requires the territories be contiguous. Dissolution removes a district and allows the annexation of the territory to neighboring districts. Annexation does not require dissolution, but dissolution will result in annexation. According to 105 ILCS 5/10-22.22a ("Illinois School Code", 2008), a school board of a unit district may place on the ballot a question of deactivating the district's high school. In the event of deactivation, the students would be sent to a neighboring district and the district that deactivated their high school would remain a unit district. Finally, 105 ILCS 5/10-22.22b ("Illinois School Code", 2008) allows two unit or high school districts to create a cooperative high school to be jointly run by both districts.

School and District Size

From the early 1900s until around 1960, most evidence showed that larger schools and districts were better in terms of cost, quality of programs, and quality of staff (Swanson, 1988). Since then, though, more research has focused on student achievement, socioeconomic status, and other criteria. This research has found that the economies previously seen quickly disappear and disadvantages of larger systems are seen quite readily. Coulson (2007) stated the impact district size has on spending is often overestimated. It was further stated, however, that when comparing creating larger districts from small ones and smaller ones from large ones the savings from the former is around 12 times smaller than the latter. Coulson, therefore, made the point that districts have become too large when considering cost alone. In a study of the cost-efficiency of Michigan districts over the course of five years, Coulson determined the ideal size for districts in the state of Michigan was 2,900 students. Districts that are either larger or smaller spend more per pupil if all other things remain equal.

Gregory (2000) pointed to a key issue when discussing school size. Small schools do not conduct themselves in the same way larger schools do and take a different approach to problem solving. Therefore, some of the differences in outcomes seen in research of school size are due to these differences. Gregory determined the limit of the effective size of small schools is around 200 students. This is due, in large part, to the more personalized nature of the education smaller schools provide. Beyond this size, small schools become less effective if they continue to operate in the same way they always have. He further argued since Conant's original work in 1959, high schools have increased in average size from 321 in 1959 to 777 in 1998. However, during this time, schools have been increasingly criticized for being ineffective (National Commission on Excellence in Education, 1983; NCLB, 2002). Gregory's recommendation if we truly want to reform schools is "we must establish a moratorium on the construction of yet more large high schools or increasing the size of those that exist already" (p. 16). Reynolds and Van Tuyle (2012) stated large schools (more than 2,000 students) were built on the belief they were more efficient in delivering the educational product but argue these schools are too big. Students in these schools become "numbers" (Reynolds & Van Tuyle, 2012, p. 41) instead of being viewed as individuals and their needs, subsequently, are not met. Due to the lack of attention some students receive in larger schools, they become frustrated and discipline issues increase.

Wasley and Lear (2001) wrote regarding small schools that had been created within larger ones that "together, parents, teachers, and principals have found these small schools better able to engage the intellectual and emotional lives of students and to improve students' academic performance" (p. 22). They also found these schools had a significantly lower drop-out rate than did their host schools and districts. Ark (2002) confirmed these findings and added that

achievement has flatlined, largely due to the fact schools are too big. Other studies have also found smaller schools have fewer discipline problems per student (Wasley et al., 2000).

Of particular note in the vein of studying differences in small and large schools is the study conducted by Kuziemko (2006). One of Kuziemko's conclusions was smaller schools achieve better in both math scores and attendance rates. When studying the impact changing enrollments had on larger districts it was noted there did not seem to be an immediate impact, but the longer students stayed in larger schools, the lower the scores became. This implies a lasting damage done to the achievement of students which decreases scores the longer they stay in a large district. Kuziemko's conclusions are of particular note as the methodology was different from most other studies. Kuziemko identified schools within the state of Indiana which had "shocks," or large increases or decreases, to their enrollment between 1988 and 1999. There were over 100 of these schools identified which were then examined for the impacts on student attendance and achievement by way of a multiple regression. This method allowed for both immediate and some longitudinal analysis of the impact of large changes in enrollment.

The issue that arises in a study of size is the outcomes that are being included as indicators of the success of the school or district. Conant (1959) looked at the comprehensiveness of the program being offered and, in fact, found there was no difference in the academic achievement of the schools which he studied. Contrary to Conant's claim, however, that larger schools can offer a more comprehensive program, others (Howley, 1995; McGuire, 1989; Monk, 1992; Monk & Haller, 1993; Nachtigal, 1992; Rogers, 1987) have found larger schools do not guarantee a better curriculum. In fact, many of the additional courses that are offered in the larger schools were found to be remedial or introductory courses. Coulson (2007) considered expenditures as a function of size. Boyd and Ulm (2006) spoke of the equity

of the educational programs, especially at the elementary level, and the importance of considering the impact larger schools and districts achieved through consolidation could have on certain populations of students, especially those of low socioeconomic status and those with special educational needs. Others (Howley et al., 2011; Klonsky & Klonsky, 2008; O'Rourke, 2006; Swanson, 1988) focused on the impact size has on students of low socioeconomic status. As schools get larger, students of poverty tend to perform lower academically (O'Rourke, 2006). Klonsky (2006) stated there is no need for further research in the field of small high schools as there is no longer anyone arguing the opposite point. He continued, however, to state that in the decade after his writing, half a trillion dollars will be spent on construction of ever larger school buildings. It appears, therefore, that those making policy decisions are not well versed on the research or the research has not been clear enough in its findings for practitioners and policy makers.

Gladwell (2002) discussed the "Rule of 150" which states when more than 150 people are involved in an endeavor it becomes less manageable. He also points out that for disadvantaged students, it would be better to build many smaller schools than a few larger ones. Howley and others (2011) would agree with this assessment as they found low-income students benefit more from a small school setting. Howley (1995), however, took this a step further and argued that decreasing the size of all schools might not be in the best interest of affluent students as they tend to do better in larger schools. He proposed, instead, that schools should be built based upon the area demographics and one size does not fit all students.

It has also been argued that district size has an impact on student achievement. Fox (1981) analyzed 31 organizations and found that there was a negative correlation between achievement and district and school size. Walberg and Fowler (1987) conducted an analysis of

many New Jersey districts. Even after controlling for expenditures and student socioeconomic status, they found an inverse relationship between achievement and size.

There are organizations within the country that support maintaining small schools. The Bill and Melinda Gates Foundation funds a grant to support small schools (Feldman, López, & Simon, 2006). The foundation has set 400 as the number of students that schools can effectively serve while providing an experience that is personal and intellectually stimulating. Concerns have been raised regarding the grant application for small schools as the size of most recipients is right around the target size, leading some to believe it is the grant parameters, not best practice, that is driving the size decision.

To illustrate the impact that consolidation has had on size, Table 2 shows the student enrollments in public schools in the United States for selected years. Table 3 then shows the number of students per elementary and secondary school as well as per district. Although the total enrollment has been increasing over time, so has the school enrollment, even though Table 1 shows there are more schools at all grade levels servicing students.

Table 2

Enrollment of Public Schools in Thousands of Students

Year	Elementary	Secondary	Total
1980	20,647	13,231	40,877
1990	29,876	11,341	41,217
2000	33,686	13,517	47,204
2009	34,418	14,955	49,373

Note. Adapted from National Center for Education Statistics, 2011.

Table 3

Number of Students Per School or District

Year	Elementary	All Secondary	District†
1986††	416	707	*
1990	449	663	2,682
2000	477	714	3,162
2009	473	693	3,623

Note. * Indicates data that were not figured. † Enrollments per district were figured using the information in Table 1 and Table 2. †† This is the first year that enrollment data were presented for all three types of school in the source data. Adapted from National Center for Education Statistics, 2011.

In an analysis of relevant research, Webb (1989) reached several conclusions. First, school districts were larger than they had ever been. This was due to a perception that only large school districts could be good school districts. This perception was beginning to change at the time of Webb's writing and researchers were beginning to question whether or not larger districts were, in reality, beneficial. Over the years, there were three primary arguments to support varying positions on district size: fiscal efficiency, effectiveness, and the identity of the community. Table 4 summarizes many of the research findings. It is notable that increased efficiency is often used to support a position of larger districts, yet the smallest size recommendations come from those who are using cost as a measure in their research.

Walberg (1989) stated, "It appears that smaller districts on average may be more effective and efficient: Their students appear to score higher on standardized tests (other things being equal) and they may be more satisfying to parents and citizens" (p. 154). P. Coleman and LaRoque (1986) studied the view that small districts cost more to operate and concluded that this perception was actually tied to small schools costing more. Because small districts tend to have small schools, this belief is more a function of the small school, not the small district. In fact,

when P. Coleman and Laroque controlled for school size, they found that there was no significant correlation between district size and per-student expenditures.

Table 4

Summary of Recommendations of District Size

District Size Recommendation	Basis for Suggested Size	Year
50 teachers	Professional opinion	1934
40 teachers, 1,200 students	Opinion survey	1934
9,800–12,000 students	Professional opinion	1934
10,000–20,000 students	Review of literature	1966
3,000–5,000 students	School administrative cost	1968
1,500–2,000 students	Business management	1968
1,500 students	Review of literature	1969
1,000 students	Gross expenditure	1971
400 students	Cost residual	1971
1,000 students	Administrative cost	1971
425–10,000 students	Review of literature	1974
Less than 750 students	Student retention, student participation, graduate productivity, citizen satisfaction, parent willingness to finance school	1977

Note. From Webb, 1989.

School and District Cost

Often central to the discussion of consolidation of schools or districts is a perceived cost savings. Governor Quinn's statement to reduce the number of districts in the state of Illinois included a perceived cost savings of over $100 million in administrative costs alone ("School Consolidation," 2011). He made no further statements regarding what other savings he perceived would occur.

Howley and others (2011) stated those in support of consolidation often cite fiscal efficiency and higher quality of education as benefits. However, the authors believed that over the preceding century of consolidation the maximum benefit achievable through consolidation

has been reached and, in many cases, exceeded by reducing efficiency through diseconomies of scale. Additionally, the result of savings by reducing the number of top-level administrators, such as superintendents, is often not realized as larger districts need and hire more mid-level administrators. Howley and others reached the following conclusions after a review of the research on school consolidation:

- Deconsolidation is more likely than consolidation to produce large scale cost savings.
- Claims that consolidation will result in greater fiscal efficiency and lower costs are unsubstantiated in current research.
- The educational benefits received from statewide consolidation initiatives have already been maximized.
- Where deconsolidation should be implemented should only be considered on a case-by-case basis and not implemented through statewide reform.
- Areas with low socioeconomic status benefit from smaller schools and face irreparable harm if forced to consolidate.
- State level consolidation policies are more politically oriented, used during a time of fiscal crisis, and are not meant to produce greater educational outcomes.

Of particular note is the conclusion that deconsolidation is more likely than consolidation to produce large-scale cost savings. This argument is interesting in that it indicates districts are going the wrong way. Gregory (1992) stated it is not necessarily true that small schools cost more to operate than large schools and, in fact, when considering the savings in remediation, small schools can be more cost effective than larger ones.

Additionally, research exists that school quality can decrease when schools become too small or too large (Slate & Jones, 2005). For small schools, this occurs due to a lack of resources to be found in economically disadvantaged areas and when those resources are available, they are not efficiently used due to a lack of economy of scale. Large schools tend to be located in urban areas of a lower social class and also lack resources. When the large school does have resources, they tend to be wasted on inefficiently run administration, which wastes any economy of scale that would have existed.

Walberg (1989) discussed the belief by many that school districts should apply business principles. In particular, he discussed the concept that the more students that are served by a district, the cheaper that service can be provided. Walberg also pointed out, though, there are many who believe the cost curve for schools is U-shaped, i.e., small districts cost more but there is a size after which costs begin to rise again and economies of scale evaporate.

Verstegen (2003) examined the minimum amount needed to adequately fund education within the state of Kentucky. The study divided Kentucky school districts into three categories of size based upon the overall student enrollment in a way that each category received approximately one-third of the overall student population. Using the professional judgment approach or the resource cost model, panels were created to develop prototype schools whose cost could then be estimated. The study stated that the smallest districts have a base cost of $7,186 per pupil, medium districts were $6,788 per pupil, and large were $6,551. The base cost did not include costs such as special education, transportation, or additional education services needed to meet the study's definition of adequate. The average enrollment for the small, medium, and large districts was 1,500 students, 4,522 students, and 19,052 students respectively.

These results tend to indicate economies of scale as districts become larger within the range of districts studied.

Of additional note in the Verstegen (2003) study was a point on class and school size. Based on other literature, Verstegen stated that "small classes and small schools support student success" (p. 13). The literature used to support this were three studies, two of which were only relevant through third grade. This potentially artificial limitation placed on class size could have served to inflate the costs of smaller districts by removing the flexibility to keep staff smaller and classes larger as those on the panel may have been forced to split classes at a smaller size than a real-world administrator would have. School sizes used for elementary, middle school, and high school were 340, 462, and 640, respectively. However, the study did not include facilities costs that would be necessary to create these smaller buildings from current larger ones, deflating the cost for large districts, although this would have been a one-time cost and not ongoing.

Student Achievement

American education is under attack today for a lack of student achievement (NCLB, 2002). This problem is not new or unique to this millennium, however.

According to Horace Mann (as cited by Caldwell & Courtis, 1924) in the latter part of the nineteenth century, American students were not being taught higher-order thinking skills and instead simply memorized facts and information. The first standardized test was given in the United States in 1845 to some of Boston's best students (Rothstein, 1998). However, on this test, only 45% were able to answer that water expands when it freezes. Rothstein (1998) also stated "an 1898 writing exam at the University of California (Berkeley) found that 30 to 40 percent of entering freshmen were not proficient in English" (p. 16). The university's policy

committee in 1981 stated they were convinced, based upon the trends in test scores and basic skills course enrollments, that the skill level of the entering freshmen had declined (Kirst, 1981).

The turn of the 20th century did little to change the criticisms of public education. Butterworth (1958) stated that in 1902, editors of New York newspapers complained of the differences between education at the time and the education they had received, stating the quality had decreased in the interim. Burgess (as cited in Resnick & Resnick, 1977) stated that of the men recruited into the Army during World War I, over half could not write a simple letter or read a newspaper. This was not due to the soldiers not attending school; rather, they enrolled and attended the primary grades but could not read as adults. Rippa (1980) shared that in 1927, the chairman of the National Association of Manufacturers claimed 40% of those who had graduated high school could not do simple tasks such as adding, subtracting, multiplying, and dividing. It was further claimed they could not express themselves in the English language or read simple materials. Fine (1943) conducted a survey of 7,000 students in 26 colleges and universities and determined many students had no clue about certain facts of history and social studies, including who was President during the Civil War, what is contained in the Bill of Rights, where key cities such as St. Louis are located, and which states were in the original 13 colonies. He stated this as an indictment either on the secondary education these students had received or the students' memories.

In 1957, Keats (as cited in Rothstein, 1998) published a criticism of public schools in *The Saturday Evening Post* for students creating bank fronts in class, electing bank presidents, hiring tellers, and simulating the working of banks in class, calling this the "social phase" of arithmetic because it did not focus on basic facts. It is also well known that American education faced severe criticism in 1957 after the launch of Sputnik (Rothstein, 1998). *Life* magazine ("Crisis in

Education, Part I," 1958a; "Crisis in Education, Part II," 1958b) published a series comparing the education of one student in Chicago with a student in Moscow. The student's education in Chicago was described as "relaxed" ("Crisis in Education, Part I," 1958a, p.33) while the student in Moscow was described as a "rough haul all the way" ("Crisis in Education, Part I," 1958a, p. 28). The comparisons of the reading instruction of the two students compared the Moscow student as having studied Shakespeare and Shaw but the Chicago student was studying only Robert Louis Stevenson. The series concluded American high school students were not learning as much as they had a generation before and considered the difficulties the United States faced in winning the Cold War.

It did not get much better in more recent decades. Walcutt (1961) included a charge that graduate students were not well versed in literacy skills, primarily due to a departure from proper pedagogy in prior schools. Slightly over a decade later, Packard (1974) proclaimed millions of educated Americans could not satisfactorily read or write and this was occurring when these skills were in ever greater demand in higher education institutions. Less than a decade later, the National Commission on Excellence in Education (1983) published a government sponsored report that began with "Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world" (para. 1). The authors followed with rhetoric such as "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war" (National Commission on Excellence in Education, para. 2). The reasons for these conclusions included the following:

- International comparisons of student achievement, completed a decade ago, reveal that on 19 academic tests American students were never first or second and, in comparison with other industrialized nations, were last seven times.
- Some 23 million American adults are functionally illiterate by the simplest tests of everyday reading, writing, and comprehension.
- About 13 percent of all 17-year-olds in the United States can be considered functionally illiterate. Functional illiteracy among minority youth may run as high as 40 percent.
- Average achievement of high school students on most standardized tests is now lower than 26 years ago when Sputnik was launched.
- Over half the population of gifted students does not match their tested ability with comparable achievement in school.
- The College Board's Scholastic Aptitude Tests (SAT) demonstrate a virtually unbroken decline from 1963 to 1980. Average verbal scores fell over 50 points and average mathematics scores dropped nearly 40 points.
- College Board achievement tests also reveal consistent declines in recent years in such subjects as physics and English.
- Both the number and proportion of students demonstrating superior achievement on the SATs (i.e., those with scores of 650 or higher) have also dramatically declined.
- Many 17-year-olds do not possess the "higher order" intellectual skills we should expect of them. Nearly 40 percent cannot draw inferences from written material;

only one-fifth can write a persuasive essay; and only one-third can solve a mathematics problem requiring several steps.

- There was a steady decline in science achievement scores of U.S. 17-year-olds as measured by national assessments of science in 1969, 1973, and 1977.
- Between 1975 and 1980, remedial mathematics courses in public 4-year colleges increased by 72 percent and now constitute one-quarter of all mathematics courses taught in those institutions.
- Average tested achievement of students graduating from college is also lower.
- Business and military leaders complain that they are required to spend millions of dollars on costly remedial education and training programs in such basic skills as reading, writing, spelling, and computation. The Department of the Navy, for example, reported to the Commission that one-quarter of its recent recruits cannot read at the ninth grade level, the minimum needed simply to understand written safety instructions. Without remedial work they cannot even begin, much less complete, the sophisticated training essential in much of the modern military (National Commision on Excellence in Education, 1983, Indicators of the Risk section, para. 2-14).

Ravitch (2011) discussed the language used in the report. She calls it “flamboyant” (p. 24). Due to its flamboyance, it was able to grab the attention of the media, and soon after, the general public. *A Nation at Risk* became a guiding document in the standards movement and is still often quoted today. The plain text of the document appealed to the common person who often saw the recommendations contained within it as making sense.

The view that American schools were not doing their jobs did not stop there. Ravitch and Finn (1988) conducted a study of high school juniors by giving a self-developed test. Their findings found, on average, 51.8% of the students supplied correct answers on the literature portion and 54.5% answered correctly in history. Little information was provided to be able to examine this study as the questions used were not provided in the publication of results nor was the method of selecting the 8000 students to whom the test was administered revealed. Kaplan, Wingert, and Chideya (1993) reported that graduates from our high schools were not able to do academic skills beyond reading simple prose or adding two integers. Gerstner (1995) charged that the national movement to incorporate standards had been successful only in mathematics. Additionally, he claimed only one in three high school seniors were able to answer basic geography questions and only 16% of seniors met the requirements on the National Assessment of Educational Progress. Gerstner, of course, was pushing for national standards and worked with a group of governors to endeavor to create national standards. The national standards movement, however, was bogged down by the politics of those same people who pushed for them (Ravitch, 2011).

Of course, the ultimate and current challenge to student achievement occurred with the passing of NCLB (2001). This law challenged states to develop standards of academic achievement that were rigorous and would require students to meet certain goals or the schools which they attended would face increasing sanctions. This is still the current law affecting schools and sets requirements for performance levels in mathematics and reading. Although science is tested in three grades, it is not included as a portion of the adequate yearly progress calculation.

Table 5 displays the results of the annual Phi Delta Kappa poll for the years 1992 and 1997 through 2012. In the poll, Phi Delta Kappa asked participants to grade both the nation's schools and the school in their local communities. Of note is that over the course of the two decades being represented, there has been little change in the percentage of respondents who believe the schools have been performing well, but the percentage issuing a failing grade has nearly doubled. This does not hold true in local schools, however, as fewer respondents issued the bottom three grades to their local schools and there was a slight increase in the number assigning the highest two grades. It might seem from the results of this poll that the citizens of the nation do not share the perception that has been given by journalists, politicians, and some researchers that our educational system is declining.

Table 5

Percentage of Respondents Assigning a Particular Grade to Schools

	Nation's Schools					Local Schools				
Year	A	B	C	D	F	A	B	C	D	F
1992	2	16	48	18	4	9	31	33	12	5
1997	2	20	48	15	6	10	36	32	11	6
1998	1	17	49	15	5	10	36	31	9	5
1999	2	22	46	16	4	11	38	31	9	5
2000	2	18	47	14	5	11	36	35	8	3
2001	2	21	51	14	5	11	40	30	8	5
2002	2	22	47	13	3	10	37	34	10	3
2003	2	24	52	12	3	11	37	31	10	5
2004	2	24	45	13	4	13	34	33	10	4
2005	2	22	46	13	4	12	36	29	9	5
2006	2	19	51	14	3	13	36	32	9	5
2007	2	14	57	18	5	9	36	34	14	5
2008	3	19	44	13	5	12	34	30	11	5
2009	1	18	55	19	6	10	41	32	11	3
2010	1	17	53	20	6	11	38	33	11	5
2011	1	16	51	23	7	14	37	32	11	5
2012	1	18	47	23	7	12	36	31	13	4

Note. Adapted from Bushaw & Lopez, 2012; Rose & Gallup, 1999, 2001, 2004, 2006.

This review of the history of student achievement and the public perception of the ability of schools to ensure students learn is important. Although schools are currently under NCLB and required to increase student performance on a yearly basis, statements such as the one made by Governor Quinn of Illinois ("School Consolidation", 2011) regarding the size of schools included no discussion as to the impact the size of schools and districts may have on student performance. Politicians faced with perceived public opinion pressure make decisions such as passing NCLB or forcing consolidation without fully considering the impact the policy may have on other areas of schools, including academic achievement.

Ravitch (2002) stated while the testing of students is not a new concept, using these tests for the accountability of teachers, principals, schools, and school systems is. The interest in accountability can be traced to the Coleman report (J. S. Coleman et al., 1966). Ravitch (1983) stated one reason the study was significant was due to the shift from looking at the inputs in education to studying results. Ravitch (2002) also claimed the states that have adhered to implementing both strong standards and accountability systems have seen improvements in student achievement over time.

Berliner and Biddle (1995) disagreed with the claims that many have made regarding the achievement of American students. They discussed, in great detail, how those who claim poor achievement are misrepresenting data. For example, in an analysis of Scholastic Aptitude Test (SAT) scores, it seems at first glance that students may be performing at a lower level. Berliner and Biddle, however, explained that changes had been made to the test and that more students were taking the test. The second point alone allows for some variation in the scores over time as more students take the test as a step to getting accepted into college.

Riggen (2013) concluded after examining student performance in Illinois High Schools by dividing the schools into three groups based upon enrollment that the largest third of the high schools significantly outperformed the smaller groups on the Prairie State Achievement Exam (PSAE) in mathematics. She found no statistically significant difference in reading scores among the groups. The difference in math scores was reported as follows:

> 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. (Riggen, 2013, p. 79)

In the analysis, per pupil instructional expenditures were used as a predictor of student achievement where it was determined that these expenditures served as a statistically significant predictor of student achievement in the smallest and largest groups of schools. Riggen stated further that size was a significant predictor for all three groups. However, there is no examination of effect size given in the study. The 2.60 difference in math scores at the varying levels is equal to .33 standard deviations. There was no examination as to the cost to achieve this increase, so it is possible that the small achievement gain is prohibitively costly.

Socioeconomic Status

Many researchers have agreed that small schools serve low-income students better than larger schools (Boyd & Ulm, 2006; Cotton, 1996; Fowler & Walberg, 1991; Howley et al., 2011; Klonsky & Klonsky, 2008; O'Rourke, 2006; Swanson, 1998). Walberg (1989) argued that student achievement cannot be studied without considering socioeconomic status (SES). He stated studying collective units such as schools and districts magnifies the effects of SES over

studying individual students. Berlin and Cienkus (1989) stated "We must remember to fit the instruction to the instructional needs of our students, rather than to the organizational needs of the school" (p. 231). This implies a need to analyze policies to reduce impact on instruction of students who need specialized instruction the most. They also stated, "For children of low SES, the need for smaller class size seems to be greater than for middle- or upper-SES children" (p. 231). Howley and Howley (2004) found student achievement decreased as the school's rate of low SES students increased. Additionally, they found if SES rates were high, larger schools achieved less. In a recent study, Reardon (2013) found students of parents with a higher income perform better in school. Reardon, in fact, stated that income serves as a better predictor of academic success than race.

According to Fowler and Walberg (1991), the percentage of students of low SES within a district is the strongest variable indicative of poor student success. School size was the next best variable to use. In an analysis of Illinois schools after the implementation of NCLB and its punitive system, Beck and Shoffstall (2005) examined student performance on the ISAT given in Grades 3-8. They found the higher the school's SES count was the lower the student achievement was on the ISAT.

Other Factors

Hattie (2009) conducted a review of many studies related to student achievement and the factors that contribute to achievement in schools. An example of an indicator of achievement is, not surprisingly, the prior achievement of the student (Hattie & Hansford, 1982; Roth, BeVier, Switzer, & Schippmann, 1996). Pong, Dronkers, and Hampden-Thompson (2003) found students from single-parent homes had lower achievement levels than those from two-parent homes. The effect size of this finding, however, was small. Other studies have found that

students who watched more television had lower scores, although this effect was small as well (Ennemoser & Schneider, 2007; Hattie, 2009; Williams, Haertel, Haertel, & Walberg, 1982). For a small number of hours of TV, there were slightly positive effects. It was also found that there were stronger negative effects for both girls and students with higher IQs.

Of the factors not previously discussed that were examined by Hattie (2009), the most striking is class size. There is actually a small effect size related to class size and its relationship to student achievement. Although some claim reducing class sizes greatly increases student achievement, Hattie found that, in reality, it is a small effect and places it in his area of "teacher effects," which he defines as "influences in this zone are similar to what teachers can accomplish in a typical year of schooling" (p. 20).

Summary

Consolidation over the years has been driven by many factors as shown here. Whether consolidation is recommended to provide a comprehensive curriculum, to save money, to increase achievement, or for political reasons, it is clear that the research on the issue has been and still is mixed. Little research exists that is truly empirical rather than opinion. Additionally, there is a lack of available research on the topic of dual-district systems such as exist in Illinois. It is important, therefore, that an empirical study be completed to analyze these factors and provide guidance and insight into the debate over consolidation.

CHAPTER 3

RESEARCH METHODOLOGY

This study is designed to determine the appropriateness of consolidation at the school and district level within the state of Illinois. Illinois currently contains 866 school districts and 3,873 school buildings, and proposals are consistently introduced in the General Assembly to force consolidation of some of these districts in varying fashions. Current state law allows districts to make this decision locally by placing a referendum on the ballot in all affected districts prior to consolidation after conducting a feasibility study. Schools may be consolidated at the district level when the local school board makes a determination that such action is needed. Therefore, a need exists for full comprehension of factors that affect the consideration of consolidation of districts and schools. A better understanding of these various factors will provide all decision makers at the state and local levels with the information necessary to make informed decisions that will minimize the impact on student achievement. Additionally, Illinois is one of a few states that currently still have a dual-district system. This study was designed to determine if this system is a factor in cost and achievement issues and if consolidation of dual-district systems into unit systems is appropriate.

Research Questions

This study worked to answer the following research questions:

1. Do elementary school size, poverty rate, and district type predict per pupil instructional expenditures?

2. Do high school size, poverty rate, and district type predict per pupil instructional expenditures?
3. Do district size, poverty rate, and district type predict per pupil operational expenditures?
4. Do elementary school size, poverty rate, and district type predict the average ISAT math scale score achieved in each tested grade level served?
5. Do elementary school size, poverty rate, and district type predict the average ISAT reading scale score achieved in each tested grade level served?
6. Do high school size, poverty rate, and district type predict the average PSAE math scale score achieved?
7. Do high school size, poverty rate, and district type predict the average PSAE reading scale score achieved?
8. Do district size, poverty rate, and district type predict the average *z*-score for mathematics on the state tests across all tested grade levels?
9. Do district size, poverty rate, and district type predict the average *z*-score for reading on the state tests across all tested grade levels?

Null Hypotheses

This was done by addressing the following null hypotheses:

$H_0$1. Elementary school size, poverty rate, and district type do not predict per pupil instructional expenditures.

$H_0$2. High school size, poverty rate, and district type do not predict per pupil instructional expenditures.

$H_0$3. District size, poverty rate, and district type do not predict per pupil operational expenditures.

$H_0$4. Elementary school size, poverty rate, and district type do not predict the average ISAT math scale score achieved in each tested grade level served.

$H_0$5. Elementary school size, poverty rate, and district type do not predict the average ISAT reading scale score achieved in each tested grade level served.

$H_0$6. High school size, poverty rate, and district type do not predict the average PSAE math scale score achieved.

$H_0$7. High school size, poverty rate, and district type do not predict the average PSAE reading scale score achieved.

$H_0$8. District size, poverty rate, and district type do not predict the average *z*-score for mathematics on the state tests across all tested grade levels.

$H_0$9. District size, poverty rate, and district type do not predict the average *z*-score for reading on the state tests across all tested grade levels.

Description of the Sample

Existing data were collected from the Illinois State Board of Education for the 2012 administration of the Illinois Standards Achievement Test (ISAT) and Prairie State Achievement Exam (PSAE) to be analyzed in this study. Scale scores on the ISAT range from 120 to an unrestricted maximum, although in practice the maximum scored generally falls below 400 (Division of Assessment, 2012). This is a continuous scale, so a student in third grade who scores a 270 is performing at essentially the same level as a student in seventh grade who scores the same. The student standard deviation of scores on the ISAT is around 30. PSAE scores range from 120 to 200 with a target mean of 160 and target standard deviation of 15 (ACT &

Illinois State Board of Education, 2012). All data reflected the 2011-2012 school year as this was the most recent year of data available.

Data Sources

All data for the study were obtained from the Data Analysis and Accountability Division of the Illinois State Board of Education (ISBE). Data collected from ISBE were available in two separate data files. One data file contained the scores obtained in each school building throughout the state, demographic information for the building and its associated district, enrollments, and the cost information to be studied. The scores in the first file provided average PSAE scale scores but did not provide average ISAT scale scores. The second file contained the individual scale scores for each elementary student within the state. This file did not contain personally identifiable information and only contained the building's region-county-district-type-school (RCDTS) code, scores, and some demographic information. No names or student identification codes were present in the file. The second file was used to determine the average scale score for each building on the math and reading portion for each grade level served, because ISAT scale scores were not provided in the first file. All other indicators used in this study were available in the first file. All data were collated with software and double checked for accuracy.

Data Collection Procedures

On July 29, 2013, the institutional review board determined this study to be exempt from review. The two data files were then collected from ISBE's public web site. The information used from the two files included the building's RCDTS code, free-reduced lunch percentage, enrollments, expenditure information, district type, and average scale scores for each tested grade level. Schools were identified in the database for purposes of linking them to their

districts, which can be accomplished by using the school code listed in the file. Districts in Illinois are identified by a region-county-district-type (RCDT) code, which is identical to the equivalent portion of the RCDTS for each building in the district. No schools or districts in this study were identified in the findings.

Data Inclusion and Exclusion

Data from all schools and districts within the state of Illinois were collected from the public website and all information related to schools within the City of Chicago Public School System was removed. However, there are occasions where other data were not included within the files. If a school had fewer than 10 students tested at a particular grade level, that grade level was not included in the data. Additionally, contrary to state law, not all districts fully report their data to the state. It is not possible for the state to include non-reported data in the file. The data for each school and district were used when all data that was necessary for a given analysis were available. It was excluded if any piece of data was missing.

Method of Analysis

The first two null hypotheses examined whether school size, poverty rate, and district type can predict per pupil instructional expenditures at the elementary and high school levels and was tested using a stepwise multiple regression. This regression only occurred, however, after an ANOVA was used to test if there were differences in instructional expenditures per pupil across the different types of districts. This step was taken because Illinois does not report instructional expenditures at the building level, and it was possible that a significant difference existed between expenditures in elementary and high school buildings which could not be seen in the district data. Due to Illinois' unique system, however, this could be tested by examining the reported instructional expenditures in elementary and high school districts as they contain only

elementary and high school buildings. A significant difference was found between these two types of districts, so equations 1 and 2 were used to adjust the instructional expenditures in unit districts to account for the difference in spending at the high school and elementary levels.

$$Expenditures_{Elementary} = \frac{(\overline{X}_{ElementaryCost})(Expenditures_{District})(Enrollment_{District})}{(\overline{X}_{ElementaryCost} + \overline{X}_{HighSchoolCost})(Enrollment_{Elementary})}$$

Equation 1

$$Expenditures_{HighSchool} = \frac{(\overline{X}_{HighSchoolCost})(Expenditures_{District})(Enrollment_{District})}{(\overline{X}_{ElementaryCost} + \overline{X}_{HighSchoolCost})(Enrollment_{HighSchool})}$$

Equation 2

The third null hypothesis was tested with a stepwise multiple regression to examine the extent to which district size, poverty rate, and district type predicted per pupil operational expenditures. The regression also provided an analysis of the amount of variance in operational expenditures that was explained by predictor variables. This allowed for a ranking of the importance of each variable in making consolidation decisions. A stepwise multiple regression also eliminated variables that did not significantly contribute to the model.

Stepwise multiple regressions were used to test the fourth and fifth null hypotheses to determine the extent to which poverty rate, school size, and district type predicted performance on state tests in each tested grade on mathematics and reading. In order to inform the best interpretation possible, a regression was conducted for each of the grade levels from 3 through 8. This was essential as not all buildings serve all of these grades and to allow the examination of

when consolidation is appropriate. It was possible that certain grade levels perform better in smaller or larger buildings than others.

Because high schools test only once in Grade 11, only one stepwise multiple regression was necessary for the sixth and seventh null hypotheses to examine the ability of school size, poverty rate, and district type to predict high school scores on the state tests in mathematics and reading. The stepwise regression provided a model that included only those predictor variables that significantly add to the ability of the model to predict achievement levels.

For the final two null hypotheses, the *z*-score for the average scale score in both mathematics and reading of each grade level was found. These *z*-scores were then averaged to determine the average *z*-score for the district across all grade levels served by the district. Two stepwise multiple regressions then provided the information necessary to determine the extent to which district size, poverty rate, and district type predict the average *z*-scores in reading and mathematics on the state tests.

Stepwise multiple regressions were used to allow the development of a model that includes only those factors that contribute more to the explanation of variance in expenditures by adding those variables that explain the most to the model first. Each stepwise multiple regression also allowed for the analysis of correlation among the variables and the amount of variance in the criterion variable that was explained by each of the predictor variables. Stepwise multiple regressions also allowed for the ranking of the importance of each of the factors by examining the beta weights that were produced during the analysis. The output from the regressions allowed me to determine the change in the criterion per unit change in each predictor while holding all others constant.

Summary

This quantitative study examined the impact school or district size, district type, and poverty rate have on the dual outcomes of student achievement on the math and reading assessments given by the state and the per pupil expenditures to develop a set of recommendations as to when districts and schools should consolidate.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

Presentation of Study Sample

For this study, data files were collected from the ISBE Data Analysis and Accountability Division public website. One file contained the scores for all students in Grades 3-8 in the state of Illinois on reading and mathematics on the ISAT as well as an identifier for the school the student attended. This identifier was also used to determine the district to which the school belongs. This file was collated to determine the average ISAT scale score in reading and mathematics for Grades 3-8 in each school and district. The second file contained demographic and expenditure information, enrollment, and PSAE average scores in reading and mathematics for both high school and district. These two files were used to create two separate files for analysis, removing all information pertaining to Chicago Public Schools. One contained all needed information for answering the research questions pertaining to schools. The other contained all needed information for analyzing those questions related to districts.

Descriptive Information for School Data

When examining descriptive data for the school information, it was obvious that a variety of schools exist in Illinois. Table 6 shows descriptive statistics for enrollment by school type. Of particular note is that the mean size of high schools (M = 916.47, SD = 889.20) was over twice that of elementary schools (M = 401.61, SD =192.40) and nearly twice the size of middle

schools (*M* = 501.79, *SD* = 315.79). Table 7 shows the descriptive statistics for average scores on the state reading tests. Table 8 shows the descriptive statistics for average scores on the state mathematics tests. It is important to remember that not all schools serve all grade levels and that some schools that serve Grades 6 through 8 are reported as elementary because they also serve lower grades, resulting in the discrepancy in *N* between Tables 6 and 7.

Table 6

School Enrollment by School Type

School Type	N	Minimum	Maximum	Mean	*SD*
Elementary School	2,073	9	2,047	401.61	192.40
Middle School	619	29	2,730	501.79	315.79
High School	650	34	4,522	916.47	889.20

Both skew and kurtosis are between -1 and 1, indicating normality. A visual examination of the P-P plots for these variables indicated at most minor variation, and then mostly in the two Grade 11 variables. These findings were likely due to the large size of each sample.

Table 7

Average School Scores on State Reading Tests

Grade	N	Minimum	Maximum	Mean	*SD*
Grade 3	1,735	167.55	249.15	211.80	12.51
Grade 4	1,696	186.53	262.70	221.76	11.72
Grade 5	1,626	194.14	270.58	233.59	10.88
Grade 6	1,141	210.75	276.96	241.00	9.96
Grade 7	937	212.78	281.13	244.63	10.09
Grade 8	932	225.62	282.68	251.41	7.87
Grade 11	639	132.00	182.00	154.64	7.06

Note. There are fewer schools than in the enrollment table because Illinois does not report scores for grades with fewer than 10 students tested.

Table 8

Average School Scores on State Math Scores

Grade	N	Minimum	Maximum	Mean	*SD*
Grade 3	1,735	177.74	263.54	219.89	13.53
Grade 4	1,696	195.24	273.72	233.25	12.51
Grade 5	1,626	200.36	289.76	243.88	13.54
Grade 6	1,142	209.00	304.47	256.52	13.28
Grade 7	937	224.00	321.06	265.55	13.01
Grade 8	932	244.54	326.84	275.58	12.16
Grade 11	639	136.00	179.00	154.11	6.18

Note. There are fewer schools than in the enrollment table because Illinois does not report scores for grades with fewer than 10 students tested.

Analysis of Difference in Instructional Expenditures

To ensure the most accurate analysis possible of the research questions regarding instructional expenditures per pupil, a one-way ANOVA was conducted to determine if there is a significant difference in reported instructional expenditures per pupil across the three district types. This was necessary because the state reports instructional expenditures only at the district level, and it was possible that expenditures differed between high schools and elementary schools.

Unadjusted instructional expenditures per pupil had a mean of 6,167.55 (SD = 1,608.59) and ranged from 3,412 to 15,088. Both skew and kurtosis were outside the range of -1 and 1. Analysis of the z-scores of skew and kurtosis revealed likely violations of normality, $z = 27.35$, $p < .05$ and $z = 26.59$, $p < .05$, respectively. A Kolmogorov-Smirnov test confirmed the violation, $D(3317) = .102$, $p < .001$. This was also confirmed by a visual inspection of the P-P plot for instructional expenditures per pupil. The assumption of the homogeneity of variance was also violated, $F(2, 856) = 43.82$, $p < .001$. The ANOVA revealed that a difference existed somewhere among the district types in instructional expenditures per pupil, $F(2, 856) = 90.51$, p

< .001. A Games-Howell analysis was used as a post-hoc test to determine where the differences were because Games-Howell is robust to heterogeneity of variance and uses studentized values so violations of the assumption of normality are not an issue. The Games-Howell analysis revealed that all three groups differed from each other with high school districts (N = 98, *M* = 7,833.99, *SD* = 1,910.12) spending the most, followed by elementary districts (N = 367, *M* = 6,281.71, *SD* = 1,688.50), then unit districts (N = 385, *M* = 5,631.87, *SD* = 1,032.73). All *p*-values for the post-hoc test were less than .01.

Analysis of Instructional Expenditures per Pupil

Because it was concluded that there are significant differences in instructional expenditures per pupil across district types, the instructional expenditures of buildings in unit districts were adjusted based upon the average expenditure in high school and elementary districts, enrollment in the district at the appropriate level, and the overall unit district enrollment. For the purposes of this adjustment and study, middle school buildings were considered as elementary buildings because they would belong in an elementary district and there was no way to adjust for potential differences between elementary and middle school buildings using the given data. Additionally, some schools are reported to the state as elementary but also contain middle grade students.

Table 9 provides an analysis of the descriptive statistics for instructional expenditures per pupil by school type. Table 10 provides this same analysis by district type. Of particular note is that a unit district had both the highest and lowest adjusted instructional expenditures per pupil. The lowest was apparently in an elementary school, and the highest was in a high school.

Table 9

Descriptive Statistics of Adjusted IEPP by School Type

School Type	N	Minimum	Maximum	Mean	*SD*
Elementary School	2,056	1,598.00	15,088.00	5,011.35	1,819.98
Middle School	617	1,598.00	12,561.00	4,879.40	1,852.77
High School	645	4,683.00	20,002.00	11,290.92	4,119.88

Table 10

Descriptive Statistics of Adjusted IEPP by District Type

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	1,207	3,412.00	15,088.00	6,533.87	1,566.75
High School District	148	4,683.00	12,667.00	8,174.09	1,929.95
Unit District	1,598	1,598.00	20,002.00	5,858.59	4,289.60

Analysis of Poverty Rates by School

The free and reduced lunch rates for the 3,342 schools in the data ranged from 0% of students to 100% of students (M = 43.84, SD = 25.99). The values of both skew and kurtosis were within an acceptable range of -1 and 1, so the assumption of normality was met. Table 11 displays descriptive statistics for free and reduced lunch by school type and Table 12 displays these school-level statistics by district type.

Table 11

Descriptive Statistics of Poverty Rate by School Type

School Type	N	Minimum	Maximum	Mean	*SD*
Elementary School	2,073	0.00	100.00	45.18	26.69
Middle School	619	0.00	99.60	40.87	23.82
High School	650	2.20	100.00	42.40	25.45

Table 12

Descriptive Statistics of School Poverty Rate by District Type

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	1223	0.00	100.00	41.80	28.31
High School District	151	2.20	94.10	32.72	20.84
Unit District	2447	0.40	100.00	53.94	28.85

Analysis of School Size

School enrollments in Illinois ranged from 9 to 4,522 (N = 3,342, M = 520.30, SD = 484.08). The values of both skew and kurtosis were outside the range of -1 and 1. Analysis of the z-scores of skew and kurtosis revealed likely violations of normality, $z = 78.67$, $p < .05$ and $z = 169.96$, $p < .05$, respectively. A Kolmogorov-Smirnov test confirmed the violation, $D(3342) = .10$, $p < .001$. Obviously, the minimum is interesting, but the school in question enrolls only kindergarten students, does not give state tests, and was, therefore, excluded in all tests related to the research questions except those related to expenditures. Table 6 and Table 13 detail the descriptive statistics for school enrollment by school type and district type, respectively.

Table 13

Descriptive Statistics of School Enrollment by District Type

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	1,223	40	2,730	438.38	225.11
High School District	151	38	4,522	1,680.97	916.76
Unit District	1,968	9	4,398	482.16	439.78

Descriptive Information for District Data

The data for districts contained data for 865 districts in Illinois. Of these districts, 378 were elementary districts, 100 were high school districts, and 387 were unit districts. The mean enrollment for districts in Illinois was 1,925.74 (*SD* = 3,229.42) with a minimum enrollment of 38 and a maximum enrollment of 40,687. Table 14 shows the descriptive statistics for the average *z*-scores on state tests for districts.

Table 14

Descriptives for Average z-Scores on State Tests

Subject	N	Minimum	Maximum	Mean	*SD*
Mathematics	856	-3.03	3.37	.01	.92
Reading	856	-3.28	3.55	.03	.94

Analysis of Operational Expenditures per Pupil

Per pupil operational expenditures varied greatly across the 858 districts. The minimum was 6,009 with a maximum of 26,225. The mean expenditure was 10,752.54 (*SD* = 2,882.31). The values of both skew and kurtosis were outside the range of -1 and 1. Analysis of the *z*-scores of skew and kurtosis revealed likely violations of normality, $z = 20.87$, $p < .05$, and $z = 25.14$, $p < .05$, respectively. A Kolmogorov-Smirnov test confirmed the violation, $D(859) = .12$, $p < .001$. Table 15 shows operational expenditures per pupil by district type.

Table 15

Operational Expenditures Per Pupil

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	375	6,009	25,355	10,875.31	2,910.61
High School District	98	8,799	26,255	13,931.44	3,706.21
Unit District	385	6,061	22,561	9,823.79	1,833.46

Analysis of Poverty Rates by District

The free and reduced lunch rates for the 865 districts ranged from 0.1% of students to 99.8% of students (M = 39.96, SD = 21.44). Skew and kurtosis were both within an acceptable range of -1 and 1, indicating no violation of the assumption of normality. A visual inspection of the P-P plot also revealed no difference from normal. Table 16 contains descriptive statistics for poverty rate by district type.

Table 16

District Poverty Rates by District Type

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	378	0.10	99.70	40.40	25.40
High School District	100	3.50	87.30	32.23	18.37
Unit District	387	6.00	99.80	41.53	17.15

Analysis of District Size

District enrollments in Illinois ranged from 38 to 40,687 (N = 865, M = 1,925.74, SD = 3,229.42). The values of both skew and kurtosis were outside the range of -1 and 1. Analysis of the z-scores of skew and kurtosis revealed likely violations of normality, $z = 20.92$, $p < .05$ and $z = 25.23$, $p < .05$, respectively. A Kolmogorov-Smirnov test confirmed the violation, $D(858) = .12$, $p < .001$. Table 17 shows descriptive statistics based upon district type.

Table 17

District Enrollment by District Type

District Type	N	Minimum	Maximum	Mean	*SD*
Elementary District	378	40	14,083	1,419.40	1,826.62
High School District	100	38	12,593	2,540.76	2,533.91
Unit District	387	92	40,687	2,261.37	4,239.88

Elementary School Size, Poverty Rate, and District Type as Predictors of Per Pupil Instructional Expenditures

The first research question and null hypothesis examined whether or not elementary school size, poverty rate, and district type serve as predictors of per pupil instructional expenditures. For the purposes of examining this research question, high schools were excluded and district type was dummy coded as either unit district or elementary district. No high school districts serve elementary schools, so they were excluded.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against adjusted per pupil expenditures revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were 1.00 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The

assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .78 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .61, 61% of the variance in instructional expenditures per pupil can be explained by the variance in district type and free and reduced lunch percentages. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of $1,146.23 of adjusted instructional expenditures per pupil regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type and free and reduced lunch percentages) can be used to predict adjusted instructional expenditures per pupil. The stepwise multiple regression did not enter school enrollment as a significant predictor of elementary per pupil instructional expenditures. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 2670) = 2{,}063.30$, $p < .001$, demonstrating that district type and free reduced lunch percentages predict a significant amount of the variance in adjusted instructional expenditures per pupil.

Using stepwise regression, the model indicated two predictors that significantly predict adjusted elementary instructional expenditures per pupil: free and reduced lunch percentage and

whether or not the building is in an elementary district. The type of district was a significant predictor of adjusted instructional expenditures per pupil, $t(2671) = 62.37$, $p < .001$, $\beta = .76$. Free and reduced lunch percentages was a significant predictor of adjusted instructional expenditures per pupil, $t(2671) = -9.32$, $p < .001$, $\beta = -.11$.

Table 18 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to spend $4,071.61 per pupil on instructional purposes. For each additional percentage of students on free or reduced lunch, expenditures were predicted to decrease by $8.00 per pupil, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to spend $2,791.44 per pupil more than one in a unit district on instruction.

Table 18

Regression Analysis Summary for Variables Predicting Elementary IEPP

Variable	B	SEB†	β
District Type	2,791.44	44.76	.76*
Free/Reduced Lunch	-8.00	0.86	-.11*

Note. $R^2 = .61$; Adjusted $R^2 = .61$; *$p < .001$, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .76 and free and reduced lunch count had a standardized partial regression coefficient of -.11. This indicates that district type has a stronger influence on adjusted instructional expenditures per pupil than free and reduced lunch percentages, although they are both significant predictors.

High School Size, Poverty Rate, and District Type as Predictors of Per Pupil Instructional Expenditures

The second research question and null hypothesis examined whether or not high school size, poverty rate, and district type serve as predictors of per pupil instructional expenditures. For the purposes of examining this research question, elementary schools were excluded and district type was dummy coded as either unit district or high school district. No elementary school districts serve high schools, so they were excluded.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against adjusted per pupil expenditures revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .78 and .95, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .76 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination

provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .58, 58% of the variance in instructional expenditures per pupil can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of $2,674.45 of adjusted instructional expenditures per pupil regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict adjusted instructional expenditures per pupil. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 641) = 295.74$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in adjusted instructional expenditures per pupil.

Using stepwise regression, the model indicated that all indicated predictors significantly predict adjusted high school instructional expenditures per pupil: free and reduced lunch percentage, whether or not the building is in a high school district, and enrollment. The type of district was a significant predictor of adjusted instructional expenditures per pupil, $t(643) = -11.48$, $p < .001$, $\beta = -.34$. Free and reduced lunch percentages was a significant predictor of adjusted instructional expenditures per pupil, $t(643) = 24.28$, $p < .001$, $\beta = .64$. School enrollment was a significant predictor of adjusted instructional expenditures per pupil, $t(643) = 5.21$, $p < .001$, $\beta = .15$.

Table 19 provides the coefficient statistics for the regression. It was indicated that a high school building in a unit district with no students on free or reduced lunch was predicted to spend $7,046.56 per pupil on instructional purposes. For each additional percentage of students on free or reduced lunch, expenditures were predicted to increase by $103.55 per pupil, holding other variables constant. If other variables are held constant, a high school building in a high school district is predicted to spend $3,333.42 per pupil less than one in a unit district on instruction. For each additional student enrolled in a high school, adjusted instruction expenditures per pupil are predicted to increase by $0.70, holding other variables constant.

Table 19

Regression Analysis Summary for Variables Predicting High School IEPP

Variable	B	SEB†	β
Free/Reduced Lunch	103.55	4.27	.64*
District Type	-3,333.42	290.45	-.34*
Enrollment	.70	.13	.15*

Note. R^2 = .58; Adjusted R^2 = .58; *p < .001, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of -.34, free and reduced lunch count had a standardized partial regression coefficient of .64, and enrollment had a standardized partial regression coefficient of .13. This indicates that free and reduced lunch percentages had the strongest influence on adjusted instructional expenditures per pupil and enrollment had the least impact.

District Size, Poverty Rate, and District Type as Predictors of Per Pupil Operational Expenditures

The third research question and null hypothesis examined whether or not district size, poverty rate, and district type serve as predictors of per pupil operational expenditures. For the purposes of this research question, district type was dummy coded into two separate dichotomous variables, elementary district and high school district. This allows easy comparisons between unit districts and elementary and high school districts. It makes little sense to compare elementary and high school districts for the purposes of this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against operational expenditures per pupil revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .98 and .98, respectively. The district type variables were not examined as they are dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .44 indicated a moderate

correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .194, 19.4% of the variance in instructional expenditures per pupil can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated a small change from R^2. After adjusting for the number of predictors and subjects, .2% less variance was explained by the model. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of $2,591.45 of operational expenditures per pupil regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict operational expenditures per pupil. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 854) = 68.72$, $p < .001$, demonstrating that district type, free and reduced lunch percentages, and enrollment predict a significant amount of the variance in operational expenditures per pupil.

Using stepwise regression, the model indicated that district type and enrollment significantly predict operational expenditures per pupil. Whether or not the district was an elementary district was a significant predictor of adjusted instructional expenditures per pupil, $t(856) = 5.91$, $p < .001$, $\beta = .19$, as was whether or not the district was a high school district, $t(856) = 13.93$, $p < .001$, $\beta = .45$. Enrollment was a significant predictor of operational expenditures per pupil, $t(856) = 2.90$, $p < .01$, $\beta = .09$.

Table 20 provides the coefficient statistics for the regression. It was indicated that a unit district with no enrolled students was predicted to spend $9,641.80 per pupil on operational expenditures. For each additional student, expenditures were predicted to increase by $.08 per pupil, holding other variables constant. If other variables are held constant, a high school district is predicted to spend $4,086.39 per pupil less than a unit district. An elementary district is predicted to spend $1,120.63 more per student than a unit district if other variables are held constant.

Table 20

Regression Analysis Summary for Variables Predicting Operating Expenditures per Pupil

Variable	B	SEB†	β
High School District	4,086.39	293.30	.45*
Elementary District	1,120.63	189.52	.19*
Enrollment	.08	.03	.09*

Note. R^2 = .19; Adjusted R^2 = .19; *p < .001, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. The variable representing whether or not a district was a high school district had a standardized partial regression coefficient of .45 and the variable representing whether or not a district was an elementary district had a standardized partial regression coefficient of .19, and enrollment had a standardized partial regression coefficient of .09. This indicates that the type of district had the strongest influence on operational expenditures per pupil and enrollment had the least impact. High school district status had a larger influence than elementary status.

Elementary School Size, Poverty Rate, and District Type as Predictors of ISAT Math Achievement

The fourth research question examined whether or not elementary school size, poverty rate, and district type serve as predictors of student achievement on the math portion of the ISAT examination in each grade served. In order to do this, the following sections will detail the analysis of a stepwise multiple regression performed for each grade level from Grade 3 to Grade 8. During these examinations, high schools are excluded and district type is dummy coded as either unit district or elementary district within a dichotomous variable. No high school districts serve elementary schools, so they are excluded.

Prediction of Grade 3 Mathematics ISAT Scores

The first portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the third grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 3 average ISAT math scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were 1.00 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .77 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .59, 59% of the variance in average Grade 3 mathematics scores on ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 8.65 points on the Grade 3 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 3 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 1731) = 836.26$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average Grade 3 math ISAT score.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 3 mathematics ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 3 mathematics ISAT performance, $t(1734) = 2.01$, $p = .04$, $\beta = -.03$. Free and reduced lunch percentages was a significant predictor of performance on Grade 3 mathematics ISAT, $t(1734) = -49.64$, $p < .001$, $\beta = -.77$. School enrollment was a significant predictor of performance on Grade 3 mathematics ISAT, $t(1734) = -2.22$, $p = .03$, $\beta = .03$.

Table 21 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 238.00 on the Grade 3 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.39, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score .84 points higher on Grade 3 mathematics ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 3, the average score on the Grade 3 ISAT in mathematics is predicted to decrease by .20 points, holding other variables constant.

Table 21

Regression Analysis Summary for Variables Predicting Grade 3 Mathematics ISAT Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.39	.01	-.77**
District Type	.84	< .01	-.03*
Enrollment	< -.01	.42	.03*

Note. $R^2 = .59$; Adjusted $R^2 = .59$; *$p < .05$; **$p < .001$. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .03, free and reduced lunch count had a standardized partial regression coefficient of -.77, and enrollment had a standardized partial regression coefficient of -.03. This indicates that free and reduced lunch percentages had the strongest influence on Grade 3 mathematics ISAT scores and enrollment and district type had the least impact.

Prediction of Grade 4 Mathematics ISAT Scores

The second portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the fourth grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 4 average ISAT math scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance level for free and reduced lunch percentages was .99. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the

residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .77 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination gives the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .59, 59% of the variance in average Grade 4 ISAT mathematics score can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 7.98 points on the Grade 4 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that some of the predictors (district type and free and reduced lunch percentages) can be used to predict average score on the Grade 4 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 1693) = 1{,}237.10$, $p < .001$, demonstrating that district type and free reduced lunch percentages predict a significant amount of the variance in average Grade 4 ISAT mathematics score.

Using stepwise regression, the model indicated that some of the predictors significantly predict average scores on the Grade 4 mathematics ISAT: free and reduced lunch percentage and

whether or not the building is in an elementary school district. The type of district was a significant predictor of Grade 4 mathematics ISAT performance, $t(1695) = 4.48$, $p < .001$, $\beta = -.76$. Free and reduced lunch percentages was a significant predictor of performance on Grade 4 mathematics ISAT, $t(1695) = -48.90$, $p < .001$, $\beta = -.76$.

Table 22 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to score an average of 248.44 on the Grade 4 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.36, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.75 points higher on Grade 4 mathematics ISAT than one in a unit district.

Table 22

Regression Analysis Summary for Variables Predicting Grade 4 Mathematics ISAT Scores

Variable	B	SEB†	*B*
Free/Reduced Lunch	-.36	.01	-.76*
District Type	1.75	.39	-.76*

Note. $R^2 = .59$; Adjusted $R^2 = .59$; *$p < .001$. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .07 and free and reduced lunch count had a standardized partial regression coefficient of -.76. This indicates that free and reduced lunch percentages had the strongest influence on Grade 4 mathematics ISAT scores and district type had less of an impact.

Prediction of Grade 5 Mathematics ISAT Scores

The third portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the fifth grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 5 average ISAT math scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance level for free and reduced lunch percentages was .99. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the p-p plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .78 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination gives the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .60, 60% of the variance in average

mathematics ISAT scores for Grade 5 can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 8.56 points on the Grade 5 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that some of the predictors (district type and free and reduced lunch percentages) can be used to predict average score on the Grade 5 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 1623) = 1{,}222.13$, $p < .001$, demonstrating that district type and free reduced lunch percentages predict a significant amount of the variance in average Grade 5 mathematics ISAT scores.

Using stepwise regression, the model indicated that some of the predictors significantly predict average scores on the Grade 5 mathematics ISAT: free and reduced lunch percentage and whether or not the building is in an elementary school district. The type of district was a significant predictor of Grade 5 mathematics ISAT performance, $t(1625) = 2.27$, $p = .02$, $\beta = .04$. Free and reduced lunch percentages was a significant predictor of performance on Grade 5 mathematics ISAT, $t(1625) = -49.06$, $p < .001$, $\beta = -.77$.

Table 23 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to score an average of 261.10 on the Grade 5 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.39, holding other

variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score .97 points higher on Grade 5 mathematics ISAT than one in a unit district.

Table 23

Regression Analysis Summary for Variables Predicting Grade 5 Mathematics ISAT Scores

Variable	B	SEB†	*β*
Free/Reduced Lunch	-.39	.01	-.77**
District Type	.97	.43	.04*

Note. R^2 = .59; Adjusted R^2 = .59; *p < .05, **p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .04 and free and reduced lunch count had a standardized partial regression coefficient of -.77. This indicates that free and reduced lunch percentages had the strongest influence on Grade 5 mathematics ISAT scores and district type had less of an impact.

Prediction of Grade 6 Mathematics ISAT Scores

The fourth portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the sixth grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch

percentages against Grade 6 average ISAT math scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .75 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .56, 56% of the variance in average mathematics ISAT score in Grade 6 can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 8.80 points on the Grade 6 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 6 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 1138) = 487.31$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average Grade 6 mathematics ISAT scores.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 6 mathematics ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 6 mathematics ISAT performance, $t(1141) = 2.14$, $p = .03$, $\beta = -.04$. Free and reduced lunch percentages was a significant predictor of performance on Grade 6 mathematics ISAT, $t(1141) = -37.73$, $p < .001$, $\beta = -.74$. School enrollment was a significant predictor of performance on Grade 6 mathematics ISAT, $t(1141) = 2.15$, $p = .03$, $\beta = .04$.

Table 24 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 272.47 on the Grade 6 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.39, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.12 points higher on Grade 6 mathematics ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 6, the average score on the Grade 6 ISAT in mathematics is predicted to increase by .20 points, holding other variables constant.

Table 24

Regression Analysis Summary for Variables Predicting Grade 6 Mathematics ISAT Scores

Variable	B	SEB†	*B*
Free/Reduced Lunch	-.39	.76	-.74**
District Type	1.12	.52	-.04*
Enrollment	< -.01	<.01	.04*

Note. R^2 = .59; Adjusted R^2 = .59; *p < .05; **p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .04, free and reduced lunch count had a standardized partial regression coefficient of -.74, and enrollment had a standardized partial regression coefficient of -.04. This indicates that free and reduced lunch percentages had the strongest influence on Grade 6 mathematics ISAT scores and enrollment and district type had the least impact.

Prediction of Grade 7 Mathematics ISAT Scores

The fifth portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the seventh grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 7 average ISAT math scores revealed no indication of non-linearity.

The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and 1.00, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normality probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .71 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .51, 51% of the variance in average mathematics score in Grade 7 on the ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 9.15 points on the Grade 7 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 7 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 933) = 319.11$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average Grade 7 mathematics ISAT scores.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 7 mathematics ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 7 mathematics ISAT performance, $t(936) = 2.92$, $p < .01$, $\beta = -.09$. Free and reduced lunch percentages was a significant predictor of performance on Grade 7 mathematics ISAT, $t(936) = -30.06$, $p < .001$, $\beta = -.69$. School enrollment was a significant predictor of performance on Grade 7 mathematics ISAT, $t(936) = 3.95$, $p < .001$, $\beta = .09$.

Table 25 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 278.91 on the Grade 7 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.37, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.76 points higher on Grade 7 mathematics ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 7, the average score on the Grade 7 ISAT in mathematics is predicted to increase by .40 points, holding other variables constant.

Table 25

Regression Analysis Summary for Variables Predicting Grade 7 Mathematics ISAT Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.37	.01	-.69**
District Type	1.76	.60	-.09**
Enrollment	< .01	<.01	.09*

Note. R^2 = .51; Adjusted R^2 = .51; *p < .01; **p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .07, free and reduced lunch count had a standardized partial regression coefficient of -.70, and enrollment had a standardized partial regression coefficient of .09. This indicates that free and reduced lunch percentages had the strongest influence on Grade 7 mathematics ISAT scores and enrollment and district type had the less of an impact with enrollment having the least.

Prediction of Grade 8 Mathematics ISAT Scores

The final portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the eighth grade mathematics portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 8 average ISAT math scores revealed no indication of non-linearity.

The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and 1.00, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .76 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .58, 58% of the variance in average score on the Grade 8 mathematics ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 7.92 points on the Grade 8 mathematics ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 8 mathematics ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 928) = 422.98$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average mathematics score on the ISAT in Grade 8.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 8 mathematics ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 8 mathematics ISAT performance, $t(931) = 3.58$, $p < .001$, $\beta = .08$. Free and reduced lunch percentages was a significant predictor of performance on Grade 8 mathematics ISAT, $t(931) = -.74$, $p < .001$, $\beta = -.74$. School enrollment was a significant predictor of performance on Grade 8 mathematics ISAT, $t(931) = 4.94$, $p < .001$, $\beta = .11$.

Table 26 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 288.67 on the Grade 8 mathematics ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.37, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.87 points higher on Grade 8 mathematics ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 8, the average score on the Grade 8 ISAT in mathematics is predicted to increase by .40 points, holding other variables constant.

Table 26

Regression Analysis Summary for Variables Predicting Grade 8 Mathematics ISAT Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.37	.01	-.74*
District Type	1.87	.52	.08*
Enrollment	< .01	< .01	.11*

Note. R^2 = .58; Adjusted R^2 = .58; *p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .08, free and reduced lunch count had a standardized partial regression coefficient of -.74, and enrollment had a standardized partial regression coefficient of .11. This indicates that free and reduced lunch percentages had the strongest influence on Grade 8 mathematics ISAT scores and enrollment had less of an impact and district type had the least of all.

Elementary School Size, Poverty Rate, and District Type as Predictors of ISAT Reading Achievement

The fifth research question examined whether or not elementary school size, poverty rate, and district type serve as predictors of student achievement on the reading portion of the ISAT examination in each grade served. In order to do this, the following sections will detail the analysis of a stepwise multiple regression performed for each grade level from Grade 3 to Grade 8. During these examinations, high schools were excluded and district type was dummy coded as either unit district or elementary district within a dichotomous variable. No high school districts serve elementary schools, so they were excluded.

Prediction of Grade 3 Reading ISAT Scores

The first portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the third grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 3 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were 1.00 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .80 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor

variables. Because the multiple correlation coefficient was .64, 64% of the variance in average Grade 3 reading scores on ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 7.49 points on the Grade 3 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 3 reading ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 1731) = 1{,}035.02$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant of the variance in average Grade 3 ISAT reading score.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 3 reading ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 3 reading ISAT performance, $t(1734) = 4.89$, $p < .001$, $\beta = .07$. Free and reduced lunch percentages was a significant predictor of performance on Grade 3 reading ISAT, $t(1734) = -54.81$, $p < .001$, $\beta = -.79$. School enrollment was a significant predictor of performance on Grade 3 reading ISAT, $t(1734) = -2.63$, $p = .01$, $\beta = -.04$.

Table 27 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled

students was predicted to score an average of 228.75 on the Grade 3 reading ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.37, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.78 points higher on Grade 3 reading ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 3, the average score on the Grade 3 ISAT in reading is predicted to decrease by .30 points, holding other variables constant.

Table 27

Regression Analysis Summary for Variables Predicting Grade 3 Reading ISAT Scores

Variable	B	SEB†	*β*
Free/Reduced Lunch	-.37	.01	-.79**
District Type	1.78	.36	.07**
Enrollment	< -.01	< .01	-.04*

Note. R^2 = .64; Adjusted R^2 = .64; *p < .01; **p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .07, free and reduced lunch count had a standardized partial regression coefficient of -.79, and enrollment had a standardized partial regression coefficient of -.04. This indicates that free and reduced lunch percentages had the strongest influence on Grade 3 reading ISAT scores, district type had less of an impact, and enrollment had the least.

Prediction of Grade 4 Reading ISAT Scores

The second portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the fourth grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 4 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were 1.00 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .82 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor

variables. Because the multiple correlation coefficient was .68, 68% of the variance in average Grade 4 ISAT reading score can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 6.68 points on the Grade 4 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that some of the predictors (district type and free and reduced lunch percentages) can be used to predict average score on the Grade 4 reading ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 1693) = 1{,}765.34$, $p < .001$, demonstrating that district type and free and reduced lunch percentages predict a significant amount of the variance in average Grade 4 ISAT reading score.

Using stepwise regression, the model indicated that some of the predictors significantly predict average scores on the Grade 4 reading ISAT: free and reduced lunch percentage and whether or not the building is in an elementary school district. The type of district was a significant predictor of Grade 4 reading ISAT performance, $t(1695) = 7.55$, $p < .001$, $\beta = .11$. Free and reduced lunch percentages was a significant predictor of performance on Grade 4 reading ISAT, $t(1695) = -57.97$, $p < .001$, $\beta = -.81$.

Table 28 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to score an average of 236.49 on the Grade 4 reading ISAT. For each additional percentage of

students on free or reduced lunch, scores were predicted to decrease by.36, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 2.47 points higher on Grade 4 reading ISAT than one in a unit district.

Table 28

Regression Analysis Summary for Variables Predicting Grade 4 Reading Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.35	.01	-.81*
District Type	2.47	.33	.11*

Note. R^2 = .68; Adjusted R^2 = .68; *p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .11 and free and reduced lunch count had a standardized partial regression coefficient of -.81. This indicates that free and reduced lunch percentages had the strongest influence on Grade 4 reading ISAT scores and district type had less of an impact.

Prediction of Grade 5 Reading ISAT Scores

The third portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the fifth grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 5 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normality plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .83 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .69, 69% of the variance in average Grade 5 ISAT reading score can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means

this model has a standard deviation of 6.08 points on the Grade 5 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that some of the predictors (district type and free and reduced lunch percentages) can be used to predict average score on the Grade 5 reading ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 1623) = 1{,}795.77$, $p < .001$, demonstrating that district type and free reduced lunch percentages predict a significant amount of the variance in average Grade 5 ISAT reading score.

Using stepwise regression, the model indicated that some of the predictors significantly predict average scores on the Grade 5 reading ISAT: free and reduced lunch percentage and whether or not the building is in an elementary school district. The type of district was a significant predictor of Grade 5 reading ISAT performance, $t(1625) = 3.65$, $p < .001$, $\beta = .05$. Free and reduced lunch percentages was a significant predictor of performance on Grade 5 reading ISAT, $t(1625) = -59.36$, $p < .001$, $\beta = -.82$.

Table 29 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to score an average of 248.25 on the Grade 5 reading ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.34, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.11 points higher on Grade 5 reading ISAT than one in a unit district.

Table 29

Regression Analysis Summary for Variables Predicting Grade 5 Reading Scores

Variable	B	SEB†	*β*
Free/Reduced Lunch	-.34	.01	-.82*
District Type	1.11	.30	.05*

Note. R^2 = .69; Adjusted R^2 = .69; *p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .05 and free and reduced lunch count had a standardized partial regression coefficient of -.82. This indicates that free and reduced lunch percentages had the strongest influence on Grade 5 reading ISAT scores and district type had less of an impact.

Prediction of Grade 6 Reading ISAT Scores

The fourth portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the sixth grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 6 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch

percentages were .99 and .99, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .81 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .65, 65% of the variance in average Grade 6 reading scores on ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 5.91 points on the Grade 6 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 6 reading ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 1137) = 700.77$, $p < .001$, demonstrating that district type, free

reduced lunch percentages, and enrollment predict a significant amount of the variance in average Grade 6 ISAT reading score.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 6 reading ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a significant predictor of Grade 6 reading ISAT performance, $t(1140) = 3.85$, $p < .001$, $\beta = .07$. Free and reduced lunch percentages was a significant predictor of performance on Grade 6 reading ISAT, $t(1140) = -45.12$, $p < .001$, $\beta = -.80$. School enrollment was a significant predictor of performance on Grade 6 reading ISAT, $t(1140) = 2.36$, $p = .02$, $\beta = .04$.

Table 30 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 253.67 on the Grade 6 reading ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.31, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.35 points higher on Grade 6 reading ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 6, the average score on the Grade 6 ISAT in reading is predicted to increase by .20 points, holding other variables constant.

Table 30

Regression Analysis Summary for Variables Predicting Grade 6 Reading ISAT Scores

Variable	B	SEB†	*β*
Free/Reduced Lunch	-.31	.01	-.80**
District Type	1.35	.35	.07**
Enrollment	< .01	< .01	.04*

Note. R^2 = .65; Adjusted R^2 = .65; *p < .05; **p < .001. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .07, free and reduced lunch count had a standardized partial regression coefficient of -.80, and enrollment had a standardized partial regression coefficient of .04. This indicates that free and reduced lunch percentages had the strongest influence on Grade 6 reading ISAT scores, district type had less of an impact, and enrollment had the least.

Prediction of Grade 7 Reading ISAT Scores

The fifth portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the seventh grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 7 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the

predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and 1.00, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .78 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .61, 61% of the variance in average Grade 7 ISAT reading score can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 6.27 points on the Grade 7 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that some of the predictors (district type and free and reduced lunch percentages) can be used to predict average score on the Grade 7 reading ISAT.

An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 934) = 743.60$, $p < .001$, demonstrating that district type and free reduced lunch percentages predict a significant amount of the variance in average Grade 7 ISAT reading score.

Using stepwise regression, the model indicated that some of the predictors significantly predict average scores on the Grade 7 reading ISAT: free and reduced lunch percentage and whether or not the building is in an elementary school district. The type of district was a significant predictor of Grade 7 reading ISAT performance, $t(936) = 4.27$, $p < .001$, $\beta = .09$. Free and reduced lunch percentages was a significant predictor of performance on Grade 7 reading ISAT, $t(936) = -38.07$, $p < .001$, $\beta = -.78$.

Table 45 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch was predicted to score an average of 257.69 on the Grade 7 reading ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.32, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.76 points higher on Grade 7 reading ISAT than one in a unit district.

Table 31

Regression Analysis Summary for Variables Predicting Grade 7 Reading Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.32	.01	-.78*
District Type	1.76	.41	.09*

Note. $R^2 = .61$; Adjusted $R^2 = .61$; *$p < .001$. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .09 and free and reduced lunch count had a standardized partial regression coefficient of -.78. This indicates that free and reduced lunch percentages had the strongest influence on Grade 7 reading ISAT scores and district type had less of an impact.

Prediction of Grade 8 Reading ISAT Scores

The final portion of this research question examined whether or not district size, poverty rate, and district type serve as predictors of average scores on the eighth grade reading portion of state tests. For the purposes of this research question, district type was dummy coded into a dichotomous variable representing whether or not the school is in an elementary district. High school districts were excluded during this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against Grade 8 average ISAT reading scores revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .99 and 1.00, respectively. The district type was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The

assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .78 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .61, 61% of the variance in average Grade 8 reading scores on ISAT can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 4.94 points on the Grade 8 reading ISAT regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average score on the Grade 8 reading ISAT. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 928) = 476.98$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average Grade 8 ISAT reading score.

Using stepwise regression, the model indicated that all indicated predictors significantly predict average scores on the Grade 8 reading ISAT: free and reduced lunch percentage, whether or not the building is in an elementary school district, and enrollment. The type of district was a

significant predictor of Grade 8 reading ISAT performance, $t(931) = 4.75$, $p < .001$, $\beta = .10$. Free and reduced lunch percentages was a significant predictor of performance on Grade 8 reading ISAT, $t(931) = -36.79$, $p < .001$, $\beta = -.76$. School enrollment was a significant predictor of performance on Grade 8 reading ISAT, $t(931) = 3.54$, $p < .001$, $\beta = .07$.

Table 32 provides the coefficient statistics for the regression. It was indicated that an elementary building in a unit district with no students on free or reduced lunch and no enrolled students was predicted to score an average of 260.43 on the Grade 8 reading ISAT. For each additional percentage of students on free or reduced lunch, scores were predicted to decrease by.25, holding other variables constant. If other variables are held constant, an elementary building in an elementary district is predicted to score 1.55 points higher on Grade 8 reading ISAT than one in a unit district. For each additional 100 students enrolled in an elementary school serving Grade 8, the average score on the Grade 8 ISAT in reading is predicted to increase by .20 points, holding other variables constant.

Table 32

Regression Analysis Summary for Variables Predicting Grade 8 Reading ISAT Scores

Variable	B	SEB†	β
Free/Reduced Lunch	-.25	.01	-.76*
District Type	1.55	.33	.10*
Enrollment	< .01	< .01	.07*

Note. $R^2 = .61$; Adjusted $R^2 = .61$; *$p < .001$. All tests were two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. District type had a standardized partial regression coefficient of .10, free and reduced lunch count had a

standardized partial regression coefficient of -.76, and enrollment had a standardized partial regression coefficient of .07. This indicates that free and reduced lunch percentages had the strongest influence on Grade 8 reading ISAT scores, district type had less of an impact, and enrollment had the least.

High School Size, Poverty Rate, and District Type as Predictors of PSAE Mathematics Achievement

The sixth research question and null hypothesis examined whether or not district size, poverty rate, and district type serve as predictors of average PSAE mathematics scale scores. For the purposes of this research question, elementary schools are excluded and district type was dummy coded as either unit district or high school district within a dichotomous variable. No elementary school districts serve high schools, so they are excluded.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against average PSAE mathematics scale score revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .77 and .96, respectively. The district type variable was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The

assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .82 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .67, 67% of the variance in average mathematics PSAE scores can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated a small change from R^2. After adjusting for the number of predictors and subjects, .2% less variance was explained by the model. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 3.58 units of average PSAE mathematics scale scores regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict operational expenditures per pupil. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 635) = 422.19$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average PSAE mathematics scale score.

Using stepwise regression, the model indicated that all predictors (free and reduced lunch percentage, enrollment, and district type) significantly predict average PSAE scale score in

mathematics. Whether or not the district was a high school district was a significant predictor of average PSAE mathematics scale score $t(638) = -2.07$, $p = .04$, $\beta = .11$. Enrollment was a significant predictor of average PSAE mathematics scale score, $t(638) = 4.05$, $p < .001$, $\beta = -.06$. Percentage of students on free and reduced lunch was a significant predictor of average PSAE mathematics scale score, $t(638) = -34.82$, $p < .001$, $\beta = -.82$.

Table 33 provides the coefficient statistics for the regression. It was indicated that a high school building in a unit district with no students enrolled or on free and reduced lunch was predicted to score an average of 162.12 on PSAE mathematics. For each additional 100 students, scores were predicted to increase by .10 points, holding other variables constant. If other variables are held constant, a high school building in a high school district is predicted to average .81 points lower than one in a unit district. For each additional percentage of students on free and reduced lunch, the building is predicted to score .20 points lower if other variables are held constant.

Table 33

Regression Analysis Summary for Variables Predicting Average PSAE Mathematics Score

Variable	B	SEB†	β
Free/Reduced Lunch	-.20	.01	-.82*
District Type	-.81	.39	.11*
Enrollment	< .01	< .01	-.06*

Note. $R^2 = .67$; Adjusted $R^2 = .66$; *$p < .001$, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. The variable representing whether or not a district was a high school district had a standardized partial regression coefficient of -.06, enrollment had a standardized partial regression coefficient

of .11, and free and reduced lunch percentage had a standardized partial regression coefficient of -.82. This indicates that free and reduced lunch percentage had the strongest influence on average PSAE mathematics scale score. Whether or not the building was in a high school district had the least influence.

High School Size, Poverty Rate, and District Type as Predictors of PSAE Reading Achievement

The seventh research question and null hypothesis examined whether or not district size, poverty rate, and district type serve as predictors of average PSAE reading scale scores. For the purposes of this research question, elementary schools are excluded and district type was dummy coded as either unit district or high school district within a dichotomous variable. No elementary school districts serve high schools, so they are excluded.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against average PSAE reading scale score revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were 1.00 and 1.00, respectively. The district type variable was not examined as it is dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The

assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .81 indicated a strong correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .66, 66% of the variance in average reading PSAE scores can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated no change from R^2. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of 4.13 units of average PSAE reading scale scores regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict operational expenditures per pupil. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(2, 636) = 612.06$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average PSAE reading scale score.

Using stepwise regression, the model indicated that two predictors (free and reduced lunch percentage and enrollment) significantly predict average PSAE scale score in reading. Enrollment was a significant predictor of average PSAE reading scale score, $t(638) = 8.77$, $p <$

.001, β = .78. Percentage of students on free and reduced lunch was a significant predictor of average PSAE reading scale score, $t(638) = -33.42$, $p < .001$, $\beta = .20$.

Table 34 provides the coefficient statistics for the regression. It was indicated that a high school building with no students enrolled or on free and reduced lunch was predicted to score an average of 162.37 on PSAE reading. For each additional 100 students, scores were predicted to increase by .20 points, holding other variables constant. For each additional percentage of students on free and reduced lunch, the building is predicted to score .22 points lower if other variables are held constant.

Table 34

Regression Analysis Summary for Variables Predicting Average PSAE Reading Score

Variable	B	SEB[†]	β
Free/Reduced Lunch	-.22	.01	.78*
Enrollment	< .01	< .01	.20*

Note. R^2 = ..66; Adjusted R^2 = .66; *p < .001, two-tailed. SEB[†] = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. Enrollment had a standardized partial regression coefficient of .20, and free and reduced lunch percentage had a standardized partial regression coefficient of -.78. This indicates that free and reduced lunch percentage had the strongest influence on average PSAE mathematics scale score and enrollment had the least.

District Size, Poverty Rate, and District Type as Predictors of Average Mathematics *z*-Score on State Tests

The eighth research question and null hypothesis examined whether or not district size, poverty rate, and district type served as predictors of average *z*-scores on state mathematics tests. For the purposes of this research question, district type was dummy coded into two separate dichotomous variables, elementary district and high school district. This allowed easy comparisons between unit districts and elementary and high school districts. It made little sense to compare elementary and high school districts for the purposes of this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against average *z*-score on state mathematics tests revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .98 and 1.00, respectively. The district type variables were not examined as they are dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .80 indicated a strong

correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .64, 64% of the variance in average *z*-score on state mathematics tests can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated a small change from R^2. After adjusting for the number of predictors and subjects, .2% less variance was explained by the model. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of .55 units of average *z*-score on state mathematics tests regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average *z*-score on state mathematics tests. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 852) = 507.67$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average *z*-score on state mathematics tests.

Using stepwise regression, the model indicated that district type and enrollment significantly predict average mathematics *z*-score. Whether or not the district was an elementary district was a significant predictor of average *z*-score, $t(855) = 5.04$, $p < .001$, $\beta = .10$. Enrollment was a significant predictor of average *z*-score, $t(855) = 4.21$, $p < .001$, $\beta = .09$. Free and reduced lunch percentage was a significant predictor of average *z*-score, $t(855) = -38.64$, $p < .001$, $\beta = -.79$.

Table 53 provides the coefficient statistics for the regression. It was indicated that a unit district with no students was predicted to have an average *z*-score of 1.23 on state mathematics tests. For additional students, the predicted change was very minimal. For every additional 10,000 students, the average *z*-score was predicted to increase by .25, holding other variables constant. If other variables are held constant, an elementary district is predicted to score .19 higher on average *z*-score than a unit district. For each additional percentage of students on free and reduced lunch, there is a predicted decrease of .03 units of average *z*-score if other variables are held constant.

Table 35

Regression Analysis Summary for Variables Predicting Average Mathematics z-Score

Variable	B	SEB†	β
Free/Reduced Lunch	-.03	< .01	-.79*
Elementary District	.19	.04	.10*
Enrollment	< .01	< .01	.09*

Note. R^2 = .64; Adjusted R^2 = .64; *p < .001, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. The variable representing whether or not a district was an elementary district had a standardized partial regression coefficient of .10, and enrollment had a standardized partial regression coefficient of .09. Free and reduced lunch percentage had a standardized partial regression coefficient of -.73. This indicates that percentage of free and reduced lunch students had the strongest influence on average *z*-score and enrollment had the least impact.

District Size, Poverty Rate, and District Type as Predictors of Average Reading *z*-Score on State Tests

The ninth research question and null hypothesis examined whether or not district size, poverty rate, and district type served as predictors of average *z*-scores on state reading tests. For the purposes of this research question, district type was dummy coded into two separate dichotomous variables, elementary district and high school district. This allowed easy comparisons between unit districts and elementary and high school districts. It made little sense to compare elementary and high school districts for the purposes of this question.

All assumptions for this multiple regression were met. The assumption of linearity was met as a visual inspection of the scatter plot of enrollment and free and reduced lunch percentages against average *z*-score on state reading tests revealed no indication of non-linearity. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (enrollment and free and reduced lunch percentage) well above the .2 minimum that is needed for this assumption. The tolerance levels for enrollment and free and reduced lunch percentages were .98 and 1.00, respectively. The district type variables were not examined as they are dichotomous.

While examining the assumptions for the residuals, the assumption of independence was met as there was no systematic pattern on the plot of residuals. Based on the distribution of the residuals on the normal probability plot, the assumption of normality of residuals was met. The assumption of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals among all values of X for this regression.

The multiple correlation coefficient, *R*, shows the correlation between the observed and predicted values of the criterion. A multiple correlation coefficient of .84 indicated a strong

correlation between the predictors and criterion. The coefficient of multiple determination provides the proportion of the total variance in the criterion that is shared with the predictor variables. Because the multiple correlation coefficient was .70, 70% of the variance in average *z*-score on state reading tests can be explained by the variance in district type, free and reduced lunch percentages, and enrollment. The adjusted R^2, which adjusts R^2 based upon the number of predictors and subjects, indicated a small change from R^2. After adjusting for the number of predictors and subjects, .1% less variance was explained by the model. The standard error of the estimate measures the variability of the observed values around the regression line. It represents the standard deviation of the points as they are distributed around the regression line, which means this model has a standard deviation of .52 units of average *z*-score on state reading tests regarding the distance of the residuals from the regression line.

The multiple regression revealed that the predictors (district type, free and reduced lunch percentages, and enrollment) can be used to predict average *z*-score on state reading tests. An ANOVA was completed to test the significance of R^2 within the model and determined the model was significant, $F(3, 852) = 660.90$, $p < .001$, demonstrating that district type, free reduced lunch percentages, and enrollment predict a significant amount of the variance in average *z*-score on state reading tests.

Using stepwise regression, the model indicated that district type and enrollment significantly predict average reading *z*-score. Whether or not the district was an elementary district was a significant predictor of average *z*-score, $t(855) = 5.32$, $p < .001$, $\beta = .10$. Enrollment was a significant predictor of average *z*-score, $t(855) = 4.36$, $p < .001$, $\beta = .08$. Free and reduced lunch percentage was a significant predictor of average *z*-score, $t(855) = -44.17$, $p < .001$, $\beta = -.83$.

Table 36 provides the coefficient statistics for the regression. It was indicated that a unit district with no students was predicted to have an average *z*-score of 1.35 on state reading tests. For additional students, the predicted change was very minimal. For every additional 10,000 students, the average *z*-score was predicted to increase by .24, holding other variables constant. If other variables are held constant, an elementary district is predicted to score .19 higher on average *z*-score than a unit district. For each additional percentage of students on free and reduced lunch, there is a predicted decrease of .04 units of average *z*-score if other variables are held constant.

Table 36

Regression Analysis Summary for Variables Predicting Average Reading z-Score

Variable	B	SEB†	β
Free/Reduced Lunch	-.04	< .01	-.83*
Elementary District	.19	.04	.10*
Enrollment	< .01	< .01	.08*

Note. R^2 = .70; Adjusted R^2 = .70; *p < .001, two-tailed. SEB† = Standard Error of B.

The standardized partial regression coefficients (β weight) of each predictor variable allow the assessment of the relative impact each predictor has on the criterion variable. The variable representing whether or not a district was an elementary district had a standardized partial regression coefficient of .10, and enrollment had a standardized partial regression coefficient of .08. Free and reduced lunch percentage had a standardized partial regression coefficient of -.83. This indicates that percentage of free and reduced lunch students had the strongest influence on average *z*-score and enrollment had the least impact.

Summary

The nine research questions examined whether or not a set of predictors could be used to predict several different criterion variables. Table 37 summarizes these findings and the directionality of the relationships. Of particular note is that all of the significant relationships with the elementary district variable are in the positive direction and all but one of the significant relationships with poverty rate are negative.

All nine research questions showed that the variables included could be used to predict the outcome variable. There are some findings of particular note, however. First, elementary buildings in elementary districts are predicted to score higher than those in unit districts, but they also have a higher cost associated with both instruction and operation. Although small, enrollment has a positive effect on scores beginning in eighth grade, sixth grade reading, seventh grade mathematics, and on the overall district average. It has a negative effect on third grade scores and sixth grade mathematics, however. High schools in high school districts are predicted to spend less on instructional expenses than those in unit districts. However, at the district level, the high school districts are predicted to spend more per pupil. Finally, elementary buildings are predicted to spend less on instruction with more free and reduced lunch students and high schools spend more. Scores on all state tests at all levels are predicted to decrease with more students on free and reduced lunch.

Table 37

Summary and Directionality of Relationships Between Predictors and Criterion

Criterion	Poverty Rate	Enrollment	Elem District†	HS District††
Elem IEPP	-		+	
HS IEPP	+	+		-
OEPP		+	+	+
Grade 3 Math	-	-	+	
Grade 4 Math	-		+	
Grade 5 Math	-		+	
Grade 6 Math	-	-	+	
Grade 7 Math	-	+	+	
Grade 8 Math	-	+	+	
Grade 3 Reading	-	-	+	
Grade 4 Reading	-		+	
Grade 5 Reading	-		+	
Grade 6 Reading	-	+	+	
Grade 7 Reading	-		+	
Grade 8 Reading	-	+	+	
Grade 11 Math	-	+		-
Grade 11 Reading	-	+		
Average Math	-	+	+	
Average Reading	-	+	+	

Note. † A positive relationship in this variable indicates an increase when going from a unit district to an elementary district. †† A positive relationship in this variable indicates an increase when going from a unit district to a high school district. + indicates a significant positive relationship. – indicates a significant negative relationship.

CHAPTER 5

RESULTS, IMPLICATIONS, AND RECOMMENDATIONS

The final chapter of this study is divided into five sections: summary, results, discussion, conclusions, and recommendations for further research. The summary section addresses the purpose of this study, why state test scores were chosen as a measure 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 section provides suggestions for additional threads of inquiry that would enhance further efforts to understand the impact of consolidation.

Summary

The purpose of this study was to examine the impact that several factors have on the expenditures and student achievement level of districts and buildings in Illinois. This study used the factors of district type, enrollment, and poverty rate to determine if these factors could be used to predict instructional expenditures per pupil, operational expenditures per pupil, and student achievement in each tested grade level.

Scores on state tests were chosen as a measure of student performance because every student in Grades 3 through 8 and 11 is required to take the state test. Because the same test is given to all of these students, it provides a baseline of comparison that is not available through other means. Additionally, it may be argued that other factors beyond math and reading should be measured, but these are currently the measures by which school success is defined in both federal and state statutes.

This study will benefit those involved in decision making regarding school consolidation. This study provides these decision makers with additional information on the impact of several variables, including school and district size. This study also serves to better educate educational leaders on the impact of these variables in order to help them make better decisions regarding the allocation of resources within their buildings and districts.

Results

Findings for this study were described in Chapter 4. This study focused on the interaction of size, poverty, and district type with student achievement and the cost of operating buildings and districts.

Research Question 1 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict elementary level per pupil instructional expenditures. The regression revealed that both district type and poverty rate were significant predictors. Research Question 2 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict high school level per pupil instructional expenditures. The regression revealed that all three variables (district type, enrollment, and poverty rate) were significant predictors. Research Question 3 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict per pupil

operational expenditures. The regression revealed that both district type and enrollment were significant predictors.

Research Question 4 was answered through the use of six stepwise multiple regressions, one per grade level, to determine those variables that could be used to predict average student scores on the ISAT mathematics test. These regressions revealed that poverty rate and district type were significant predictors at all levels. Additionally, enrollment was a significant predictor for Grades 3, 6, 7, and 8. Although poverty rate always had a negative influence and district type (being an elementary district) always had a positive one, enrollment was negative in Grade 6 mathematics and Grade 3 and positive in Grade 6 reading, Grade 7 mathematics, and Grade 8.

Research Question 5 was answered through the use of six stepwise multiple regressions, one per grade level, to determine those variables that could be used to predict average student scores on the ISAT reading test. These regressions revealed that poverty rate and district type were significant predictors at all levels. Additionally, enrollment was a significant predictor for Grades 3, 6, and 8. Although poverty rate always had a negative influence and district type (being an elementary district) always had a positive one, enrollment was negative in Grade 3 and positive in Grades 6 and 8.

Research Question 6 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict average student scores on the PSAE mathematics test. The regression revealed that poverty rate, enrollment, and district type were significant predictors. Poverty rate and district type (being a high school district) both had negative influences and enrollment had a positive one.

Research Question 7 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict average student scores on the PSAE

reading test. The regression revealed that poverty rate and enrollment were significant predictors. Poverty rate had a negative influence and enrollment had a positive one.

Research Question 8 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict average student *z*-scores on state mathematics tests across all tested grades in a district. The regression revealed that poverty rate, enrollment, and whether or not a district was an elementary district were significant predictors. Poverty rate had a negative influence and enrollment and district type (being an elementary district) was a positive one.

Research Question 9 was answered through the use of a stepwise multiple regression to determine those variables that could be used to predict average student *z*-scores on state reading tests across all tested grades in a district. The regression revealed that poverty rate, enrollment, and whether or not a district was an elementary district were significant predictors. Poverty rate had a negative influence and enrollment and district type (being an elementary district) was a positive one.

Discussion

Findings of this study revealed that poverty rate is a constant indicator of student success. This has also been found by others (Beck & Shoffstall, 2005; Fowler & Walberg, 1991; Howley & Howley, 2004; Reardon, 2013). Beck and Shoffstall (2005), in fact, conducted a study in Illinois in Grades 3-8. Not only was poverty rate a significant predictor in all but one of the regressions, it was always the strongest indicator by far in each regression in which it was significant. The overarching presence of poverty rate in this study reveals it to be the single most important factor in student achievement.

Findings of this study also reveal information about school and district size. For expenditures, enrollment had a significant positive relationship with expenditures at both the high school and district levels, although in both cases size had the least impact. Size had a negative impact on third grade test scores in both reading and mathematics and sixth grade in mathematics, although, again, it had the least impact on the outcome. There was a positive impact in Grades 7, 8, and 11 in mathematics and Grades 6, 8, and 11 in reading. In all cases, however, the change in scores was minimal and would take many additional students to see any substantial change in the outcome variable. This confirms the findings of Riggen (2013) regarding mathematics. Unlike Riggen, however, the reading results were significant as well. This is likely due to a difference in methodology as Riggen divided high schools into three groups and conducted an ANOVA rather than examining the differences through regression as this study did. It also extends the findings of Riggen to elementary schools in the upper grades, except in seventh grade reading and sixth grade mathematics.

Further, findings of this study also reveal information about the dual district system in Illinois. All of the research questions examined the ability of appropriate district types to predict the outcome variable. In all but one, Research Question 7 dealing with PSAE reading scores, district type was found to be a significant predictor. In most of these cases, it had more of an impact than enrollment. In all but two of these cases, it had a positive relationship. This study indicated that elementary districts tend to score better on ISAT but also have higher expenditures in both instructional and operational expenditures. High school districts spend less on instruction but more on operational expenditures. Additionally, they are predicted to score lower on PSAE mathematics.

Implications for Consolidation in Illinois

The argument for consolidation in Illinois is often that consolidation will save money. This study, however, shows that this is not the case. In two of the three questions regarding expenditures, expenditures increased as enrollment increased. This study shows an increase in high school instructional expenditures and district operational expenditures as enrollment increases. Although elementary schools' enrollment increase did not have a significant positive correlation with instructional expenditures, it also did not have a negative correlation. At best, elementary expenditures are expected to stay somewhat equal with increasing enrollment.

One area that does raise some questions regarding expenditures in districts in Illinois is in the dual district system. Both elementary and high school districts indicated increased operating expenditures over unit districts. Elementary districts indicated increased instructional expenditures and high school districts indicated decreased instructional expenditures. This raises some concerns as it indicates that less of a high school district's expenditures are going to instructional expenses because operational increased, instructional decreased, and instructional are included in the reported operational expenditures. This is an indication that a smaller portion of a high school district's expenditures make it to the classroom and a larger portion is spent on other expenditures such as transportation and general administration.

Contrary to some beliefs, however, cost cannot be the only measure used in making a consolidation determination. If the state forces consolidation of elementary and high school districts into unit districts, this study indicates that a decrease in student performance will occur. There was a positive correlation between being in an elementary district and increased student performance. Although there was a negative correlation in mathematics and no significant correlation in reading for high school districts, it would be difficult for the state to develop a

system that would allow the continuation of elementary districts and eliminate high school districts. This is an all or nothing proposition.

The final variable under analysis was poverty rates as measured by the number of students on free and reduced lunch. This variable's outcomes were consistent regarding achievement and in line with previous research. The unfortunate outcome of consolidation in regard to this variable is that during consolidation, the laws of mathematics inevitably conclude that some students gain from lowering their school or district poverty rate and others lose, unless all concerned poverty rates were equal to begin with. The detriment of some children's education for the benefit of others' is never a good idea.

Therefore, the recommendation from this study regarding consolidation in Illinois is that the state continues to allow consolidation of districts when the districts determine that is in their best interest. Districts must conduct a feasibility study to determine the impacts of their specific consolidation proposal and these variables can be examined through that study in order to inform the boards and communities of the involved districts. Forced statewide consolidation will result in either decreased student achievement or increased costs and should be avoided as these are both undesirable outcomes.

Implications Under No Child Left Behind

As mentioned in Chapter 2, NCLB requires school and districts to maintain a level of student achievement. The law does not address the cost of the education, simply the achievement of students in an attainment model unless a state has received a waiver to implement a growth model. Although I do not agree with the law, it defines the current set of requirements under which all schools and districts must operate. Under this premise, districts in Illinois should not be forced to consolidate.

According to the findings of this study, elementary districts are predicted to score better on the ISAT than unit districts. Although there may be a savings in cost by consolidating to unit districts, the predicted non-monetary cost of this change would be lower scores. This would likely result in sanctions to schools and districts under NCLB. These sanctions often mean providing extra services such as supplemental education services and also places additional restrictions on the use of federal funds such as Title I. These restrictions and extra costs could potentially outweigh any cost savings seen through consolidation. At a minimum, the impact of these costs on districts that are currently under sanctions should be studied prior to a consolidation likely to result in decreased scores.

General Conclusions

When considering consolidation of schools and districts, all of the studied variables are important to consider. Although it has been argued that smaller schools are better (Cotton, 1996; Gregory & Smith, 1987; Gregory, 1992, 2000), this study did not bear that conclusion out. In fact, beginning in Grade 6, the opposite conclusion was found to be true. Students tend to perform somewhat better in larger schools.

Regarding cost, savings from consolidation are not borne out in the findings of this study. Larger districts are predicted to spend more in both high school instructional expenditures and operational expenditures than smaller ones. This is also based on per pupil expenditures, so any consolidation of two smaller districts into a larger one will create additional expenditures within the state, not reduce them. However, there may be some savings in examining the dual district system. Elementary districts are predicted to spend more in both instructional and operational expenditures than unit districts, $2,791.44 and $1,120.63, respectively. Although high school districts are predicted to spend less on instructional expenditures, they are also predicted to spend

more on operational expenditures, $3,333.43 and $4,086.39, respectively. There could be substantial savings in districts that form unit districts from their existing dual districts. These districts, however, must also keep in mind that elementary students in an elementary district were predicted to score better on both tests at all grade levels than those students in a unit district. Therefore, formation of unit districts would likely lower the student achievement of elementary students.

It was not surprising to find that the strongest indicator of student success was the percentage of students on free and reduced lunch within a school or district. It is obvious from this study that creating schools and districts with a higher percentage of students on free and reduced lunch should be avoided for the sake of student achievement. This proposition, however, is problematic as a combination of two schools or districts will always result in one of them reducing its percentage and the other one will rise, if they were not equal to begin with. Free and reduced lunch percentage is also the one variable studied over which schools, districts, and the state have the least control.

Consolidation is by no means a simple subject. The interaction of these variables requires deep consideration before implementing any consolidation referendum or consolidation mandate. It is not enough to simply save money as there will also be an impact on student achievement, possibly resulting in sanctions under NCLB and its state counterparts.

Regional Differences in Illinois

There is no doubt that Illinois is an extremely diverse state. This is shown in the data presented in Chapter 4. Illinois' diversity, however, is not completely portrayed in this study. If I had it to do over again, I would endeavor to capture more of this diversity within the study.

This study definitely captured some of these differences, especially in size and affluence, but missed a critical difference.

Within Illinois, there are districts that range from small rural districts encompassing hundreds of square miles to larger suburban districts that contain only a few square miles and beyond. Obviously, the pattern of expenditures in these districts will be quite different. This study did not examine these regional differences. It is quite possible that this design choice lead to some of the findings presented. It is also possible that the recommendations for consolidation when considering the variables used here vary across these different regions. Perhaps school size does not mean much in suburban settings but is a larger indicator in rural schools or vice versa. Anyone attempting this survey in the future should consider including region as a variable as this is a weakness in this study.

Researcher Bias

As the superintendent of a small suburban elementary district in Illinois, it would be easy to dismiss the findings of this study due to researcher bias. However, not all of the findings in this study support what I have always personally believed based upon experience.

First, much of my career has been spent in small schools in rural Illinois. My experiences led me to easily believe the research that stated small schools are better academically. That conclusion, however, is not supported by the findings of this study. I did expect costs to increase with increased enrollment, but not student achievement.

Second, every position I have held in Illinois has been in a unit district. I would have argued, based solely upon experience, that unit districts are better because they can provide a continuum of professional development and can ensure a continuity of curriculum that is not as easily reached in a dual district system, especially when several different elementary districts are

involved, each with its own school board and superintendent. However, again, the findings of this study contradicted this belief. Elementary districts outperform unit districts on state tests. Although this is not true at the high school level, I would, for academic achievement purposes, say that the dual district system is better because six grades can perform better. Additionally, consolidating these elementary districts to unit districts would likely decrease not only the elementary scores but the high school scores in those same districts as well because the same students would be taking both sets of tests.

Finally, I have not hidden any data or findings in this study. To do so would be pointless as the data are publicly available and could be downloaded and examined by anyone. Instead, even findings that could lead to forced consolidation if the conclusions regarding achievement are ignored are included. The conclusion that meets this criterion which would have the most impact on me personally is that consolidating dual districts to unit districts is predicted to save money.

Therefore, my beliefs have been shaped by this study rather than my beliefs shaping the study. Any study conducted otherwise cannot be used in decision making with fidelity, and the point of this study was to inform decision makers regarding consolidation.

Recommendations for Further Study

Further recommended study included the need to investigate why elementary schools in elementary districts are predicted to score better on state tests than those in unit districts, but the same does not hold true at the high school level. Is it related to the predicted increase in instructional expenditures? This may be true, considering that the opposite relationship exists at the high school level. Is it related to a unit district needing to focus professional development on K-12 programs and elementary can focus on only K-8? Are there differences in the professional

development provided in these different district types? Follow-up qualitative study could reveal some of these differences in approaches to professional development.

An additional question is why third grade and sixth grade mathematics are predicted to lower scores in larger schools, but this relationship does not occur at any of the other examined levels. Is this also true in lower grades than Grade 3? What factors contribute to this finding?

Where are the differences in expenditures, both instructional and operational, in the different district types? Why do elementary districts spend more on instruction and high school districts spend less? Why do they both spend more on operations?

Given the contradiction of this study as related to literature regarding school size, further research to include other states is needed to clarify the relationships found in this study. This further research would serve to better inform decisions regarding consolidation or to provide further input into needed future paths of investigation. An additional possibility for study in this area is whether or not regional differences contributed to this contradictory finding. Is it the availability of outside resources in the typically larger suburban schools that impacted this finding or is there no relationship there?

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