An equity analysis of the Iowa school funding model that addresses the instructional support program and the influence this program has on student achievement

by

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ABSTRACT

Financial equity among school districts across the country has been studied for many years. Research has given mixed reviews that increased funding will equate to higher student achievement. As educators and legislators debate the adequacy and equity of funding for all schools across states and the country, having a strong foundation of research in which to base the discussion is crucial. School funding models must be studied to ensure that all students have an opportunity for an equitable and adequate educational experience.

The purpose of this study was to take a look at the Iowa school funding model and the relationship within the model that pertains to the instructional support program and student achievement. Information was gathered from the 2006–2007 school year for student achievement and school finance for all 365 school districts in Iowa. From this information several factors were analyzed based on student achievement, in which test scores for 4^{th} grade students on the Iowa Test of Basic Skills (ITBS) was used as the measure for student achievement. Several variables were used on the school finance side to gain insight into both property wealth and socioeconomic status (SES) of students within each district. The instructional support program was the primary focus when addressing the participation levels and tax rates surrounding the program. Several statistical models were set up to examine the relationship between student achievement and school funding in Iowa.

Findings revealed no statistically significant relationship between the instructional support program and student achievement. In addition to these findings, previous research was reinforced indicating that school districts with a larger population of low SES students tended to have statistically lower student achievement. Last, as school district enrollment increased the

relationship with student achievement was negative. This study should be revisited with current data on a regular basis to determine if any changes occur in the relationship between the instructional support program and student achievement.

CHAPTER 1. INTRODUCTION

> The provisions of law relative to common schools shall apply alike to all districts, except when otherwise clearly stated, and the powers given to one form of corporation, or to a board in one kind of corporation, shall be exercised by the other in the same manner, as nearly as practicable. But school boards shall not incur original indebtedness by the issuance of bonds until authorized by the voters of the school corporation (Code of Iowa, 2007). Iowa Code Chapter 274: School Districts in General under Section 2 (274.2) General Applicability

Background

Equity in educational funding and the level at which schools are considered to be adequately funded are historically debated topics. There has been a charge to increase funding to public schools in the light that more money will equate to higher student achievement. Likewise, states and researchers are continually looking at the equity in school funding not only by state, but also across the country. This study focused on the Iowa funding model and the equity within the instructional support program.

Iowa, like other states, has a complex funding formula that is supposed to ensure that all students in the state have equal access to resources and are treated in an equitable and fair manner. However, there are different parts to the Iowa funding formula that allow local school districts the opportunity to increase the amount of funding the district receives for each individual student. Such flexibility has not, however, prevented Iowa from being challenged in court for the Constitutionality of its K-12 school funding formula. In 2002 , Iowa, like most other states (except for Delaware, Hawaii, Mississippi, Nevada, and Utah), was also challenged.

Iowa schools are primarily funded using a mixture of state aid and local property taxes. Inside the school funding formula is a tax that school districts can pose on their constituents, called the instructional support program. This program was the focal point of this study. The

instructional support program allows school districts to increase their spending per pupil by up to 10%. Currently, in Iowa, 31 districts do not participate in this program while the majority of districts that do participate do so at a variety of levels. Participation in this program can be in one of two ways. The board of directors of a school district may choose to participate in the program for up to five years or by an election of the people for a period of ten years (Iowa Department of Education, 2007a).

Because of this option, one could argue that the state is setting up districts to become inequitable by providing more opportunities for property wealthy districts to gain a funding advantage through local property taxes. A possible reason property wealthy districts may take advantage of this program is because they have abundant property value to spread the cost across while the cost to the district's residents may be too high for less affluent districts. Additionally, the portion of the instructional support program that can be funding by using income surtax could provide a disadvantage to districts whose residents have lower incomes, making the decision to use the income surtax a difficult one for those districts. The inability for districts to implement the program because of the costs associated with the program could start to perpetuate inequities between districts.

Purpose

The purpose of this study was to gain insight into the Iowa school funding model and relationships that may exist between the current funding model and student achievement, especially focusing on the instructional support program. Legislators and educators alike would like to ensure that all children in the state receive an adequate and equitable education. This

study ascertained the equity in the instructional support levy to determine whether there is a correlation between this levy and student achievement across districts in the state of Iowa.

The two dependent variables in the study were proficiency in math and reading as measured by the Iowa Test of Basic Skills for 4th grade students across the state of Iowa for the 2006-2007 school year. Selecting the 4th grade for test scores was not a random choice. As the age of the students taking the test increases the accuracy of the test scores diminish. This is due to the fact that some students do not take the test seriously and merely create a bubble pattern out of their answer sheet or rush through the test so they can finish. At the 4th grade level students, as a whole, tend to still take standardized tests very seriously and provide a more accurate picture of student achievement within a district. Even though there are other grades where students may take the test sincerely, 4th grade allows for the student to be in the school system for several years with, *hopefully*, a positive effect on student achievement. Additionally, the Iowa Test of Basic Skills was chosen because of the test's long standing as one of the most reliable resources of measuring student achievement (Iowa Department of Education, 2007b). The test is taken by approximately 95% of all 4th grade students across the state of Iowa, providing a look at most students' achievement level at the fourth grade.

Both math and reading achievement scores were measured for this study to determine if each reacts in the same manner when placing these variables into the same model with the same independent variables. One might conjecture that, if a district has high student achievement in math, then the same district would have similar scores in reading. The findings in Chapter 4 reveal if this is to be a true assumption or if student achievement in reading and math are independent of one another.

In addition to the two dependent variables, several independent variables were analyzed to determine if they have an effect on student achievement. Following is a description of the variables that were used and the rationale behind each variable.

School district size was selected as an independent variable to help differentiate between large and small districts in Iowa. This variable addressed equity in the study. This variable helped to answer the question of equity as it pertains to the size of school districts in Iowa and the ability of these districts to implement the instructional support program.

The independent variable "percentage of free or reduced lunch" was designed to measure the socioeconomic status (SES) of students in the district. The federal government sets certain guidelines that determine the income levels for families whose children may or may not qualify for free or reduced lunch. Children whose families have an income of 130% or less of the Federal poverty guideline as well as those who receive food stamps or Temporary Assistance for Needy Families (TANF) are eligible for free lunch. Those whose families have incomes of 131% to 185% of the poverty guideline are eligible for reduced-price meals.

The way in which the variable "percentage of free or reduced lunch" differs from adjusted gross income in a district, per se, is a measure of the students' SES for those who attend school within the district as opposed to the adjusted gross income of all wage-earning individuals who reside within a school district's boundaries. Some smaller school districts might have a number of very high wage earners that could disproportionately affect the district's average adjusted gross income for residents within the district. Using free or reduced lunch is a measure that the federal government uses to determine funding for title programs (which are federally funded programs for low income students), therefore, making this variable a viable measure of poverty within a school district.

The additional levy is the amount of tax needed to make up the final 12.5% of the total cost per pupil set by the state. A complete description of the additional levy can be found in chapter two. This is an important independent variable because, depending on the district's property valuation, the additional levy changes the property tax rates between districts. Different property tax rates could have an adverse effect on student achievement by impeding different districts' ability to implement the instructional support program. The additional levy was one of the main issues that was debated in the state as this study was conducted, and faced possible legal challenges (Sioux City Community Schools, 2007).

The independent variable "total property tax levy" is the tax rate that school districts impose upon the property owners within a school district's boundaries. This rate may be important in looking at the equity of the current school funding model. One believes and would recommend for further study that maintaining a certain property tax rate can drive the decisions to either levy for additional dollars or make do with what is provided at the current rate. Some levies that are imposed on a school district's property owners have the ability to generate more or less money depending on the property valuation within a district.

Several independent variables were applied within the instructional support program. The first is instructional support program percentage. This is the percentage that districts increase their budgets by up to 10%. Some districts choose to increase to the full amount while other districts increase their budgets by a portion of the 10%. Including this variable enables one to measure student achievement related to the instructional support program. The following four variables were included to address the equity of the instructional support program.

Another independent variable within the instructional support program is the property tax rate. This variable generates the money needed to fund the instructional support program from

the property side. This rate can be adjusted depending on possibly district valuations or existing tax rates in conjunction with the income surtax to generate the funding for the program.

The income surtax was included as an independent variable to determine if school districts that are considered property poor use this method of tax to reduce the property tax burden. This tax is directly affected by the earning capacity of the district, but not the property valuation.

The average adjusted gross income helps paint the picture of SES within a district. Unlike the free or reduced lunch which shows the amount of poverty within the schools in a district, the adjusted gross income, as an independent variable, reflects an average income level of all people residing within a school district.

The final independent variable applied was district property valuation per pupil. This value is derived by taking the total property valuation in a school district and dividing the total by the number of students within the school district. This variable is important in determining not only if a student's SES matters, but also if the property wealth of the district as a whole has an effect on student achievement.

Research Questions

How much variability can one explain about student achievement, using the Iowa Test of Basic Skills for 4th grade students, knowing district size, instructional support levy tax rate, property valuations per pupil, and free or reduced lunch percentages using multiple linear regression models? The following research questions guided this study:

1. What effect does a school district's property valuation per pupil have on student achievement for 4th grade students on the Iowa Test of Basic Skills?

2. Does district enrollment (# of pupils) positively or negatively affect student achievement as shown using the Iowa Test of Basic Skills for 4th grade students, controlling for the level of participation in the instructional support program?
3. Does the participation percentage in the instructional support program relate statistically to student achievement?
4. Is there any statistically significant correlation between school district enrollment and the participation percentage in the instructional support program?
5. Does school district average adjusted gross income per return, account for any variations in student achievement, controlling for the level of participation in the instructional support program?
6. What relationship is there between the percentage of students on free or reduced lunch and student achievement, controlling for the level of participation in the instructional support program?

Hypotheses

Given the literature on school finance and student achievement six one-tailed hypotheses were tested in this study:

1. School districts with higher property valuations per pupil will show higher student achievement when using the Iowa Test of Basic Skills for fourth graders.
2. As school district enrollment (# of pupils) increases, student achievement will decrease, controlling for the level of participation in the instructional support program.
3. A higher level of participation in the instructional support program has a positive effect on student achievement.

4. Larger school districts tend not to participate fully (10%) in the instructional support program.
5. School districts with higher adjusted gross income per return will show higher student achievement, controlling for the level of participation in the instructional support program.
6. School districts with a higher percentage of free or reduced lunch students will show lower student achievement, controlling for the level of participation in the instructional support program.

Rationale

This main focus of this study was on the way public schools in Iowa are funded. There has always been a question as to the equitability in which one school district is funded as compared to another. Even though the state of Iowa attaches a price tag to each student that is supposed to be equal throughout the state, there are different opportunities for school boards to levy for additional funding for the district. These levies are can be directly tied to tax rates. One way levies may be tied to tax rates is, if the district wants to keep property taxes low, instead of taking advantage of all possible levies available to the district, school boards decide to either pass on some levies and/or reduce the amount of others. As outlined in the review of literature, school districts with higher property valuations tend to be able to retain lower tax rates. A community with lower tax rates may be a more desirable place in which to live. In turn, when families move into the community, their children will enroll in the school district.

One must also look to determine if there is a relationship between student achievement and levy rates. If there is a relationship between student achievement and levy rates, then one

may conclude that the current funding model in Iowa for public schools is not equitable to all districts and may need to be reviewed and changed.

Significance of the Study

School funding formulas applied nationwide have been challenged as to their equity for all students. The findings of this study may shed light regarding the question of equity of the Iowa school funding model as it pertains to the instructional support program. If there is little or no correlation among the variables, then one may conclude that the instructional support program in the current model is not a statistically viable way to improve student achievement. However, if there is moderate or strong correlation between all or any of the variables, one may conclude the current model is inequitable and it should be changed.

Before reviewing the literature related to school funding and student achievement, one might presume that more money should equate to higher achievement. However, this study looked at a very small amount of information to ascertain the impact on student achievement. Hopefully, shedding light on the instructional support program in the school finance model and the relationship this model has with student achievement, one more piece of the puzzle will be put into place to assist educators and community members to increase student achievement.

CHAPTER 2. LITERATURE REVIEW

There is a great amount of literature on school funding and student achievement. This review of literature focused on several areas. First, a brief description of the Iowa school funding model is provided which focuses on the instructional support program. Next, an explanation of the measure of student achievement is outlined, explicitly the Iowa Test of Basic Skills and the proficiency levels which the state have determined as adequate student achievement. Then, school funding equity is addressed, with particular attention paid to legal challenges to school funding formulas used nationwide and how equity has been determined in each of the cases. Last, an overview of the relationship between student achievement and school funding provides backdrop as to the findings of previous studies in this regard. These areas are important in determining whether the current Iowa school funding model has an instructional support program that is based on an equitable model.

School Finance Model in Iowa

Iowa's current model of funding public education for the K-12 system is financed through a combination of state assistance and local school district funding. The foundation formula is the base for which school districts in Iowa are funded. The state contributes up to 87.5% of the allotted cost per pupil calculation, which is referred to as the state foundation level after the local school districts implement the uniform levy. Local school districts contribute the bulk of their portion through property taxes.

The uniform levy, a flat property tax set at $5.40 per $1,000 of assessed value of a piece of property within a school district, is the base or floor level of local school district financing (Tack, 2000). Above this amount, the state contributes financing up to the foundation level. This

level is 87.5% of the total cost per pupil set by the state. To fund the final portion, the local school district is responsible for levying additional property taxes in the amount equal to the remaining 12.5% × the cost per pupil × the amount of students in the district. This formula is illustrated in Figure 1.

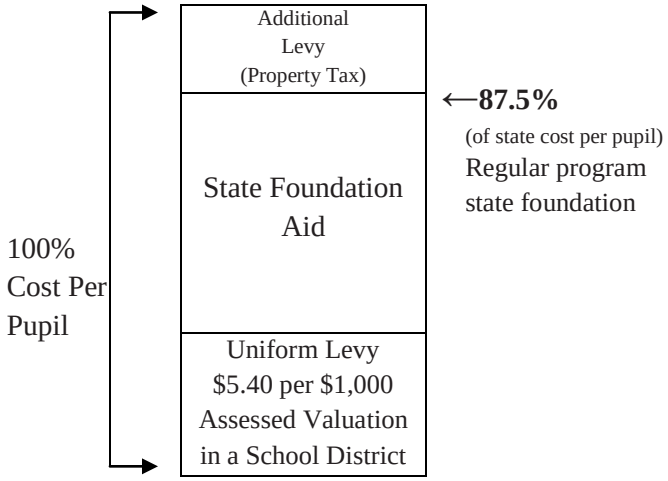

Figure 1. Primary funding components

The current formula is used to balance the relationship between the uniform levy and the state foundation level to provide some equalization of money between districts that have low taxable property value (property poor districts) and high taxable property districts (property rich districts). This is done by generating more money from the uniform levy in districts that are property rich, thus enabling the state to spend less money subsidizing those districts, while districts that are property poor will receive more state subsidies to maintain property tax levels consistently (Nelson, 2001). The tax formula is illustrated in Figure 2.

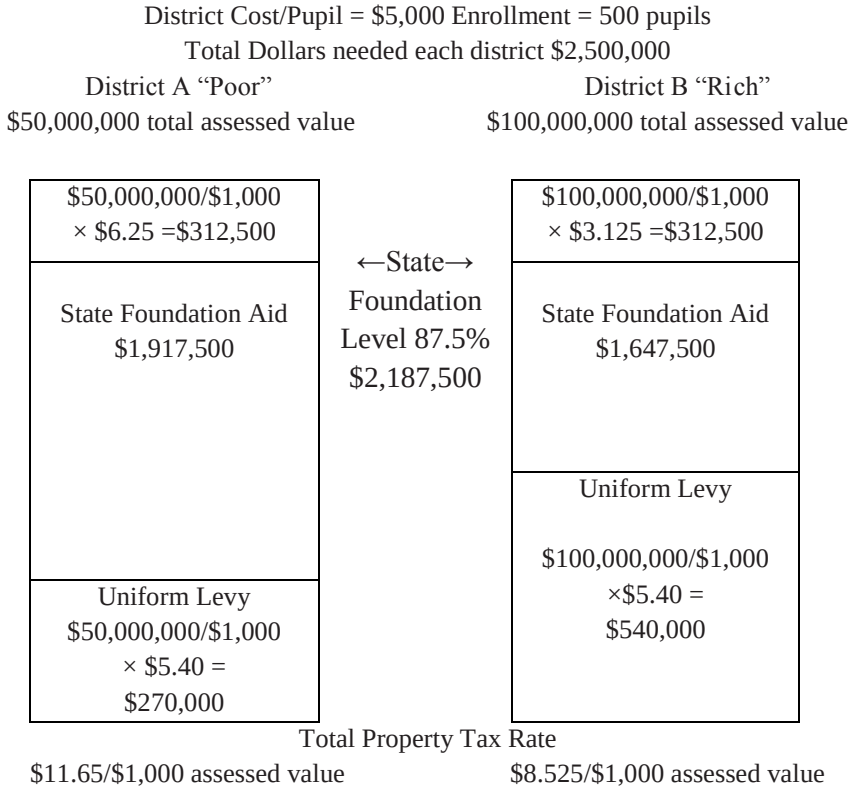

Figure 2. Property tax comparison between property "rich" and property "poor" school districts

Applying the state foundation level, uniform levy, and additional levy to a particular school district involves calculating the district cost per pupil. District cost per pupil is based on the historical spending per pupil in a school district plus a per pupil growth amount. This growth figure is called "allowable growth" which, in recent years, has been determined two years in advance by each session of the Legislature. The district cost per pupil, plus allowable growth, is multiplied by a district's enrollment to arrive at the minimum district cost (Nelson, 2001). Minimum district cost is illustrated in Figure 3.

Minimum District Cost

500 Students for FY 08

District Cost Per Pupil

FY 07 Cost/Pupil	X	Allowable Growth	=	FY08 Cost/Pupil
$5,128	X	1.04	=	$5,333

Figure 3. Minimum district cost

Enrollment, for this purpose, is adjusted or "weighted" to accomplish various objectives, or provide funding for certain programs so the weighted enrollment number that is calculated is generally a different number than the actual headcount of students enrolled in the district. For example, special education students are weighted. According to the state, it costs more money to educate a special education student than a regular education; student; therefore, special education students will be counted as more than one student (i.e., 1.7, 2.4, or 3.74). The uniform levy, state foundation aid, and additional levy in each district combine to fund the district cost per pupil amount (see Figure 3).

Spending Authority

The maximum spending authority in each district is controlled through the foundation plan (Ferguson, 2005). The spending authority for a district is the total amount of money the district can spend in the budget year. Districts are not allowed to levy for more taxes than what is allowed for in the Combined/Controlled Budget, the number of students multiplied by the amount per student, even if the constituency is willing to approve the increases. The only exception to this rule is the instructional support program, which enables a school district to

increase the district's spending authority by up to 10%. This limitation keeps property rich districts from increasing their spending and moving no more than 10% apart from the other districts in the state. This is one of the equity controls set up in the current system.

The maximum spending authority (i.e., the maximum amount authorized under the school funding formula for a school district to spend and certify on its budget for a fiscal year) includes property taxes as calculated by the foundation formula and state aid. In addition to these funding sources, unspent authority from the previous year (i.e., authority that was not spent and has been carried over) and actual miscellaneous income are also included in the maximum spending authority (Ferguson, 2005). According to the Iowa Code, once spending authority is granted by the state, the authority is not removed even if the authorized state aid or property tax revenues are not actually received. Budget authority and sources of revenue are outlined in Figure 4.

The unspent authority is the amount of authority a school district has left over from a previous year. For example, if a person has a cellular phone plan with an allocation of 500 minutes a month and the first month the individual uses only 400 minutes, this person's plan allows her to roll over her unused minutes from month to month. This person now has 600 minutes to use in the next month (100 rollover and 500 plan minutes). This is the same principle behind the unspent authority carryover. The carryover enables the district to spend unused authority in the next fiscal year.

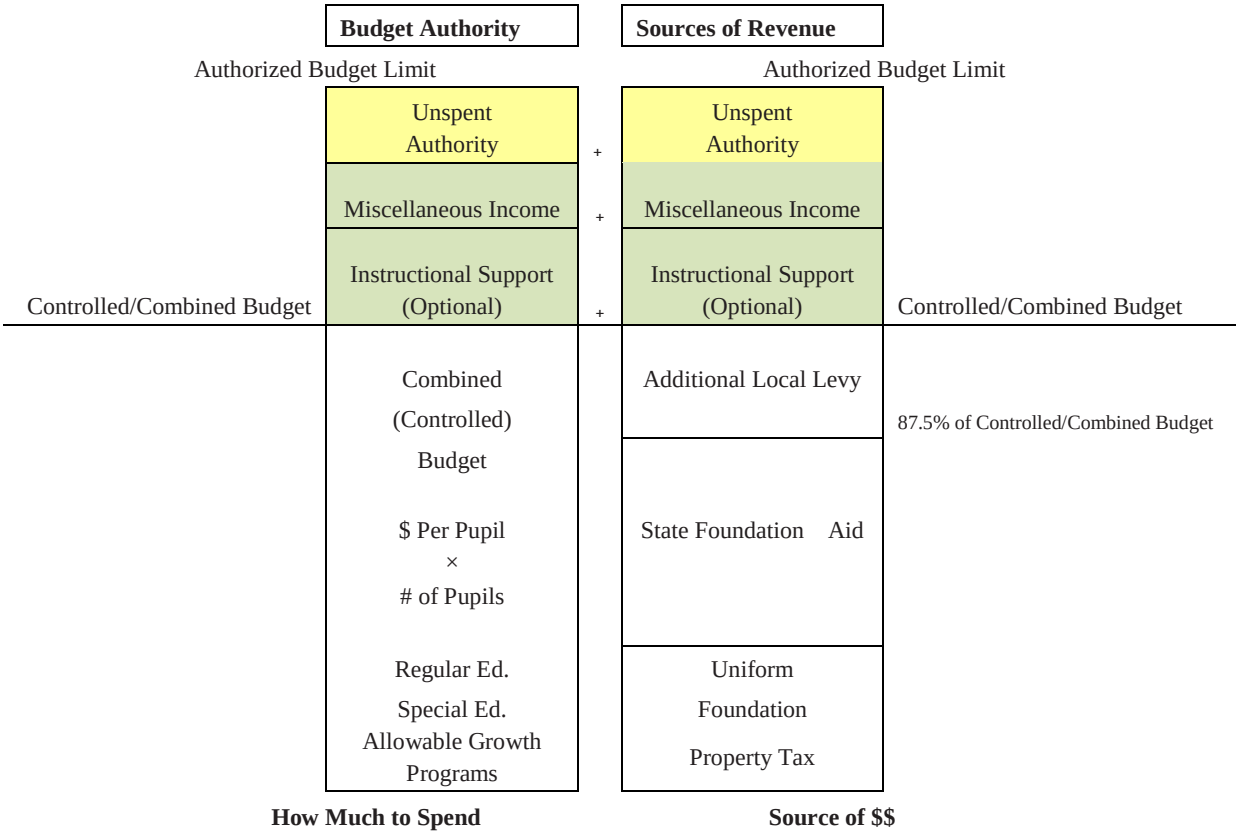

Figure 4. Budget authority and sources of revenue

Uniform Levy

The uniform school district property tax levy is the footing on which school funding in Iowa rests. The property tax levy is assessed on all property within the school district boundaries. The rate for this levy is $5.40 per $1,000 of assessed valuation on all property in a school district each year (Addy, 2007). Only tax-exempt property in the state is not subject to the levy (e.g., hospitals and schools along with other properties that have been granted tax relief by local or state government).

The reason the term “uniform” is used to describe the levy, due to the fact that a flat rate of $5.40 is levied in all school districts across the state (Nelson, 2001). Even though the uniform

levy is a flat rate, the amount of money the levy generates for each district is different depending on the total property valuation within the different districts. A district that has more property valuation will generate more money with the uniform levy than a district with less property valuation. For example, a district with $100,000,000 of valuation would generate $540,000 from the uniform levy. A district with $50,000,000 of valuation would generate $270,000 from the uniform levy. The difference is made up using state aid (Addy, 2007).

Foundation Level

State foundation aid is the next component in Iowa school finance. Through this commitment of state funds derived from the state General fund (i.e., the main fund in which the majority of state dollars are kept), the school funding formula seeks to address the funding inequities that are inherent in a property tax-reliant system (Nelson, 2001). These inherent inequities basically arise from a diverse range of property values around the state causing tax rates to fluctuate to maintain a certain level of funding.

To fully understand the impact the state foundation aid has on the current school finance model in Iowa, one must look at state cost per pupil. The cost per pupil is the amount of money the state calculates as the minimum amount a district should spend for each student within the school funding formula (Nelson, 2001). The state cost per pupil calculation is done by taking the previous year's cost per pupil and adding the allowable growth for the ensuing year. Allowable growth is the percentage of increase the state legislature allows districts to increase the cost per pupil. This is done by a vote within the state legislature and agreed upon by the governor. The increase affects both the local contributions and the state aid. The effect is a result of increased spending which, in turn, means more funds need to be generated at the local level as well as

additional funds contributed to schools at the state level. In previous years, the average increase in cost per pupil was approximately 4% (see Table 1).

Table 1. History of allowable growth

Fiscal Year	Percentage
FY08	4.0%
FY07	4.0%
FY06	4.0%
FY05	2.0 %
FY04	2.0%
FY03	1.0%
FY02	4.0%
FY01	4.0%
FY00	3.0%

According to the formula, funding per pupil is equalized at 87.5%, which is referred to as the foundation level. State aid is added to the money generated from the uniform levy to ensure that all districts throughout the state have the same tax rate for the first 87.5% of the state cost per pupil. Districts with high property valuations will generate more money from the uniform levy needing less state aid to arrive at the 87.5% foundation level. Districts with lower property valuations will generate less money from the uniform levy needing more state aid to arrive at the 87.5% foundation level (Nelson, 2001). The foundation level only ensures 87.5% of the funding is generated for school districts. The final 12.5% is generated using what is termed the additional levy.

Additional Levy

The additional levy is used to generate the remaining 12.5% to fully fund a school district's combined district cost (Nelson, 2001). Unlike the uniform levy which ensures all

districts have the same levy rate to generate funds, the additional levy is calculated by taking the remaining district cost and dividing the cost by the total property valuation in the district per $1,000.

For districts with high property valuations, (property rich), the tax rate will stay relatively low; and for districts with comparatively low property valuation, (property poor), the tax rate will need to be much higher to generate the funds needed for the remaining 12.5 percent (Nelson, 2001). Figure 5 illustrates the difference between property rich districts and property poor districts.

Instructional Support Program

The instructional support program provides additional funding for local school districts (Marshall County, 2007). The additional funding is limited to an amount not to exceed 10% of the total regular program district cost for the budget year. This cap was written as part of the law when the instructional support program was enacted (Ferguson, 2005). Funding for the instructional support program is obtained from a combination of state aid and local funding using either local property taxes or a combination of property tax and income surtax (Ferguson, 2005). The board of directors of a school district determines whether property tax or the combination of property tax and income surtax will be used to fund the local portion of the program.

Guaranteed Minimum Foundation

Amount needed	**Poor CSD**		**Rich CSD**
Number of students	500		500
Dollars per Student	$5,333	x	$5,333
Total Needed	$2,666,500	=	$2,666,500
District Tax Value	$50,000,000		$100,000,000
Uniform Levy $ /$1,000	$5.40	x	$5.40
Local Levy Raised	$270,000	=	$540,000
Total Needed	$2,666,500		$2,666,500
Minimum Guarantee	$2,333,188	87.5%	$2,333,188
Local Taxes Raised	$270,000	-	$540,000
State Funds Needed	$2,063,188	=	$1,793,188
Additional Local Dollars	$333,313		$333,313
Additional Levy Per $1,000	$6.67		$3.33
Total Local Levy	**$12.07**		**$8.73**

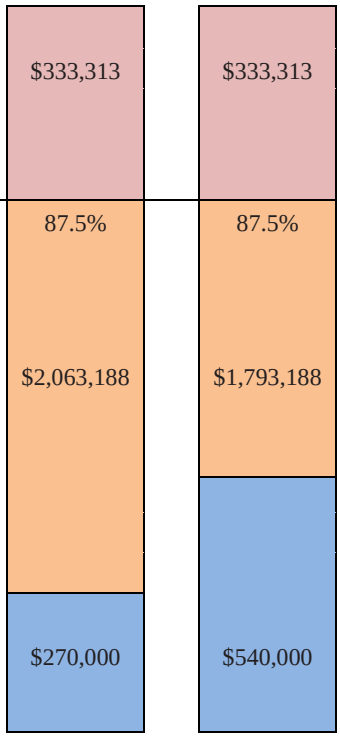

Figure 5. Difference between property rich districts and property poor districts

Participation in this program can be in one of two ways. The board of directors of a school district may choose to participate in the program for up to five years and by an election of the people for a period of 10 years (Iowa Department of Education, 2007a). If a board of directors of a school district decides to participate in the instructional support program, the district shall participate for 5 years unless within 28 days following the board action, the secretary of the board receives a petition containing the required number of signatures asking that an election be called (Marshall County, 2007).

The state portion of the funding is the balance remaining after the local portion is subtracted from the total instructional support program (Iowa Department of Education, 2007a). The local portion of the funding is determined by the following formula: 1 – (total assessed valuation in the state / total budget enrollment in the state) / (district assessed valuation / district budget enrollment) × .25). However, the current state funding has been frozen at $14,798,225, which is the amount of state aid funded in FY 1993 (Snyder, 2007). If there is a shortfall, the state funding will be prorated. A school district may not levy additional property taxes to make up for any shortfalls in state aid (Iowa Department of Education, 2007a). For example, in FY 2005, an additional $31.2 million would be needed to fully fund the state aid portion of the Instructional support levy (Ferguson, 2005). Since the instructional support program is a percentage of the general fund the shortfall will continue to increase as allowable growth increases reducing the actual percentage a school district can count on for the program.

The funding generated from the instructional support program can be used towards any general fund expenditure. However, the money cannot be used as, or in a manner which has the effect of, supplanting funding authorized to be received for returning dropout/dropout prevention programs, gifted and talented programs, physical plant and equipment levy, management levy, or special education deficits. The instructional support program funds may be used to supplement these other levies as appropriate from the general fund, but cannot be used in place of these other levies for expenditures appropriate from those levies (Iowa Department of Education, 2007a).

The combination of the instructional support income surtax and all other income surtaxes shall not exceed 20 percent when combined with property taxes (Tack, 2000). The income surtax is a tax on a tax. The surtax is imposed on the income tax liability after tax credits on the Iowa Individual income Tax returns of taxpayers residing within the district on the last day of the tax

year. The surtax is not imposed on other income tax returns such as fiduciary or corporate income tax returns (Nelson, 2001). Basically, this means the income surtax is an additional tax one will pay in addition to his or her state income tax. The tax is a percentage of the amount of tax an individual owes. For example, if the income surtax rate for the instructional support program is 4% and a person owed the state of Iowa $1,000 in income tax, the state would collect an additional $40 for the school district for the income surtax.

For the fiscal year of 2008, 340 of the 365 school districts participated in the instructional support program up from 325 in FY05 (Snyder, 2007). The amount funding the program for FY 08 is $173.0 million. Of that money, state aid accounted for $14.8 million, property tax generated $88.6 million, and income surtax produced $70 million. An additional $43.1 million of state aid was needed to fully fund the program (Snyder, 2007). Figure 6 shows the percentage of funding each area contributes to the instructional support program.

The Iowa school funding model is very complex. The description of the model given in the aforementioned pages is a general overview of this model. This overview pertains to the basic components of the foundation formula and the instructional support program. A more in-depth look at the Iowa funding model can be found in the Iowa Code.

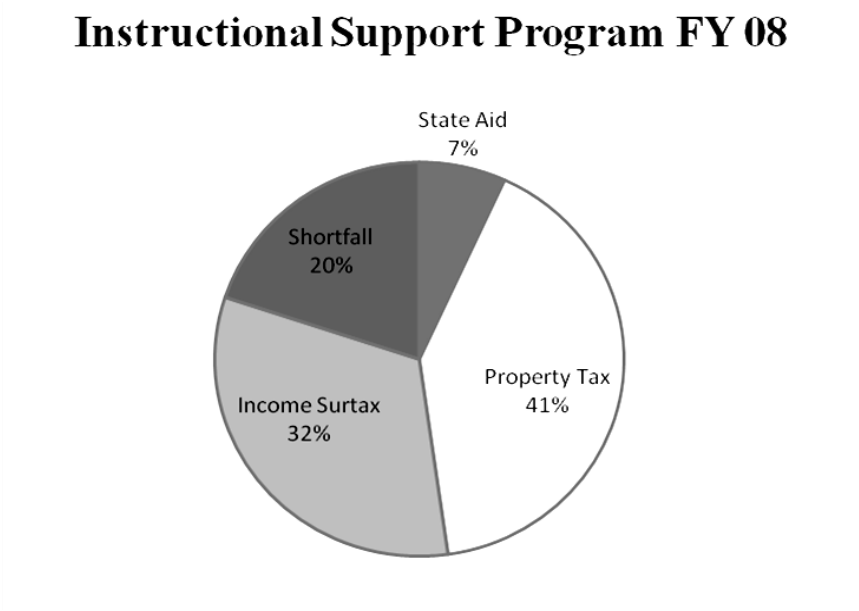

Figure 6. Percentage of funding each area contributes to the instructional support program

Testing Instrument

The current study used the Iowa Test of Basic Skills as the assessment tool to provide insight into student achievement. The rationale for this tool comes from the State of Iowa which declared this assessment as the standard for which all Iowa school children will be measured for reporting student achievement as it relates to the No Child Left Behind Act (NCLB) of 2001.

Tests can be categorized into two major groups: norm-referenced and criterion-referenced tests. Norm-referenced tests (NRT) are primarily used to classify students (Bond, 1996). NRTs are designed to highlight achievement differences between and among students to produce a dependable rank order of students across a continuum of achievement from high achievers to low achievers (Stiggins, 1994). A possible reason a school district may want to classify students is to

appropriately identify those to be placed either in remedial or talented and gifted programs (Bond, 1996).

With norm-referenced tests, a group of students that represents future test-takers is given the test prior to releasing the test to the public. This group of students is called the norm group. The scores of the students who take the test after publication are then compared to those of the norm group (Bond, 1996). A test such as the Iowa Test of Basic skills is normed using a nationwide sample of students. Because of the tremendous costs associated with this procedure, nationally norm-referenced test are usually re-normed every five to seven years.

Using norm-referenced tests enables one to ascertain the rank of student, whereas criterion-referenced tests (CRTs) determine "…what test takers can do and what they know, not how they compare to others (Anastasi, 1988, p. 102). These types of tests report how well students are doing in relation to a preset performance level on a specified set of educational goals or outcomes in a school, district, or state curriculum (Bond, 1996).

Policy makers or educators would select a criterion-referenced test over a norm-referenced test if the information needed pertains to how well students are mastering material and content vs. understanding where students are in relation to other students within the state or other parts of the country if the test is national proctored. CRTs can be beneficial in gaining an understanding of how well a student is learning information or how well a particular school or teacher is teaching the curriculum that the test is measuring (Bond, 1996). For instance, "… a CRT score might describe which arithmetic operations a student can perform or the level of reading difficulty he or she can comprehend" (U.S. Congress, OTA, 1992, p. 170). However, if the content of the test does not match the curriculum being taught, CRTs are not going to be beneficial in diagnosing problems both with the student and the teaching of the student.

The Iowa Test of Basic Skills was originally developed for elementary students in 1935 under the direction of the staff of the College of Education at the University of Iowa. The first edition, called the Iowa Every Pupil Test of Basic Skills, was developed by E.F. Lindquist, Harry Greene, Ernest Horn, Maude McBroom, and Herbert Spitzer (Riverside Publishing, 2007).

The original intent of the Iowa Every Pupil Test of Basic Skills was to improve instruction. Participating schools statewide devote 20 minutes of annual test-taking time to try new items on the test to aid the authors in the research and development of the test. Using this method nearly 7,000 items are tried yearly under nearly ideal conditions (Riverside Publishing, 2007). Currently, the Iowa Testing Programs have grown to having nearly all of the public, parochial, and private school students in Iowa regularly and voluntarily participate (Riverside Publishing, 2007).

The Iowa Test of Basic Skills consists of a plethora of educational achievement instruments that benefit from a history of development that has been an integral part of the research program at the University of Iowa for the past 70 years (Madaus, Airasian, Hambleton, Consalvo, & Orlandi, 1982). The Iowa Test of Basic Skills (ITBS) is a nationally standardized, norm-referenced test. A nationally standardized test is one that is taken and administered it in the exact same way across a specific referenced population (e.g., age groups, grade groups etc.). The score interpretations on this test are based on a comparison of the test taker's performance to the performance of other students in the nation (Riverside Publishing, 2007). The ITBS is very reliable and valid. The test was developed by the University of Iowa, and there are over 70 years of ongoing research behind the test.

The benefits of using the Iowa Test of Basic Skills are many. The test provides educators a diagnostic tool to collect data that can drive remediation and better preparation for other high-

stakes testing. Another benefit of using the test is the manner in which the test reports information. The information is easy to read and breaks down a student's performance into several categories. The test compares students nationally as well as students within the state of Iowa. Along with these comparisons, the test also gives grade level indicators which alert educators and parents if a child is falling behind or making progress (Riverside Publishing, 2007). The current test has a national norm using data from students in 2005 who took the test.

Proficiency

Achievement for the Iowa Test of Basic Skills is reported under three categories to help districts describe where students' levels of performance fall within a school and to monitor the performance of these groups over time. The three levels are Low, Intermediate, and High. For accountability purposes, the Iowa Department of Education has combined the Intermediate and High performance levels to define a single achievement level called "Proficient."

The operational definition for Proficient, as determined by the Iowa Department of Education (in consultation with the U.S. Department of Education), uses the national percentile rank scale from the Iowa Test of Basic Skills. Low performance ranges from 1-40, Intermediate from 41-89, and High from 90-99. Consequently, the Proficient range of percentile ranks is from 41-99, whereas 1-40 is regarded as Less-than-Proficient.

An achievement level descriptor tells what the typical student in a score range knows or is able to do relative to the content measured by the test (Iowa Department of Education, 2006). The reason for these descriptors is to describe how those who perform at a higher level within a range can do more than those who perform at a lower level within the same range. Achievement level descriptors are not used to describe what individual students can do. That is, descriptors are

intended to show what group performance is like within a range on an achievement continuum. Individuals who are grouped within the same achievement level are likely to vary extensively from one another, more so when the range encompassed by the achievement level is wide (Iowa Department of Education, 2006). For example, those within the range 41-99 should be expected to differ from one another much more than those within the range 76-99.

When used to label an achievement level, the term "Proficient" embodies a performance standard. It is a term that connotes sufficiency of performance—achievement that is regarded as "good enough" (Iowa Department of Education, 2006). Achievement level labels such as low, intermediate, and high are merely descriptive without conveying a judgment about sufficiency. The term Proficient describes and indicates that the level of performance is acceptable or minimally sufficient for some standard. That standard is determined by the test score user—the Iowa Department of Education in this case. In this accountability context, these descriptors should help schools interpret the concept of proficiency and convey the appropriate meaning in their public reporting of achievement data.

Finding a comprehensive way to measure student achievement is not easy. The Iowa Test of Basic Skills is a research-backed nationally recognized assessment tool that is mandated by the Iowa Department of Education to measure student achievement. The reason for using this test as the measure of student achievement in the current study was to add validity to the findings of this research so that the study may be applied address to current educational questions within in the state of Iowa.

School Funding Equity

Ensuring equity and adequacy of education funding are two of the most complex problems facing state legislatures (Augenblick, Meyers, & Berk Anderson, 1997). Despite the shift to adequacy, school finance policy must still be vigilant about fiscal disparities caused by the unequal distribution of the local property tax base (Odden, 2003). This study focused on the equity portion of school finance instead of how adequately schools are funded in the state of Iowa. The definition of equity when applied to school finance would be to provide the same or consistent amount of funding for all students across the state of Iowa. Fiscal neutrality is a very important part of a strong and equitable school finance model.

School finance litigation began as far back as the 1960s, when students with special needs and disadvantaged students began to become more common in the public schools (Augenblick et al., 1997). Many of these cases were filed in federal court and made little headway due to the inability to identify special needs and to quantify the costs associated with serving pupils with special needs.

A new theory was developed after the failure of these cases. Because of their geography and socioeconomic makeup, school districts showed signs of a relationship between district wealth and district spending (Augenblick et al., 1997). Under this theory, such relationships and disparities were viewed as violating the equal protection clause in the U.S. Constitution, especially if education was to be viewed as a fundamental right, like the right to vote guaranteed by the Constitution and district wealth a suspect classification, like race, under the Constitution(Augenblick et al., 1997). This ruling means the amount school districts spend on students in one district in the state needs to be the same for all school districts within a state.

In 1971 *Serrano v. Priest*, the plaintiffs triumphed using the theory that school district wealth and spending were directly connected, in a federal court in California, interpreting both the state and federal constitutional guarantees. The school finance system was found to be not "fiscally neutral", meaning the resources available to educate children were a function of school district wealth, and not the wealth of the state as a whole. In the end, however, the federal Constitution was determined not to guarantee equality of funding among school districts. In a 1973 case involving Texas, *San Antonio Independent School District v. Rodriguez*, the U.S. Supreme court ruled that education was not a fundamental right, district wealth was not a suspect classification, and the Texas system of school finance was rational, passing the standard used by the court when judicial "strict scrutiny" is not required (Augenblick et al., 1997). This ruling is interpreted as the U.S. Constitution does not guarantee equal spending across school districts within a state.

From 1971 to 1983 intense litigation took place in regards to state school finance systems. During those 12 years, 17 state high courts ruled on the constitutionality of their state school finance systems (Augenblick et al., 1997). School finance systems in Arkansas, California, Connecticut, New Jersey, Washington, West Virginia, and Wyoming were found to be unconstitutional, requiring those states to change the structure of the system, in some cases more than once (Verstegen, 1994). However, during that same time period, school finance systems were upheld by the highest courts of Colorado, Georgia, Idaho, Illinois, Maryland, Michigan, New York, Ohio, Oregon, and Pennsylvania (Verstegen, 1994). As of 2007, there are only five states that remain unchallenged in a court; Delaware, Hawaii, Iowa, Mississippi, and Nevada.

Although these cases proved the constitutionality of school finance systems in certain states, there was no single standard by which to gauge the level of equity. The reason for this lack of legal standard is the fact the cases used different statistics or different cutoff points of the same statistic within school funding models to draw a conclusion. What is viewed as equitable in one state is not necessarily considered equitable in others (Augenblick et al., 1997).

Being that equity has proven to be a difficult standard to nail down; states and courts began looking at the adequacy with which public schools have been funded.

> Under standards-based education reform, the benchmark test of school finance policy is whether it provides sufficient, or *adequate*, revenues per pupil for districts and schools to deploy educational strategies that are successful in educating students to high performance standards. Determining adequate revenue levels entails first identifying the costs of effective programs and strategies, translating those costs into appropriate school finance structures, and then ensuring that the resources are used in districts and schools to produce the desired results. (Odden, 2003, p. 122)

What this means is now we are primarily beginning to focus on the amount of money spent on education and how can we determine the adequate amount of money needed to enhance student achievement. This change is necessary, but will not distract school district across the state from wanting the same amount of funding and opportunities as all other school districts regardless of district wealth or demographics.

In 1989 *Rose v. Council for Better Education*, the courts expanded the reach of school finance litigation to the entire system of education. In this case the court declared the entire Kentucky educational system as unconstitutional, causing the state legislature to radically reform the state's mechanisms for school governance, the state department of education, and the state educational standards and assessment systems. From this case came a list of sanctions and

incentives based on school performance designed to make the necessary improvements (Augenblick et al., 1997). This case was monumental in looking at the entire educational system.

Another landmark case was in 1989 *Helena Elementary School District No. 1 v. State*, where an emphasis was placed on universal access to a quality education and not just a minimal basic educational experience. What this case did was call for the bar to be raised in what state could consider adequate. In 1990 *Abbott v. Burke*, the court held that the New Jersey finance system was unconstitutional only as it pertained to certain class of districts. The court's order required legislators to fund poor urban districts at a level commensurate with wealthy districts and to provide additional funding to accommodate the special needs of students in poor urban districts. This was done by the state supplementing local funds enough to bring all districts to the average level of the wealthiest districts (with adjustments for local tax effort, needs, and other factors) (Slavin, 1994). Included in the ruling was the court specifically rejecting the idea that every dollar of new funds be spent on programs with demonstrable impacts on student achievement, this was decided to prevent gold-plated programs in rotting school buildings. This means school districts can spend money on infrastructure to maintain the physical adequacy of the buildings as well as the academic adequacy of the curriculum.

There are no federal constitutional requirements to guide states in the matter of equity in the public school system. Because of the lack of constitutional requirements, there is no federal program that ensures interstate equity when discussing school finance. This lack of federal regulations and guidelines has caused a gap in the research when comparing school funding from one state to another.

The way in which Iowa looks at equity among schools across the state is outlined in the Iowa Code. Iowa Code Chapter 274: School Districts in General under Section 2 (274.2) General Applicability:

> The provisions of law relative to common schools shall apply alike to all districts, except when otherwise clearly stated, and the powers given to one form of corporation, or to a board in one kind of corporation, shall be exercised by the other in the same manner, as nearly as practicable. But school boards shall not incur original indebtedness by the issuance of bonds until authorized by the voters of the school corporation. (Code of Iowa, 2007)

The code makes a reference to provisions of law applying to all districts alike. This portion of the Iowa Code was included to ensure equity among school districts in Iowa regardless of their size or socioeconomic makeup. The code reference was the basis for the current study. Looking at the instructional support program and the factors that impact the ability to fully implement the program may enable one to determine the equity of the instructional support program and any possible effects of this program, or whether the level at which the program is funded could have on student achievement.

Some opposition to funding equity is inevitable; if funding equity were popular, then legislators would ensure it and courts would not need to be involved (Margolis & Moses, 1992). Even though the Iowa Code uses language such as “all schools” and “alike”, this does not mean the current system is perfect. As of fall of 2007, several school districts in Iowa were meeting to discuss the equity of the current system and possibly bring suit against the state for inequities these districts perceive are currently taking place, such as levy disparity.

In the current Iowa funding model there is what is called “levy disparity”. The total combined school property tax rates in 2006-07, including all levies, varied in Iowa school districts from a low of $9.20 per $1,000 to a high of $21.96 per $1,000 (Sigel, 2006). The biggest

contributor to this disparity is the additional levy within the school funding formula, explaining $10.16 of the nearly $13.00 variance. The additional levy is the final portion of the foundation formula that funds the final 12.5% of the per pupil cost. This means that it takes a property poor district a tax rate over three times that of a property rich district to raise the remaining money required by the foundation formula.

Large disparities in school property tax rates between neighboring districts can magnify economic and tax challenges. Property tax rates can play an important role in whether or not businesses locate in a community, home sales, and new home starts. Having a higher property tax rate greatly impacts more than the schools, the high rate impacts the livelihood of the community. This portion concerning the additional levy could be the Achilles heel of the Iowa funding model.

Districts with low property values are less able to raise revenues with instructional support levies, infrastructure levies, afford equipment, technology and bus purchases through the physical plant and equipment levy, or fully fund drop-out prevention, English-language learner programs, special education deficits and sufficient cash reserves (Sigel, 2006). The result is that districts with lower property values will have fewer resources to support education. This is compounded by the likelihood that families in districts with lower property values, especially in urban areas, are also more likely to have lower income levels, requiring an even greater investment of school resources for items that parents may otherwise afford (Sigel, 2006).

Finding equity in school finance is neither simple nor easy to discuss. Looking at the disparities between educational institutions can be quite frightening. Knowing that the current system is causing some children in our state to go to school in a less opportunistic environment is

a concern. Firestone and colleagues concluded their study of school finance reform in New Jersey with this sad assessment:

> The gap between the rich and poor districts in this country continues to be dramatic in both what students bring to school and the services they receive when they arrive. The litigation strategy has helped to minimize the damage to urban schools, but it has not bridged the gap between rich and poor. Twenty-five years of new court cases have generated stalled litigation and legislative steps forward followed by years of inaction with, at best, only minimal, often temporary, reductions in the inequities between rich and poor districts. (Firestone, Goertz et al., 1997, p. 165)

As educators and legislators look at the current school funding system in Iowa, the need for change may present itself. When that need for change does come about, educators and legislators will hopefully possess the courage needed to follow through with true significant change to provide equity for all students within the state.

School Funding and Student Achievement

Does money really matter? That is the real question behind school finance and the funding of America's schools. This section addresses the studies that have been conducted to ascertain whether or not money matters. Financial inputs are reviewed, specifically the instructional support program and the cognitive outputs from student achievement in Iowa.

Large differences in outcomes have been found at the same level of input, and similar outcomes have been found despite large differences in inputs (Ceci, Papierno, & Mueller-Johnson, 2002). Rutter, Maughan, Mortimore, Ouston, and Smith (1979) suggested the following:

> Studies of school effectiveness have generally … shown that, at any given level of resource, schools differ in their capacity to make use of what is available, and also that schools with similar levels of resources vary in their degree of effectiveness. That has been an important finding…. (p. 50)

Rutter et al. suggested that appropriate data are lacking to analyze whether or not the availability of exceptional levels of expenditures would lead to very significant gains. Thus, the current study identified the relationship of increased levels of expenditures to student achievement and whether there were significant gains with the instructional support program.

The earliest major study on student achievement as it is related to school spending was the Equality of Educational Opportunity Study (EEOS), otherwise known as the Coleman report (Coleman et al., 1966). The study collected and analyzed data on a national level looking at schools and students from across the country. The study revealed that, when student socioeconomic status and other background characteristics are taken into account, aggregate per-pupil spending is not significantly related to student achievement. The study also researched school spending and student achievement for various regional and ethnic subgroups and found that some resources impacted certain subgroups (Wenglinsky, 1998). The Coleman report (Coleman et al., 1966) concluded that student background characteristics are more important than school inputs on student achievement.

Nevertheless, there were some methodological errors in the Coleman report. First, the Coleman report used aggregate per-pupil expenditures at the measure of school district spending (Coleman et al., 1966). The problem with this snapshot of school spending is that some expenditures are less significantly related to student achievement. The researchers in the Coleman report did not break out expenditures that have a direct impact on instruction or student achievement. Because of this lack of dissemination of expenditures, the insignificant expenditures could, in fact, cancel out the significant expenditures as they relate to student achievement. Second, this study did not adjust for regional variations in the cost of education. It requires more dollars in some areas of the country to buy the same services; a dollar may go

farther in Des Moines, Iowa than in New York City. Lastly, the variations in student achievement that are attributed to spending may actually be due to the variations in the cost of education (Wenglinsky, 1998). In order to compare districts across the country in a reliable manner, a researcher would have to build in a cost of living multiplier into the study to equalize the variable of expenditures.

Another set of studies on student achievement and the relationship it has to school funding were conducted by Wenglinsky (1997). In these studies Wenglinski used structural equation modeling techniques to relate spending to student achievement in mathematics at the fourth and eighth grade levels (Wenglinsky, 1997a). Instead of using an aggregate measure of spending, he distinguished between spending on instruction, central office administration, principal's office administration, and capital outlays (Wenglinsky, 1998). To further validate his study, Weglinksy adjusted these expenditures by the cost of education, using the Teacher Cost Index. He drew his sample from a national database of fourth and eighth graders who had taken the National Assessment of Educational Progress in mathematics. Wenglinsky (1997a) found that some expenditures matter and some were considered moot. Instructional and central office spending were positively related to student achievement; principal's office and capital spending were not. From this study one might assume that district level supports and money spent directly on the classroom are the most important use of funds. The current study, however, did not examine specific areas of funding; rather, it addressed funding as it pertains to the instructional support program and the general fund as a whole.

The Wenglinsky studies suggest that, depending on the type of spending being measured, some types of expenditures matter and some types of expenditures do not. Wenglinsky additionally suggested that spending and the relationship it has to student achievement may

depend on the development level of students. Spending was more strongly related to 4th grade achievement than it was to eighth grade achievement. These studies may provide different insight than originally hoped. In the current research, ascertaining the grade level that gives one the most return for one's investment may help school districts decide where to spend the majority of their money.

The fit between educational practices and spending may also influence the spending-achievement relationship (Wenglinsky, 1998). In a study conducted by Murnane and Levy (1995), in which 15 schools were given additional resources to hire teachers, these resources led to achievement gains in only two of the districts. In the two districts that had gains, the resources were accompanied by other educational reforms designed to take advantage of smaller class sizes (Murnane, 1995). This translates into the notion that merely hiring more teachers does not necessarily equate to improved student achievement; professional development and pedagogical changes are needed for real improvement.

Other researchers have chosen to conduct meta-analyses of previous research to try and clarify the relationship between spending and student achievement. For example, (Hanushek, 1997), conducted a meta-analysis of hundreds of production-function studies and concluded that "there is no strong or systematic relationship between school expenditures and student performance" (p. 152). These researchers sought to gain greater insight into previous findings regarding school expenditures and student performance. In addition to Hanushek, Hedges, conducted a meta-analysis of a similar set of production studies and found that student achievement is related to school spending (Hedges & Greenwald, 1996; Hedges, Laine, & Greenwald, 1994). What these findings point out is that there are very divergent results when looking at the relationship spending has with student achievement. As stated previously, because

the researchers used different statistical models and measured fairly different variables the results were dissimilar. Thus, the next researcher may also have different results as to how one state or organization may account for spending on instruction.

The purpose of the current study was to provide a quantitative look at the instructional support program part of the Iowa school funding model and provide a concrete answer to the question, "Does the instructional support program impact student achievement in an equitable manner?" This investigation may help fill a void in research pertaining to the relationship school finance has on student achievement that currently exists within the state of Iowa.

Summary

There is a great amount of literature on school funding and student achievement. This review of literature focused on several areas. The first area was the Iowa school funding model and selected components within the model. Because of the complexity of the funding model, this review focused primarily on the basics of how funding for school districts is generated in Iowa, with a principal emphasis on the instructional support program. Having a general understanding of the program is imperative to realizing the full impact the results of this study may have on the school finance in Iowa.

Understanding the school funding model is only half of the equation. Student achievement and how achievement is measured in Iowa within the public schools is the other half of the equation. The Iowa Test of Basic Skills is a mandatory test taken by all elementary public school children within the state to measure student achievement. The proficiency levels that have been set forth by the state provide school districts in Iowa with a measuring stick as to the percentage of students who are achieving at an adequate level. This norm-referenced test

provides only a glimpse into student achievement, but does offer a starting point to look at the relationship between student achievement and school spending.

School funding equity in the state of Iowa was the backbone of the current study. The definition of equity when applied to school finance is to provide the same or consistent amount of funding for all students across the state of Iowa. From a review of legal precedents it was determined that there is no one universal rule to define the equity of school funding across the country. However, other states do provide an excellent starting point for the discussion of equity within the school funding model in Iowa.

Finally, the relationship between student achievement and school funding has been heavily debated. As stated previously, some studies revealed a strong relationship between student achievement and school funding while others considered this relationship a moot point. The current research may fill in the gap in the question of the relationship between school funding and student achievement in Iowa.

All of these areas are important when examining the instructional support program and the equity or inequity resulting from this program within the current Iowa school funding model. The purpose of the current research on school funding and student achievement was to shed light on these areas as they relate to Iowa. Uncovering inequities might enable schools to fix the troubles within the current system.

CHAPTER 3. METHODOLOGY

Introduction

The purpose of this research was to identify several independent variables (i.e., school district size, percentage of free or reduced lunch, additional levy, total property tax levy, instructional support program, district property valuation per pupil, district taxable property valuation including utilities). This might help explain variations in the dependent variables (student achievement in math and reading) between school districts within the state of Iowa.

Methods

Descriptive quantitative research methods were used in this study to determine the relationship between the independent and dependent variables. Data for this study were accessed from 365 school districts in Iowa in FY 07. The source of the data that were analyzed is the Iowa Association of School Boards, which is certified by Iowa Department of Education.

This study used multivariate analysis of variance (MANOVA), a method of statistical analysis which is simply an ANOVA with several dependent variables (Dunteman, 1984). The two dependent variables for this study were the percent proficient in reading at the 4th grade level and the percent proficient in math at the 4th grade level. As stated in the hypotheses in Chapter 1, both variables together were affected by the same independent variables.

MANOVA is functional in situations where at least some of the independent variables are manipulated. It has several advantages over ANOVA. First, by measuring several dependent variables in a single study, there is a better chance of discovering which factor is actually important. Second, MANOVA can protect against Type I errors that might occur if multiple

ANOVAs were conducted independently. Additionally, it can expose differences not discovered by ANOVA tests (Tabachnick & Fidell, 1996). "If separate ANOVAs are conducted on two dependent variables, the distributions for each of the two groups (and for each dependent variable) might overlap sufficiently, such that a mean difference probably would not be found" (Mertler & Vannatta, 2005, p. 120). In other words, by looking at the two dependent variables together instead of separately, one may find that there is a statistical significance in relation to the independent variables that would have been overlooked by running separate tests.

If the model fits the data well, the overall r^2 value will be high, and the corresponding *p* value will be low (the great fit is unlikely to be a coincidence). In addition to the overall *p* value, multiple regressions also report an individual *p* value for each independent variable. A low *p* value, such as .020 for average adjusted gross income per return, means that this independent variable significantly improves the fit of the model (Hinkle, Wiersma, & Jurs, 2003). It is calculated by comparing the goodness-of-fit of the entire model to the goodness-of-fit when that independent variable is omitted. If the fit is much worse when that variable is omitted from the model, the *p* value will be low, signifying the variable has a significant relationship to the model.

When using multiple regression testing, one must perform some cleanup work on the data prior to running the model. For example, there is a plethora of information in the area of school finance, both on a state and a district level. With this wealth of data, one must first narrow the variables to be used in the study. This study initially had 76 variables, both dependent and independent of one another. Through a correlation matrix the researcher reduced the number of variables used for the final models. A correlation matrix is a square, symmetrical matrix, with each row and each column representing different variables; located at each intersection of a row and column is the bivariate correlation between the two variables (Mertler & Vannatta, 2005).

The correlation matrix applied in this study appears in next chapter. The correlation matrix was used to determine if the Pearson correlation between two variables is greater than .90. By eliminating one of the two variables to reduce multicollinearity, there is a greater likelihood of producing more accurate results.

In regression, multicollinearity can be a problem when estimating the contributions of individual predictors. Multicollinearity occurs when variables are so highly correlated with each other that it is difficult to determine reliable estimates of their individual regression coefficients. When two variables are highly correlated, in essence, they are measuring the same phenomenon or construct. In other words, when two variables are highly correlated, they both convey essentially the same information. For example, average gross income per return is highly correlated with average tax paid per return $r = .974$, because the amount of tax one pays per return is based on a percentage of the gross income per return. Thus, if both variables are included, one would essentially measure the same entity twice.

When multicollinearity is present, *p* values can be misleading and the regression coefficients' confidence intervals will be very wide and may vary dramatically with the addition or exclusion of just one case/participant (Mertler & Vannatta, 2005). There were several instances of mulitcollinearity in the original set of variables; therefore, this researcher removed the highly correlated terms from the model to eliminate multicollinearity which may greatly affect the estimated coefficients of the other highly correlated terms. A complete list of all variables considered prior to removal to reduce multicollinearity can be found in Appendix B.

Variables

Several variables were considered in this study. Correlation matrixes were used to determine the variables to eliminate to reduce multicollinearity. A list of the dependent and independent variables selected for use in the study are shown in Table 2. As shown in Table 2, there are some values missing for reading and math percentages. These missing values are due to the fact that some school districts in Iowa have such a small population of 4th grade students that these districts are not required by law to report the district's proficiency levels for this age group. However, this researcher believes that, by investigating all of the districts in Iowa, the lack of reporting from these few districts should not affect the accuracy of the findings. There are other small districts that do report the math and reading achievement scores to make the model viable.

Dependent

As stated previously, the two dependent variables are proficiency in math and reading as measured by the Iowa Test of Basic Skills for 4th grade students across the state of Iowa for the 2006-2007 school year. These dependent variables were selected for the study for several reasons. First, reading and math are two of the major indicators for determining student achievement according to the No Child Left Behind Act of 2001.

Table 2. Descriptive statistics of the dependent and independent variables

Dependent variable	N	Missing	Mean	Median	Mode	Std. Dev.	Variance	Range	Minimum	Maximum
Percent Proficient Math*	341	24	83.72%	84.92%	100.00%	8.98%	80.66%	44.00%	56.00%	100.00%
Percent Proficient Reading*	343	22	82.44%	83.76%	83.33%	9.01%	81.18%	48.00%	52.00%	100.00%
Additional Levy Per $1,000	365	0	$4.90	$4.74	$4.58	$1.20	$1.44	$8.37	$1.45	$9.82
Total Property Tax Levy Per $1,000	365	0	$14.53	$14.25	$13.86	$2.20	$4.82	$11.69	$9.58	$21.27
Total Property Valuation	365	0	$289,631,840	$154,897,304	$27,439,472	$536,053,433	$287,353,282,787,859,000	$5,553,863,904	$27,439,472	$5,581,303,376
ISL Percentage	365	0	8.50%	10.00%	10.00%	3.04%	0.09%	10.00%	0.00%	10.00%
ISL Percentage Actual	365	0	6.814%	8.000%	8.000%	2.634%	0.069%	9.000%	0.000%	9.000%
Total Funding	365	0	$444,896	$235,563	$0	$991,927	$983,918,229,674	$12,696,056	$0	$12,696,056
ISL Property Tax Rate	365	0	0.593616438	0.45	0	0.55695756	0.310201721	2.31	0	2.31
ISL Income Surtax Rate	365	0	0.060958904	0.07	0	0.04505687	0.002030122	0.2	0	0.2
Enrollment	365	0	1323.6	656.0	244.0	2566.5	6587139.5	31462.5	86.1	31548.6
Average AGI per Return	364	1	$25,550.70	$24,264.59	$17,662.68	$5,170.92	$26,738,451.97	$35,230.59	$17,662.68	$52,893.27
District Property Valuation per Pupil	365	0	$240,339.28	$229,244.53	$114,876.72	$77,087.36	$5,942,460,914.74	$589,805.70	$114,876.72	$704,682.42
Free or Reduced Lunch Percentage	365	0	30.82%	30.00%	24.00%	11.34%	1.29%	68.00%	6.00%	74.00%

Second, as the age of the students taking the test increases the accuracy of the test scores diminish. This phenomenon could be from lack of test preparation to students becoming disinterested in the exam, realizing that the students' performance on the test does not impact his or her own grades within a class or set of courses. At the 4th grade level students generally tend to look at the test as an opportunity to demonstrate their abilities. Due to this sense of importance, a more accurate picture of student achievement is provided within a district creating a more valid study. Although there are other grades wherein students may take the test seriously, most fourth graders have been in the school system for several years with the impact of teaching on student achievement. Additionally, the Iowa Test of Basic Skills was chosen because of the test's long standing as one of the most reliable resources of measuring student achievement (Iowa Department of Education, 2007b). The test is taken by at least 95% of all 4th grade students across the state of Iowa, thus providing a look at student achievement level at the fourth grade.

Math and reading achievement scores were measured to determine if both react in the same manner when these variables are placed into the model with the same independent variables. One would like to presume that if a district has high student achievement in math that the same district would have similar scores in reading. The findings in Chapter 4 reveal if this is a relatively accurate statement or if student achievement in reading and math are independent of one another.

Independent

School district enrollment is an independent variable selected to differentiate between large and small districts in Iowa. School district enrollment is often viewed as a measurement of

efficiency, with supposedly larger districts being more efficient due to their ability to offer a wider curriculum. School districts in Iowa range in size from 86 students to 31,548 students. This is an important variable as one considers equity in this study. This variable helps answer the question of equity as it pertains to the size of school districts in Iowa and the ability these districts have to implement the instructional support program.

Percentage of free or reduced lunch is a variable designed to measure the socioeconomic status (SES) of students attending the district. This variable helps to ascertain the poverty level of students within a school district. The federal government sets certain guidelines that determine the income levels for families whose children may or may not qualify for free or reduced lunch. Children in families with an income of 130% or less of the Federal poverty guideline ($27,464 for a family of four) as well as those who receive food stamps or Temporary Assistance for Needy Families (TANF) are eligible for free lunch. Those whose families have incomes from 131% to 185% of the poverty guideline ($27,464 to 38,202 for a family of four) are eligible for reduced-price meals.

The way in which this variable differs from adjusted gross income in a district would be that the variable is a measure of the students' SES for those who are enrolled in a district as opposed to the adjusted gross income of all wage earning individuals who reside within a school district's boundaries. Some smaller school districts could possibly have some very high wage earners that could disproportionately affect the district's average adjusted gross income for residents within the district. Free or reduced lunch levels is a measure that the federal government uses to determine funding for title programs (which are federally funded programs for low income students), therefore, making this variable a viable measure of poverty within a school district.

The additional levy is the amount of tax needed to make up the final 12.5% of the total cost per pupil set by the state. This is an important variable because, depending on the district's property valuation, the additional levy changes the property tax rates between districts. This portion of the school funding model is a large part of the property tax disparities across the state because higher property values in a district can generate more tax dollars at a lower rate. Different property tax rates could have an adverse affect on student achievement by impeding different districts' ability to implement the instructional support program. As shown n Figure 5, a school district with half of the property valuation as another district with the same amount of students will have a difference in property tax rates of $3.34/$1,000, resulting in a $666.62 tax debt difference in a home assessed at $200,000 in both districts. The additional levy is one of the main issues that is currently being debated in the state and will possibly face legal challenges before or after the conclusion of this study (Sioux City Community Schools, 2007).

The total property tax levy is the tax rate that school districts impose upon the property owners within a school district's boundaries. This rate ranges in Iowa from $11.69 per $1,000 of assessed value to $21.67 per $1,000 of assessed value, causing what some might perceive as extreme inequities within the funding formula. A person who lives in the district with an $11.69 rate would pay $2,338 in school property taxes on a $200,000 house, while another person who lives in the district with a $21.67 rate would pay $4,334 in school property taxes on the same $200,000 house. A future study might consider whether maintaining a certain property tax rate can drive the decisions to either levy for additional dollars or make do with what is provided at the current rate. Some levies that are imposed on a school district's property owners have the ability to generate more or less money depending on the property valuation within a district.

Several of the independent variables in this study fall under the umbrella of the instructional support program. The first of these variables is the instructional support program participation percentage. This is the percentage that districts increase their budgets by up to 10%. Some districts choose to increase to the full amount while other districts choose to increase their budgets by a portion of the 10%. Including this variable enables one to measure student achievement as related to the participation level in the instructional support program. This finding enables one to determine if implementing the instructional support program has a positive impact on student achievement. If it does not, could this program go by the way side? The following four variables were included to help build the case regarding the equity of the instructional support program.

The property tax rate within the instructional support program generates the money needed to fund the instructional support program based on property. This rate can be adjusted depending on existing tax rates in conjunction with the income surtax to generate funding for the program. For example, some districts may choose to keep this rate lower in an effort to keep property taxes lower, while using the income surtax to make up the difference.

Income surtax was included as an independent variable to determine if school districts that are considered property poor use this method to reduce property tax burden. Income surtax is a tax on a tax. The surtax is imposed on the income tax liability after tax credits on the Iowa individual income tax returns of taxpayers residing within the district on the last day of the tax year. This tax is directly affected by the earning capacity of the district and not the property valuation.

Average adjusted gross income helps one visualize SES within a district. Unlike the free or reduced lunch, which reveals the amount of poverty within the schools in a district, average

adjusted gross income exposes the average income level of all people residing within a school district.

Property valuation per pupil and taxable property valuation including utilities within the district are the last two independent variables. Valuation per pupil is derived by taking the total property valuation in a school district and dividing it by the number of students within the school district. Total valuation enables one to determine overall property wealth of a district without further breaking down the wealth by student. These variables are important in determining not only if a student's SES matters, but also whether the property wealth of the district has an affect on student achievement. With the current system relying heavily on property taxes, knowing the relationship property valuations have with student achievement helps ascertain equity versus inequity within the current system.

Ethical Considerations

This study conformed to ethical standards in conducting research. All of the data used within this study were considered public information. The use of descriptors or labels that could identify an individual person or persons were avoided. In addition, the Iowa State University Institutional Review Board (IRB) was contacted regarding the study. They did not feel the study needed IRB Human Subjects approval. This researcher, in conjunction with a university advisor, reviewed all methods applied in this study to ensure that applicable measures were taken to ensure the ethicalness of the study.

Limitations

This study has several limitations. The first and most prevalent is the use of only 4th grade data as a measuring tool for student achievement. Use of only one year of data does not

enable one to take into consideration the growth a cohort group could have from several years in the same school district. In addition to this limitation, the use of a single year of data provides only a snapshot of each school district. This researcher chose to use only one year of data to prevent the likelihood to eliminate school districts from multiple years due to consolidation. A more in-depth study could provide a greater exploration regarding equity garnered from multiple years of data for school finance and student achievement by reviewing different parts of the Iowa school funding model.

Delimitations of the Study

The study was conducted with the following delimitations:

1. Data were used from public school districts within the state of Iowa. Private schools and other institutions of education were not included in this study.
2. The analysis of data covered the 2006-2007 school year. Only school districts in existence during the 2006-2007 school year were included in this study. On average over the past 10 years, one to two school districts per year in Iowa have consolidated with other districts.

CHAPTER 4. RESULTS AND FINDINGS

The results and findings of this study are discussed in this chapter. Each research hypothesis is identified individually and statistical evidence provided to reject or retain the null hypothesis. MANOVA and Pearson correlation were used to determine the outcomes of each of the research questions. The descriptive statistics for the variables were provided in Table 2 in the previous chapter.

This chapter is divided into three parts: statistical analysis, summary of statistical analysis, and summary of the chapter. The statistical analysis presents the results for each hypothesis, followed by a summary of the research questions. Last, the chapter summary provides an overview of the findings and relevant outcomes.

The data for this study were taken from the 2006-2007 school year. Although 365 school districts were in existence during this time period, data were available for only 339. This discrepancy is due to the lack of reporting by some school districts to the State of Iowa for student achievement among 4^{th} grade students. The reason for these districts not reporting this information is due to their small student population size, as well as grade sharing among smaller school districts.

Table 3 shows the results of the MANOVA conducted for percent proficient in reading and percent proficient in math as the two dependent variables within the same model. The independent variables included in this model were described previously in the methodology. Each independent variable was correlated with the two dependent variables while taking into account all of the other independent variables. The significance values were divided by 2 to determine the actual significance values for a one-tailed test (Table 3). Each hypothesis in the

study was written in the form of a one-tailed test. Because SPSS will produce only two-tailed MANOVA results, one-half of the significance value in the table yields the significance value for a one-tailed test (Shelley, 2008).

As shown in Table 3, several variables have an effect on student achievement while accounting for interaction with all of the other variables. For example, the average adjusted gross income per return for math (p=.017) and for reading (p=.013) suggests that the relationship between average adjusted gross income per return has a statistically significant relationship with both dependent variables. Another independent variable, instructional support property tax rate does not have a statistically significant relationship with either dependent variable, math (p=.262) and reading (p=.559). The r^2 value for this model is .157, while the adjusted r^2 is .127. One can conclude that 15.7% of variation in student achievement can be explained with these variables. When considering the vastness of the area of student achievement, the ability to explain approximately 16% of student achievement from examining these predictor variables is extremely important.

Table 4 shows the correlation matrix, which helped answer research questions that required a bivariate Pearson correlation coefficient between two variables to block the other variables from impacting the outcome. For example, the additional levy has a statistically significant negative relationship with student achievement in math (r = –.252; p<.001) and reading (r =–.122; p=.012). As stated previously, a pair of variables that indicated $r \geq .90$ had one of the two variables removed to reduce multicollinearity, since one could presume the two variables would, in essence, measure the same entity. A one-tailed test was conducted because all of the hypotheses were written in a single directional format.

Table 3. Tests of between-subjects effects for independent variables with student achievement in both math and reading

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig./2 * one-tailed test	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	Percent_proficient_Math	4298.753[a]	10	429.875	6.121	.000	.157	61.215	1.000
	Percent_proficient_Reading	4191.159[c]	10	419.116	6.124	.000	.157	61.245	1.000
Intercept	Percent_proficient_Math	11613.375	1	11613.375	165.375	.000	.335	165.375	1.000
	Percent_proficient_Reading	7883.885	1	7883.885	115.206	.000	.260	115.206	1.000
AdditionalLevy	Percent_proficient_Math	82.293	1	82.293	1.172	.280	.004	1.172	.190
	Percent_proficient_Reading	247.151	1	247.151	3.612	.058	.011	3.612	.474
Total_Property_Tax_Levy	Percent_proficient_Math	6.479	1	6.479	.092	.762	.000	.092	.061
	Percent_proficient_Reading	5.857	1	5.857	.086	.770	.000	.086	.060
Total_Property_ Valuation	Percent_proficient_Math	73.090	1	73.090	1.041	.308	.003	1.041	.174
	Percent_proficient_Reading	2.492	1	2.492	.036	.849	.000	.036	.054
ISL_Percentage	Percent_proficient_Math	105.227	1	105.227	1.498	.222	.005	1.498	.231
	Percent_proficient_Reading	35.276	1	35.276	.515	.473	.002	.515	.110
ISL_Property_ Tax_Rate	Percent_proficient_Math	88.563	1	88.563	1.261	.262	.004	1.261	.201
	Percent_proficient_Reading	23.455	1	23.455	.343	.559	.001	.343	.090
ISL_Income_ Surtax_Rate	Percent_proficient_Math	233.492	1	233.492	3.325	.069	.010	3.325	.444
	Percent_proficient_Reading	63.904	1	63.904	.934	.335	.003	.934	.161
Enrollment	Percent_proficient_Math	18.875	1	18.875	.269	.605	.001	.269	.081
	Percent_proficient_Reading	19.153	1	19.153	.280	.597	.001	.280	.082
Average_AGI_ Per_Return	Percent_proficient_Math	403.661	1	403.661	5.748	.017	.017	5.748	.667
	Percent_proficient_Reading	429.340	1	429.340	6.274	.013	.019	6.274	.705
District_PropertyValuation_Per_ Pupil	Percent_proficient_Math	63.230	1	63.230	.900	.343	.003	.900	.157
	Percent_proficient_Reading	581.750	1	581.750	8.501	.004	.025	8.501	.828
Free_Reduced_ Lunch_ Percentage	Percent_proficient_Math	1488.104	1	1488.104	21.191	.000	.061	21.191	.996
	Percent_proficient_Reading	1676.609	1	1676.609	24.500	.000	.070	24.500	.999

Table 3. (Continued).

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig./2 * one-tailed test	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Error	Percent_proficient_Math	23033.579	328	70.224					
	Percent_proficient_Reading	22445.982	328	68.433					
Total	Percent_proficient_Math	2403481.745	339						
	Percent_proficient_Reading	2337539.432	339						
Corrected Total	Percent_proficient_Math	27332.332	338						
	Percent_proficient_Reading	26637.141	338						

*Sig. – Divide by two for one-tailed test.
a. r^2 = .157 (Adjusted r^2= .132)

b. Computed using α = .05

c. r^2= .157 (Adjusted r^2= .132)

Table 4. Correlation matrix for the dependent and independent variables (one-tailed test used because of directional hypotheses)

	Percent_ proficient _Math	Percent_ proficient_ Reading	Additional Levy	Total_ property_ Tax_Levy	Total_ property_ Valuation	ISL_ Percentage	ISL_ Property_ Tax_Rate	ISL_ Income_ Surtax_ Rate	Enroll-ment	Aveage_ AGI_Per Return	District_ Property_ Valuation_ Per_Pupil	Free_ Reduced_ Lunch_ Percentage
Percent_proficient_ Math	1											
Pearson Cor.		.720***	−.232***	−.118*	−.088	.080	−.037	.067	−.128**	.139**	.156**	−.326***
Sig (1-tailed)		<.001	<.001	.015	.053	.070	.248	.110	.009	.005	.002	<.001
N	341	140	341	341	341	341	341	341.	341	340	341	341
Percent_proficient_ Reading												
Pearson Cor.	.720***	1	−.122*	−.051	−.082	.049	−.030	.011	−.132**	.162**	.151**	−.340***
Sig (1-tailed)	<.001		.012	.172	.065	.181	.291	.418	.007	.001	.003	<.001
N	340	343	343	343	343	343	343	343		342	343	343
Additional Levy												
Pearson Cor.	−.232***	−.122*	1	.657***	.016	−.168**	.009	−.040	.154**	−.067	−.695***	.264***
Sig (1-tailed)	<.001	.012		<.001	.380	.001	.429	.224	.002	.100	<.001	<.001
N	341	343	365	365	365	365	365	365	365	364	365	365
Total_property_ Tax_Levy												
Pearson Cor.	−.118*	−.051	.657***	1	.124**	.025	.267**	−.161***	.207***	.237***	−.556***	.056
Sig (1-tailed)	.053	.172	<.001		.009	.315	<.001	.001	<.000	<.001	<.001	.143
N	341	343	365	365	365	365	365	365	365	364	365	365
Total_property_ Valuation												
Pearson Cor.	−.088	−.082	.016	.124**	1	−.007	.189**	−.285***	.953***	.459***	.000	.010
Sig (1-tailed)	.053	.065	.380	.009		.446	.000	<.001	<.001	<.001	.499	.422
N	341	343	365	365	365	365	365	365	365	364	365	365
ISL_Percentage												
Pearson Cor.	.080	.049	−.168**	.025	−.007	1	.388**	.488***	−.036	.020	.200***	−.078
Sig (1-tailed)	.070	.181	.001	.315	.446		.000	<.001	.247	.352	<.001	.069
N	341	343	365	365	365	365	365	365	365	364	365	365
ISL_Property_ Tax_Rate												
Pearson Cor.	−.037	−.030	.009	.267***	.189***	.388***	1	−.456***	.207***	.193***	−.024	.020
Sig (1-tailed)	.248	.291	.429	<.001	<.001	<.001		<.001	<.001	<.001	.325	.355
N	341	343	365	365	365	365	365	365	365	364	365	365
ISL_Income_ Surtax_Rate												
Pearson Cor.	.067	.011	−.040	−.161**	−.285***	.488***	−.456**	1	−.287***	−.401***	.153**	.105*
Sig (1-tailed)	.110	.418	.224	.001	<.001	<.001	.000		<.001	<.001	.002	.023
N	341	343	365	365	365	365	365	365	365	364	365	365

Table 4. (Continued).

	Percent_ proficient _Math	Percent_ proficient_ Reading	Additional Levy	Total_ property_ Tax_ Levy	Total_ property_ Valuation	ISL_ Percentage	ISL_ Property_ Tax_Rate	ISL_ Income_ Surtax_ Rate	Enroll-ment	Aveage_ AGI_Per _ Return	District_ Property_ Valuation_ Per_Pupil	Free_ Reduced_ Lunch_ Percentage
Enrollment												
Pearson Cor.	−.128**	−.132**	.154**	.207***	.953***	−.036	.208**	−.287***	1	.386***	−.144**	.078
Sig (1-tailed)	.009	.007	.002	<.001	<.001	.247	.000	<.001		<.001	.003	.069
N	341	343	365	365	365	365	365	365	365	364	365	365
Aveage_AGI_ Per_Return												
Pearson Cor.	.139**	.162**	−.067	.237***	.459***	.020	.193**	−.401***	.386***	1	−.109*	−.354***
Sig (1-tailed)	.005	.001	.100	<.001	<.001	.352	.000	<.001	<.001		.018	<.001
N	340	342	364	364	364	364	364	364	364	364	364	364
District_Property_ Valuation_Per_ Pupil												
Pearson Cor.	.156**	.151**	−.695***	−.556***	.000	.200***	−.024	.153**	−.144**	−.109*	1	−.013
Sig (1-tailed)	.002	.003	<.001	<.001	.499	<.001	.325	.002	.003	.018		.404
N	341	343	365	365	365	365	365	365	365	364	365	365
Free_Reduced_ Lunch_ Percentage												
Pearson Cor.	−.326***	−.340***	.264***	.056	.010	−.078	.020	.105*	.078	−.354***	−.013	1
Sig (1-tailed)	<.001	<.001	<.001	.143	.422	.069	.355	.023	.069	<.001	.404	
N	341	343	365	365	365	365	365	365	365	364	365	365

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed).
** Correlation is significant at the 0.001 level (1-tailed).

Statistical Analysis

Six hypotheses guided the study. The findings are given according to each hypothesis.

Hypothesis 1

School districts with higher property valuations per pupil will show higher student achievement when using the Iowa Test of Basic Skills for fourth graders.

According to the results of the Pearson correlation coefficient shown in Table 5, there is a minimal relationship between property valuation per pupil and percent proficient in reading. A correlation coefficient of less than .30 is considered to show little correlation between the two variables (Hinkle et al., 2003). Unlike the MANOVA, the *p* value did not have to be divided by two since the correlation model was designed for a one-tailed test. The correlation between the two variables is significant, and the two variables are linearly related ($r = .151$; $p = .003$). Thus, one rejects the null hypothesis that the two variables have zero correlation. From this result, one could conclude that, as property value per pupil increases, student achievement in the area of reading proficiency also increases.

Table 5 also indicates that the relationship between property value per pupil and percent proficient in math also is moderate. The correlation between the two variables is significant and the two variables are linearly related ($r = .156$; $p = .002$). Thus, one rejects the null hypothesis that the two variables have zero correlation. Similar to the previous finding, one also could presume that as property value per pupils goes up, there is a positive influence on student achievement in math.

Table 5. Pearson correlations for percent proficient in reading and math, and district property valuation per pupil

	Correlations		
	Percent proficient in reading	Percent proficient in math	District property valuation per pupil
Percent proficient in reading			
Pearson correlation	1	.720*	.151*
Significance		.000	.003
N	343	340	343
Percent proficient in math			
Pearson correlation	.720*	1	.156*
Significance	.000		.002
N	340	341	341
District property valuation per pupil			
Pearson correlation	.151*	.156*	1
Significance	.003	.002	
N	343	341	365

* Significant at 0.01 level (1-tailed).

The 1st research question was designed to determine if school districts with higher property valuations per pupil will show higher student achievement in math and reading as determined by the Iowa Test of Basic Skills for 4Th grade students. The Pearson correlation coefficient provided results to reject the null hypothesis that property valuation and student achievement in math and reading have zero correlation. The conclusion can be made from this result that as property values per pupil increase, student achievement in reading and math is positively affected.

Hypothesis 2

As school district enrollment (# of pupils) increases, student achievement will decrease, controlling for the level of participation in the instructional support program.

Multivariate analysis of covariance (MANCOVA) was conducted to determine the effect of school district enrollment on student achievement as measured by reading and math proficiency while controlling for instructional support participation percentage. Box's Test of Equality of Covariance Matrices was not computed because there were fewer than two nonsingular cell covariance matrices. Wilks' Lambda was chosen because homogeneity of variance was not in question and Wilks' is the most commonly reported MANOVA statistic (Mertler & Vannatta, 2005). MANOVA provided in Table 6 reveal significant differences among levels of school district enrollment on the combined dependent variable, Wilks' Λ=.980, F(2, 336)=3.454, p=.033, multivariate η^2=.020. The covariate (instructional support participation percentage) did not significantly influence the dependent variable, Wilks' Λ =.994, F(2, 336)=.994, p=.371, multivariate η^2=.006.

Analysis of covariance (ANCOVA) was conducted on each dependent variable as a follow up to the MANCOVA results. District enrollment was significant for student achievement in math (Table 7), (F(1, 337)=5.392, p=.021, η^2=.016) and student achievement in reading, (F(1,337)=6.383, p=.012, η^2=.019). However, the instructional support participation percentage was not significant for student achievement in math

Table 6. Effect of school district enrollment on student achievement as measured by reading and math proficiency while controlling for instructional support participation percentage

	Multivariate Test[b]					
Effect (Wilks' Lambda)	Value	F	Hypothesis df	Error df	Sig.	Partial Eta squared
Intercept	0.079	1.85E+03	2	336	0	0.921
ISL Percentage	0.994	.994[a]	2	336	0.372	0.006
Enrollment		3.454[a]	2	336	0.033	0.02

[a] Exact statistic

[b] Design: Intercept + ISL Percentage + Enrollment

Table 7. Tests of between subjects' effects and the dependent variables

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Percent_proficient_Math	598.869[a]	2	299.435	3.769	.024	.022
	Percent_proficient_Reading	578.726[b]	2	289.363	3.703	.026	.022
Intercept	Percent_proficient_Math	266304.150	1	266304.150	3351.807	.000	.909
	Percent_proficient_Reading	262887.493	1	262887.493	3364.087	.000	.909
ISL_Percentage	Percent_proficient_Math	157.973	1	157.973	1.988	.159	.006
	Percent_proficient_Reading	70.849	1	70.849	.907	.342	.003
Enrollment	Percent_proficient_Math	428.416	1	428.416	5.392	.021	.016
	Percent_proficient_Reading	498.778	1	498.778	6.383	.012	.019
Error	Percent_proficient_Math	26774.962	337	79.451			
	Percent_proficient_Reading	26334.957	337	78.145			
Total	Percent_proficient_Math	2409452.398	340				
	Percent_proficient_Reading	2341883.560	340				
Corrected Total	Percent_proficient_Math	27373.832	339				
	Percent_proficient_Reading	26913.683	339				

[a] r squared = .022; [b] adjusted r squared = .016)

($F(1,337)=1.988$, $p=.159$, $\eta^2=.006$) and student achievement in reading, ($F(1, 337)=.907$, $p=.342$, $\eta^2=.003$). Thus, participation in the instructional support program will not necessarily yield gains in student achievement, but district enrollment by itself does have a statistical relationship with student achievement.

The 2nd research question was designed to determine if district enrollment (# of pupils) positively or negatively affects student achievement as shown using the Iowa Test of Basic Skills for 4th grade students, controlling for the level of participation in the instructional support program? A multivariate analysis of covariance was conducted and the results concluded that district enrollment has a significant relationship with student achievement. However, the instructional support program percentage did not significantly influence the relationship between these variables.

Hypothesis 3

A higher level of participation in the instructional support program has a positive effect on student achievement.

The Pearson correlation coefficient as shown in Table 8 reveals that the relationship between instructional support participation percentage and percent proficient in reading is negligible, (r = .049) and non-significant (p=.181). This result indicates there is no statistical relationship between instructional support participation percentage and reading achievement. Thus, one fails to reject the null hypothesis that the two variables have zero correlation. As stated in the previous hypothesis finding, participating in the instructional support program does not statistically improve student achievement in reading.

As shown in Table 8, the Pearson correlation coefficient for the relationship between instructional support participation percentage and student achievement in math is negligible, as well (r=.080) and non-significant (p=.070). This result also indicates that a statistical relationship does not exist between instructional support participation percentage and student achievement in math. Thus, one fails to reject the null hypothesis that the two variables have zero correlation. Just as in reading achievement, participation in the instructional support program will not statistically influence student achievement in math.

A Pearson correlation was conducted to determine if a higher level of participation in the instructional support program would have a positive effect on student achievement. From the results, one failed to reject the null hypothesis that there is zero correlation between participation percentage in the instructional support program and student achievement in math and reading.

Table 8. Pearson correlations for relationship between instructional support participation percentage and percent proficient in reading and math

	Correlations		
	Percent proficient in math	ISL percentage	Percent proficient in reading
Percent proficient in math			
Pearson correlation	1	.080	.720*
Significance		.070	.000
N	341	341	340
ISL percentage			
Pearson correlation	.080	1	.049
Significance	.070		.181
N	341	365	343
Percent proficient in reading			
Pearson correlation	.720*	.049	1
Significance	.000	.181	
N	340	343	343

* Significant at 0.01 level (1-tailed).

Hypothesis 4

Larger school districts tend not to participate fully (10%) in the instructional support program.

A Pearson correlation coefficient shown in Table 9 indicates that the relationship between instructional support participation percentage and enrollment is negligible, (r = –.036) and non-significant (p=.247). This result indicates that there is no statistical relationship between instructional support participation percentage and enrollment. Thus, one fails to reject the null hypothesis that the two variables have zero correlation. One can conclude regarding research question 4, that school district enrollment is not a good indicator of whether or not a school district participates in the instructional support program.

Table 9. Pearson correlations for the relationship between instructional support participation percentage and enrollment

	Enrollment	ISL percentage
Enrollment		
Pearson correlation	1	–.036
Significance		.247
N	365	365
ISL percentage		
Pearson correlation	–.036	1
Significance	.247	
N	365	365

In this analysis, the hypothesis—larger school districts tend not to participate fully (10%) in the instructional support program—was tested using Pearson correlation. The result showed a negligible and non-significant relationship between school district enrollment and participation percentage in the instructional support program. Thus, one fails to reject the null hypothesis that these two variables have zero correlation.

Hypothesis 5

School districts with higher adjusted gross income will show higher student achievement, controlling for the level of participation in the instructional support program.

MANCOVA was conducted to determine the effect of average adjusted gross income per return on student achievement as measured by reading and math proficiency while controlling for instructional support participation percentage. Box's Test of Equality of Covariance Matrices was not computed because there were fewer than two nonsingular cell covariance matrices. Wilks' Lambda was chosen because homogeneity of variance was not in question and Wilks' is the most commonly reported MANOVA statistic (Mertler & Vannatta, 2005). Controlling for the instructional support participation percentage is important when trying to determine whether

participating in this program can help overcome any hurdles that may be set up for student achievement due to average adjusted gross income per return. MANOVA results as shown in Table 10 revealed significant differences among average adjusted gross income per return on the combined dependent variable, Wilks' Λ =.975, $F(2, 335)=4.297$, $p=.014$, multivariate $\eta^2=.025$. The low *r*-squared value may show that there may be other important factors which can be used to explain performance; some of those factors may include family history, timing of curriculum, and level of instruction. The covariate (instructional support participation percentage) did not significantly influence the dependent variable, Wilks' Λ =.994, $F(2, 335)=.928$, $p=.396$, multivariate $\eta^2=.006$. ANCOVA was conducted on each dependent variable as a follow-up test to MANCOVA. Average adjusted gross income per return was a significant predictor of student achievement in math (Table 11), ($F(1, 336)=6.7$, $p=.010$, $\eta^2=.020$) and student achievement in reading, ($F(1,336)=7.940$, $p=.005$, $\eta^2=.023$). This finding reinforces previous research that socioeconomic status is an indicator of student achievement. Again, the instructional support participation percentage was not significant for student achievement in math ($F(1, 336)=1.860$, $p=.172$, $\eta^2=.006$) and student achievement in reading, ($F(1, 336)=.878$, $p=.349$, $\eta^2=.003$).

A multivariate analysis of covariance was conducted to determine if school districts with higher average adjusted gross income per return will show higher student achievement, while controlling for the level of participation in the instructional support program. The MANCOVA results showed student achievement had a significant relationship with average adjusted gross income per return. However, participation percentage in the instructional support program did not significantly influence the relationship between these two variables.

Table 10. Effect of average adjusted gross income per return on student achievement as measured by reading and math proficiency while controlling for instructional support participation percentage

	Multivariate Test[b]					
Effect (Wilks' Lambda)	Value	F	Hypothesis df	Error df	Sig.	Partial Eta squared
Intercept	0.274	4.44E+03	2	335	0	0.726
ISL percentage	0.994	.928[a]	2	335	0.396	0.006
Average AGI per return		4.297[a]	2	335	0.014	0.025

[a] Exact statistic

[b] Design: Intercept + ISL Percentage + Average AGI per return

Table 11. Tests of between subjects' effects and the dependent variables, average adjusted gross income per return as a predictor of student achievement in math and reading

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Percent_proficient_Math	706.251[a]	2	353.126	4.456	.012	.026
	Percent_proficient_Reading	701.398[b]	2	350.699	4.543	.011	.026
Intercept	Percent_proficient_Math	60540.286	1	60540.286	763.970	.000	.695
	Percent_proficient_Reading	58873.502	1	58873.502	762.712	.000	.694
ISL_Percentage	Percent_proficient_Math	147.376	1	147.376	1.860	.174	.006
	Percent_proficient_Reading	67.756	1	67.756	.878	.349	.003
Average_AGI_Per_	Percent_proficient_Math	530.940	1	530.940	6.700	.010	.020
Return	Percent_proficient_Reading	612.877	1	612.877	7.940	.005	.023
Error	Percent_proficient_Math	26626.081	336	79.244			
	Percent_proficient_Reading	25935.744	336	77.190			
Total	Percent_proficient_Math	2403481.745	339				
	Percent_proficient_Reading	2337539.432	339				
Corrected Total	Percent_proficient_Math	27332.332	338				
	Percent_proficient_Reading	26637.141	338				

[a] *r* squared = .026 (Adjusted *r* squared = .020)

[b] *r* squared = .026 (Adjusted *r* squared = .021)

Hypothesis 6

School districts with a higher percentage of free or reduced lunch students will show lower student achievement, controlling for the level of participation in the instructional support program.

Box's Test was conducted to test for homogeneity of variance-covariance (Table 12). Box's test was not significant, indicating that the assumption of homogeneity of variance-covariance is fulfilled, $F(114, 4353)=1.087$, $p=.251$, therefore, Wilks' Λ test statistic was used in interpreting the MANCOVA results (Mertler & Vannatta, 2005).

Table 12. Box's test of equality of covariance matrices

Box's M	160.469
F	1.087
df1	114
df2	4353.02
Sig.	0.251

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups. Design: Intercept + ISL_Percentage + Free_Reduced_Lunch_Percentage + ISL_Percentage * Free_Reduced_Lunch_Percentage

A two-way MANOVA was conducted to determine the effect of instructional support participation percentage and free or reduced lunch percentage on the two dependent variables of achievement in math and reading. As shown in Table 13, factor interaction was not significant, $F(130, 428)=.819$, $p=.913$, $\eta^2=.199$. MANOVA results (Table 13) indicate that instructional support participation percentage (Wilks' $\Lambda=.972$, $F(16, 428)=.385$, $p=.986$, $\eta^2=.014$) and free or reduced lunch percentage (Wilks' $\Lambda=.618$, $F(102, 428)=1.142$, $p=.185$, $\eta^2=.214$) do not significantly influence the combined dependent variables of student achievement for math and reading.

Table 13. Effect of instructional support participation percentage and free or reduced lunch percentage on the two dependent variables of achievement in math and reading

	Multivariate Test[C]					
Effect (Wilks' Lambda)	Value	F	Hypothesis df	Error df	Sig.	Partial Eta squared
Intercept	0.029	3.61E+03	2	214	0	0.971
ISL Percentage	0.972	.385[a]	16	428	0.986	0.014
Free_Reduced_Lunch_Percentage	0.618	1.142[a]	102	428	0.185	0.214
ISL_Percentage * Free_Reduced_ Lunch_Percentage	0.641	.819[a]	130	428	0.913	0.199

[a] Exact statistic

[b] The statistic is an upper bound on F that yields a lower bound on the significance level.

[c] Design: Intercept + ISL_Percentage + Free_Reduced_Lunch_Percentage + ISL_Percentage * Free_ Reduced_Lunch_Percentage

An ANOVA follow-up test was conducted. As shown in Table 14, the ANOVA results indicate that student achievement in math is not significantly influenced by instructional support participation percentage ($F(8, 215)=.451$, $p=.889$, $\eta^2=.017$), but is significantly influenced by free and reduced lunch percentage ($F(51, 215)=1.631$, $p=.009$, $\eta^2=.279$). Student achievement in reading is not significantly influenced by instructional support participation percentage ($F(8, 215)=.533$, $p=.831$, $\eta^2=.019$) or free or reduced lunch percentage ($F(51, 215)=1.385$, $p=.058$, $\eta^2=.247$).

Table 14. ANOVA to determine whether student achievement in math is influenced by instructional support participation percentage and/or by free and reduced lunch percentage

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Percent_proficient_Math	11836.280[a]	124	95.454	1.321	.038	.432
	Percent_proficient_Reading	11434.450[b]	124	92.213	1.281	.057	.425
Intercept	Percent_proficient_Math	435981.913	1	435981.913	6032.875	.000	.966
	Percent_proficient_Reading	432013.068	1	432013.068	6000.479	.000	.965
ISL_Percentage	Percent_proficient_Math	260.983	8	32.623	.451	.889	.017
	Percent_proficient_Reading	306.929	8	38.366	.533	.831	.019
Free_Reduced_Lunch_ Percentage	Percent_proficient_Math	6013.039	51	117.903	1.631	.009	.279
	Percent_proficient_Reading	5083.938	51	99.685	1.385	.058	.247
ISL_Percentage * Free_Reduced_Lunch_ Percentage	Percent_proficient_Math	3462.637	65	53.271	.737	.925	.182
	Percent_proficient_Reading	4116.813	65	63.336	.880	.724	.210
Error	Percent_proficient_Math	15537.552	215	72.268			
	Percent_proficient_Reading	15479.233	215	71.996			
Total	Percent_proficient_Math	2409452.398	340				
	Percent_proficient_Reading	2341883.560	340				
Corrected Total	Percent_proficient_Math	27373.832	339				
	Percent_proficient_Reading	26913.683	339				

[a] *r* squared = .432 (Adjusted *r* squared = .105)

[b] *r* squared = .425 (Adjusted *r* squared = .093)

Multivariate analysis of variance was conducted to determine if school districts with a higher percentage of free or reduced lunch have lower student achievement while controlling for participation percentage in the instructional support program. The results did not indicate that the participation percentage in the instructional support program and free or reduced lunch percentage significantly affect the combined variables of student achievement in math and reading. However, ANOVA revealed that the free or reduced lunch percentage has a statistically significant relationship with student achievement for both math and reading separately, but both math and reading achievement are not significantly related to instructional support program percentage.

Summary of Research Questions

This study was designed to answer the question of how much variability can one explain about student achievement, using the Iowa Test of Basic Skills for 4th grade students, knowing district size, instructional support levy tax rate, property valuations per pupil, and free or reduced lunch percentages using multiple linear regression models? Within this question the following questions were answered:

1. What effect does a school district's property valuation per pupil have on student achievement for 4th grade students on the Iowa Test of Basic Skills?
2. Does district enrollment (# of pupils) positively or negatively affect student achievement as shown using the Iowa Test of Basic Skills for 4th grade students, controlling for the level of participation in the instructional support program?
3. Does the participation percentage in the instructional support program relate statistically to student achievement?

4. Is there any statistically significant correlation between school district enrollment and the participation percentage in the instructional support program?
5. Does school district average adjusted gross income per return, account for any variations in student achievement, controlling for the level of participation in the instructional support program?
6. What relationship is there between the percentage of students on free or reduced lunch and student achievement, controlling for the level of participation in the instructional support program?

Question 1

This question was included in the study to ascertain if there is a relationship between property wealth within a school district's boundaries and student achievement. Looking at the funding model from this direction helps shed light on property rich and property poor school district in the area of student achievement. Property rich or property poor is not a direct reflection of SES for residents in the district or student within a school. Property poor districts tend to lack in commercial and industrial property base which, in turn, causes the property tax rate of a district to be higher.

For example, Norwalk Community School district which has a total property value of $ 275,485,545/2,238 students = $ 123,094.52 assessed value per student, has a total school tax rate of $21.27/$1,000 of assessed value. A property rich district with an abundance of commercial and industrial property such as West Des Moines which is a neighboring district that has a total property value of $ 3,520,173,049/8,798 students = $400,069.67 assessed value per student, has a total school tax rate of $ 13.70/$1,000 of assessed value. Some school districts have very

affluent students and residents, but are considered property poor based on the district's lack of property tax base (primarily residential dwellings). Norwalk is a prime example of this type of school district.

Pearson correlation coefficient results indicate there is a positive relationship between property valuations per pupil and student achievement in both math and reading. Thus, the null hypothesis was rejected, inferring there is zero correlation between these variables. From this finding one may conclude that as property value per pupil increases, student achievement in both math and reading also increases. This finding moves beyond the SES of individual students and takes a look the district as a whole. In a funding model that relies heavily on property taxes and tax rates, the current model may be detrimental to achievement to a student because of where he or she lives and not because of her own SES.

Question 2

This question was driven by the argument that small school districts in Iowa should consolidate into larger districts. Within the state of Iowa, school districts range in size from 86 students at Lineville-Clio School District to 31,548.6 students in the Des Moines Independent School District. The state legislature has given school districts the opportunity to increase their general fund by up to ten percent using the instructional support program. This question in the study ascertained the relationship between district enrollment and student achievement, and the influence the instructional support program has on this relationship.

From the findings, one may conclude that student achievement is related to district enrollment. As school district enrollment increases, on average, student achievement will decrease. The level of participation in the instructional support program has no influence on this

relationship. Smaller school districts are not required to report testing from specialized populations if they do not have enough students in a subgroup to meet the minimum state requirements. This lack of reporting may have impacted the findings.

Question 3

This analysis answers the underlying question as to the equity of the instructional support program and the relationship this program has regarding student achievement. Pearson correlation coefficient was used to test the hypothesis. The findings from this inquiry revealed there is no statistical relationship between student achievement in math and reading, and the level of participation in the instructional support program. Thus, one fails to reject the null hypothesis that student achievement in math and reading has zero correlation with the participation percentage in the instructional support program. This finding disproves the theory that more money will equate to higher student achievement.

If pouring money into schools with little direction regarding how the money is to be spent actually works, than this researcher perceives there will be a statistical relationship between the instructional support program and student achievement. The discussion that people around the state should be having is: “How can we spend our money most effectively to improve student achievement,” rather than simply talk about how we can solicit more funds for education.

Question 4

This question was designed to ascertain whether a school district participates in the instructional support program and to what level the district participates looking solely at district enrollment. Pearson correlation coefficient was conducted to examine this relationship. The findings indicate the relationship between these two variables is negligible and non-significant.

Thus, one fails to reject the null hypothesis that district enrollment and instructional support program participation percentage have zero correlation. School district enrollment is not an adequate indicator of participation percentage in the instructional support program, suggesting that equity is not an issue when considering the relationship between district enrollment and participation percentage.

Question 5

An examination of the average adjusted gross income per return enables one to review the SES levels within a community rather than only the students attending the schools in the community. This provides a background to the community that supports the schools. Based on the findings, one may conclude that student achievement in math and reading is related to average adjusted gross income per return. As average adjusted gross income per return increases, student achievement in math and reading also increases. This finding reinforces the notion that students from a more affluent community will have higher achievement in math and reading. As in question 2, the participation percentage in the instructional support program had no influence on this relationship.

Question 6

The last question pertains to the impact a district's participation percentage in the instructional support program has on students with low SES and their achievement in math and reading. The results showed no effect on student achievement when combining participation percentage in the instructional support program and free or reduced lunch percentage. However, when looking at these two entities separately, free and reduced lunch percentage negatively affects student achievement in math but not in reading. One may conclude that full participation

in the instructional support program will not overcome a negative relationship between low SES and student achievement. This finding reinforces the finding in Question 2, that simply adding money to a problem will not help solve the problem. The education community needs to systematically look at how dollars are being spent and which practices yield the best results for students with low SES.

Summary

This chapter presented the results of the statistical models that were used to test the hypotheses outlined in Chapter 1. MANOVAs and bivariate correlations were conducted to determine the relationship between variables and to eliminate unnecessary variables. From the findings one may conclude that participation in the instructional support program has little to no statistical relationship with student achievement. One might also presume that, as property valuation per pupil increases, student achievement in math and reading also increase, and as free or reduced lunch percentage increase student achievement in math and reading will decrease.

In addition to these relationships, school district enrollment was negatively related to student achievement suggesting that as school districts grow (enrollment increases), student achievement, on average, will decrease. Including an instructional support program in a district cannot help overcome this relationship. Another relationship was revealed pertaining to student achievement and average adjusted gross income per return. This relationship was positive, explaining that as average adjusted gross income per return increases student achievement also increases.

This study primarily investigated the instructional support program. However, after conducting several tests including instructional support participation percentage, the findings

revealed that one was unable to reject the possibility that this program has zero correlation with student achievement. Although, one must consider the low *r*-squares in the model indicating that there may be other factors which could be used that have an effect on the relationship between student performance and the instructional support program. Other variables such as average adjusted gross income per return, property valuation per pupil, free or reduced lunch percentage, and enrollment surrounding the instructional support program revealed significant relationships with student achievement. A more in-depth analysis to examine what these findings mean and what policy implications the findings may have will be discussed in the Chapter 5.

CHAPTER 5. SUMMARY, CONCLUSIONS, AND DIRECTIONS FOR FUTURE RESEARCH

Summary

The purpose of this study was to gain insight into the Iowa school funding model and any relationships that may exist between the current funding model and student achievement, especially focusing on the instructional support program. Legislators and educators alike would like to ensure that all children in the state receive an adequate and equitable education. Using statistical analysis of variables related to school financing and student achievement, this study took a look at the equity in the instructional support program and whether there is any statistical relationship between variables associated with this program and student achievement across districts in the state of Iowa.

The idea for this study came from a conversation with Larry Sigel, who is the School Finance Director for the Iowa Association of School Boards. Larry spends a lot of his time with individual school districts and legislators discussing the Iowa Funding Model. As discussions statewide focus more and more on funding for education, Larry suggested that insight regarding the instructional support program and the relationship this program has with student achievement could help direct legislators and district leaders to take a closer look at the program and possibly make changes as needed. The instructional support program is one of the only ways a school district can increase its general fund. Because of the uniqueness of the Iowa funding model, there has been little research conducted that specifically addresses the instructional support program and the equity [or inequity] the program provides to school districts around the state (Sigel, 2006).

Data for this study were compiled from the 365 school districts in Iowa in FY 06 and FY 07. The data came from the Iowa Association of School Boards. Every public school district in the state during this time period was included in this study. However, because of the small size of some of the districts, there was missing information since districts with less than the minimum number of students enrolled of in a subgroup were not mandated by the state to report student achievement data.

Theoretical Significance

The two most important findings in this study revolve around the relationship the instructional support program has with student achievement, and the relationship school district enrollment has with student achievement. This study was conducted under the notion that the instructional support program is a very powerful piece of the student achievement puzzle. Studies by Wenglinsky (1997b) revealed that student achievement does have a relationship with funding if one delineates among the different areas of funding that are spent directly on instruction. Various statistical models were used to ascertain how the instructional support program directly and indirectly relates to student achievement. Several conclusions were made based on the findings of this study.

First, the relationship between the participation level in the instructional support program and student achievement is non-existent. From the findings one was unable to find a statistically significant relationship between these two areas. Additionally, in each of the tests that were conducted, participation in the instructional support program did not statistically influence the relationship other variables have with student achievement. These findings suggest that increased

participation in the instructional support program does not improve student achievement either directly or by helping to overcome other variables indirectly.

One must also remember because of the immense arena of student achievement and school finance, some factors such as quality of instruction and money spent directly on instruction, may influence the relationship between student achievement and the instructional support program were not included possibly accounting for the lower *r*-squared values in the model. However, this finding does provide some understanding between the relationship between student achievement and school funding showing that when the instructional support program and student achievement are looked at in a controlled model, the additional funds do not statistically help student achievement.

One may also conclude that additional money alone will not increase student achievement. This study found no statistical relationship between the instructional support program at any level and student achievement. This study reinforces research conducted by Hanushek (1997) who revealed there is no strong or systematic relationship between expenditures and student achievement. Additionally, in this study some school districts participated in the program whereas others did not, but the statistical models were unable to find a statistically significant relationship between student achievement and being a part of the instructional support program. Because of this finding, the original notion that student achievement is tied to funding (Hedges & Greenwald, 1996) was not supported in 2007 for school districts in Iowa regarding the relationship between student achievement and funding from the instructional support program.

From the legal aspect of this finding, one may conclude that school districts in Iowa are not all funded at the same level because of the local control of the instructional support program.

Unlike the case in 1990, *Abbott v. Burke*, where the court's order required legislators to fund poor urban districts at a level commensurate with wealthy districts and to provide additional funding to accommodate the special needs of students in poor urban districts (Slavin, 1994). The present study revealed that the current model in Iowa does not have tremendous inequities wherein poor urban districts do not get as much funding because of the model. The inequity in funding for school districts in Iowa is not imposed from the state and could be considered self-imposed by a school district's lack of willingness to participate in the instructional support program. Although a funding inequity does exist, this funding inequity does not have a statistically significant relationship to student achievement and, therefore, could be considered as a moot point. The policy implications for this finding are far reaching and are discussed in the policy implications section of this chapter.

The other main finding of this study is in the area of district enrollment. The significant relationship between student achievement and district enrollment was a by-product of the original intent of the study. As revealed in Chapter 4, there was a negative relationship between student achievement and school district enrollment; as school district enrollments increased, student achievement decreased. However, there is no ideal school district size that will ensure outstanding student achievement (Bard, Gardener, & Wieland, 2007).

The statistical relationship between school district enrollment and student achievement sends the message that larger school districts are not always better when it comes to student achievement. Smaller school districts in Iowa have been under fire recently for their inability to offer as comprehensive of a curriculum as that of larger districts. However, smaller districts have become more creative in their endeavors to provide their students with a well-rounded education through grade sharing and regional academies. Other examples of this creativity are the use of

the Iowa Communication Network (ICN) to hold classes at several locations statewide with the teacher at one central location. There are also opportunities for all districts in Iowa to increase their curricular offerings through online learning provided by the Area Education Agencies (AEA) and community colleges. These online learning opportunities enable students to enroll in a variety of courses, many which allow students to complete the course requirements at any time of the day or night.

An interesting comparison would be to look at student achievement at multiple grade levels to determine if there is a negative affect over time as to the limited curriculum in smaller districts. Perhaps curriculum is not the sole factor of importance in the debate between large versus small schools. Other factors might be SES, special populations, and resources. Further research would help provide information on student achievement and school district size.

In addition to the previously mentioned findings, this study reinforces previous studies that districts with a higher percentage of low SES students will have lower student achievement and districts with higher property values per pupil will have higher student achievement. These findings are important, but should be expanded to include the area of enrollment and student achievement to provide additional information to answer the question, "Is bigger, better?"

Practical Significance

The primary focus of this study centered around the instructional support program and any inequities that may exist surrounding the program. The findings did not reveal inequities with the instructional support program and the relationship the program has to student achievement. However, there were other practical findings that did arise from the study that reinforce previous research discussed in Chapter 2.

As stated previously, the primary focus of this study was to look at the instructional support program. The findings provided no statistical evidence that would enable one to argue that the current instructional support program is inequitable or unfair. Thus, one could state that the instructional support program does not provide a statistically significant advantage to a school district that implements the program over a school district that does not implement the program when looking at student achievement.

From a practical standpoint one might look at these findings and conclude that, for students in the state of Iowa, simply adding additional money to school district budgets will not yield statistically significant gains. Therefore, the rationale is unfounded that districts with higher property tax rates feel they are at a student achievement disadvantage because of their inability to implement the instructional support program in order to keep tax rates low. An example of a district that might be in the position of not being able to participate in the instructional support program because of a high tax rate is Carlisle Community Schools ($17.21/$1,000) as compared to Okoboji Community Schools ($9.58/$1,000) who is participating at the highest percentage allowed, or 10%.

By looking at the relationship school district enrollment has with student achievement one can conclude from these findings that as school district enrollment increases, student achievement suffers. There was a lack of astonishment at this relationship because this researcher has worked in schools with a high percentage of low SES student and in schools with a low percentage of low SES students, and has seen first-hand what student achievement resembles in each of the settings. This relationship, however, is difficult to explain based on the limited data points in this study. There were 26 school districts that did not report student achievement data for 4th grade students in math and reading. Because these 26 districts were some of the smallest

districts in the state, the absence of this data may possibly have affected the outcome of the study in the area of district enrollment and its relationship to student achievement.

Other findings that were no surprise to this researcher were that school districts with higher percentages of students on free or reduced lunch tended to have lower student achievement. As this research study was being conducted the Supreme Court ruled on the case, *Parents Involved in Community Schools v. Seattle School District No. 1 et al.,* in the area of desegregation and using race as a sole determiner in desegregation policies. The Supreme Court found that a school district cannot base their desegregation plan solely on the race of a student (Hollen, 2007).

Because of this ruling, several school districts in Iowa are looking at possibly using socioeconomic status instead of race as a determiner of desegregation as other districts in other parts of the country do this factor. This study provided a brief look at the relationship socioeconomic status has with student achievement. Because this study's primary focus was school finance and not socioeconomic status and the relationship with student achievement, caution should be used when looking at these results and attempting to use them for anything other than their intended purpose, which was to determine if the instructional support program influences the relationship between the percentage of low SES students and student achievement. Nevertheless, this study did provide a starting point for discussion regarding SES and student achievement in the state of Iowa.

Policy Implications

As school districts and policymakers look for ways to improve education in the area student achievement, assigning money with no intended purpose associated with the instructional

support program does not seem to work. There are many in education who feel that, if schools had unlimited funds, they would be more successful. However, the negligible effect of the instructional support program in this study indicates that, at least, this form of funding does not make a difference. The implications from this study to the educational community are very strong. The findings of this study can be used to advise that, as the state legislature meets to discuss funding for education in Iowa, legislators need to understand that simply giving school districts more money, under the same conditions as the instructional support program, will not necessarily equate with greater student achievement.

In the area of the instructional support program and the inequities that may exist within the Iowa funding model for schools, one may conclude that allowing individual school districts to have the ability to approve participation in the instructional support program does not perpetuate inequities in student achievement among districts. Therefore, the argument that the current model is inequitable as it relates to student achievement and the instructional support program is unsubstantiated.

In addition to findings regarding the instructional support program, the policy implications from the relationship school district enrollment has with student achievement could prove to be important as legislators and others in education examine the push to consolidate smaller school districts. This study revealed that, as school district enrollment goes up, student achievement goes down. These findings help validate the need for smaller districts, and may provide a starting point to begin looking at student achievement in relation to district size. However, it is not clear that school district size is the most important factor in student achievement.

The findings from this study might, hopefully, push legislators and educators alike to take a closer look at how money is being spent in districts with higher student achievement as opposed to simply asking for more money. The discussion of how to best educate the children in the state of Iowa with the limited funds the state has should be at the forefront of the discussion. Caution should be made regarding those in school districts and teacher unions who ask for more money from the state simply for the sake of having more money. Study after study has shown that what matters most in student achievement is quality instruction (Murnane, 1995).

The following are a list of recommendations to legislators and policymakers in the area of school finance and student achievement as these groups go forward and make decisions about the education of children in the state of Iowa.

Recommendations

Several recommendations were made based on the findings of the study.

1. *Continue the use of the instructional support program until further study can be done to determine the effectiveness of this program in each school district.* To make a decision to cut funding to public schools by up to 10% by removing the instructional support program can only be done after conducting a more in-depth analysis of each school district and the direct effect the instructional support program has had on student achievement in each district. This researcher does not advocate cutting funding to public schools in Iowa. If the instructional support program were repealed, it could be detrimental to the school districts that have come to rely on this source of funding for the day-to-day operations within their district. For example, school districts have used this money to increase teacher salaries; if the money were taken away, they would either have to reduce their teaching staff or reduce the salary of the employees in the district.

2. *The money associated with the instructional support program should come with a series of researched-backed best practices that must be implemented with the program.* As stated previously in Chapter 2 and in the findings in this study, simply throwing money at education without definitive expected outcomes will result in statistically insignificant gains. In a study conducted by Murnane and Levy (1995), 15 schools were given additional resources to hire teachers, however, these resources only led to achievement gains in only two of the districts. In these two districts, the resources were accompanied with other educational reforms designed to take advantage of smaller class sizes (Murnane, 1995). The educational community should look at ways to implement a program that mandates the use of best practices at all levels in order for school districts to continue to receive the funds from the program (e.g., reduction of class size in the elementary and other transition years). Accountability is a key component that is lacking in the instructional support program. School districts have the ability to spend funds for the instructional support program on any type of general fund item. Therefore, a school district could use the money entirely for salaries and benefits and forego applying the money for professional development or classroom materials.

3. *Provide property tax relief for school districts that are property poor by implementing a state property tax rate for the general fund that is equal to the current average of all property tax rates across the state.* The current system has some extreme inequities as outlined in Chapter 2. For example, the total combined school property tax rates in 2006-07, including all levies, varied in Iowa school districts—from a low of $9.20 per $1,000 to a high of $21.96 per $1,000 (Sigel, 2006). The property tax rate among school districts varies so much that the property tax rate could be crippling to some districts when it comes to levying for additional money not only for the instructional support program, but also for facility needs. By implementing this type of

reform, the state would level the playing field for all districts to evaluate their own need for special levies. In addition, a common property tax rate among school district in Iowa could lend itself to an easier consolidation of smaller districts if that is the desired outcome.

Directions for Future Research

Further study is needed in the area of property tax rates and the decision making process behind local decisions to implement the instructional support program. A qualitative study using interviews and a survey instrument to gather information on why school districts choose to or not to participate in the instructional support program would provide needed feedback into the current system. For example, someone could take a sample of school districts that have different levels of participation in the instructional support program along with varying tax rates and different district sizes to gain to provide a context for the discussion of why districts do or do not implement the instructional support program.

Another recommendation for further study would be to look at each school district's student achievement data prior to the implementation of the instructional support program and what the difference in student achievement was after implementing the program. Such an analysis would reveal the relationship between having and not having the instructional support program in a district. Further research could also measure the effectiveness of the instructional support program by looking at longitudinal data of school districts, taking a sample from years with and without the instructional support program to examine any differences that may have taken place over a period of time. This type of study would provide more detailed information for each school district as to the effectiveness of their participation in the program. The findings from this study could also support or oppose the need for more money for schools in Iowa.

In addition, this study only provided a snapshot into student achievement and district enrollment. As stated previously, with a longitudinal study one could take a greater in-depth look at student achievement within a school district and examine gains within cohort groups. This type of study would provide data to help drive the discussion regarding the consolidation of smaller school districts.

Limitations

This study was conducted using a single year of data for both student achievement and school finance. Therefore, the data may not reflect trends that are occurring over time within a school district and across the state. However, this study did provide a good starting point to examine school funding in Iowa and the relationship it may have with student achievement.

The measure of student achievement was same as used by the state to determine adequate yearly progress. However, as an educator, one understands that a single assessment to measure student achievement is not necessarily a perfect reflection of student achievement within or across school districts. Yet, this type of assessment is the only universal measure currently used for student achievement in Iowa.

This study was a quantitative study. Therefore, no attempt was made to determine the reasoning behind a school district's choices whether to implement or not implement the instructional support program. This lack of understanding leaves to speculation the reasons for the districts' decisions.

The topic of interest in this study was limited to a very small portion of the Iowa school finance model, thus caution should be used when generalizing this study beyond the scope of the instructional support program and the Iowa school finance model. Only public school data for

school districts that had to report student achievement to the state of Iowa were included in this study. There were some missing data points from extremely small districts that were not required to report student achievement data for 4th grade students. Thus, an argument could be made that, if the missing data were included, a different statistical outcome might have occurred.

Conclusion

The Iowa school funding model is a complex and unique method to finance K-12 public education in Iowa. This study addressed, a very small component within this model and tried to shed light on the relationship that exists between school funding in Iowa and student achievement. This study did not look at school funding in Iowa and should be viewed as a single piece of a very complex puzzle.

Unfortunately, this study does not support the notion that more money for schools will equate to higher student achievement. What this study accomplished is to open the door to discussion about school finance and the relationship it has with student achievement in Iowa, placing emphasis not on the need for more money, but by focusing on what successful school districts are doing to increase or maintain high student achievement.

Equity in educational funding and the adequacy by which schools are funded will continue to be a heavily debated topic around the state. As an educator, taxpayer, and parent, I would like to ensure that the conversation regarding increasing student achievement is carried out in a manner that is cognizant and respectful to everyone. This study was designed to inform and, hopefully, motivate people to strive for ways to improve student achievement as well as reevaluate how we look at funding public schools in Iowa.

APPENDIX A. DEFINITIONS

Additional levy: A property tax levy in the amount necessary to fully fund a school district's combined district cost and required by the school finance formula to be levied each fiscal year. It is sometimes referred to as the foundation levy. It is one component of funding the combined district cost. Iowa Code § 257.4.

Certified annual report (CAR): A detailed annual compilation of enrollment and receipts and disbursements of all funds for the fiscal year filed with the department of Education on or before August 15 each year.

Combined district cost: The first and major element of a school district's authorized spending authority. It is determined briefly by multiplying the district cost per pupil by the number of pupils in the school district. It is funded by state foundation aid, the uniform levy and the additional levy. It is often referred to as controlled budget. Iowa Code §§ 257.1, .4.

District cost per pupil: The value assigned by the school finance formula to the pupils in a particular school district. Iowa Code § 257.10.

Fiscal year: July 1 through June 30. Iowa Code § 24.2

Free or reduced lunch: Children whose families have an income of 130% or less of the Federal poverty guideline as well as those who receive food stamps or Temporary Assistance for Needy Families (TANF) are eligible for free lunch. Those whose families have incomes from 131% to 185% of the poverty guideline are eligible for reduced-price meals.

General fund: The fund that receives the revenues from the school finance formula. It is a governmental fund under GAAP which accounts for the revenues and expenditures for the educational program and most school district operations. Iowa Code § 298A.2.

Instructional support program: Miscellaneous income to the school district of up to ten percent of the regular program cost in the form of property tax and state aid or property tax income surtax and state aid. §257.18-27.

ITBS: Iowa Test of Basic Skills, a test used by the state of Iowa to measure student achievement through annual yearly progress.

Miscellaneous income: Revenue which is not part of the combined district cost. In other words revenue other than the uniform levy, state foundation aid and the additional levy are considered miscellaneous income. The second element of total spending authority. Iowa Code § 257.2(9).

Property valuations: The value of all taxable property within a school district's boundaries

State allowable growth: The annual dollar amount calculated by the Iowa Department of Management based on legislation and which is added to each school district's cost per pupil to provide additional funding to school districts. Iowa Code §§ 257.8, .29(12).

State cost per pupil: The value assigned by the school finance formula to each pupil in Iowa's school districts. Iowa Code § 257.10.

School finance formula: A statutory funding mechanism based on the number of pupils in a school district which authorizes the maximum (spending ceiling) a school district may spend in any fiscal year. Iowa Code § 257.

State foundation aid: Funding paid by the state to school districts to provide equitable funding on a per pupil basis. It is one component of funding the combined district cost. Iowa Code. § 257.1 (2).

Total spending authority: The maximum amount authorized under the school funding formula for a school district to spend and certify on its budget for a fiscal year. It includes the sum

of the combined district cost, miscellaneous income and unspent balance. It is often referred to as authorized budget. Iowa Code § 257.7.

Uniform levy: A property tax levy in the amount of $5.40 per thousand dollars of assessed valuation and required by the school finance formula to be levied each fiscal year. It is sometimes referred to as the foundation levy. It is one component of funding the combined district cost. Iowa Code § 257.3.

APPENDIX B. VARIABLES

District Name	Total	District Taxable Val Per pupil
County	Total Operating Levy	budget Guarantee
AEA	Management Levy	First Fiscal Year
District	Library Levy	Last Fiscal Year
Total Number of Students PK-12	Board Approved PPEL	Stated Percent Generated
Free Lunch	Voter Approved PPEL	Effective Percent Generated
Reduced-Price Lunch	Schoolhouse	Maximum Dollars
Free or Reduced Price Lunch	Public Education and Recreation Levy (PERL)	ISL Property Tax Rate
math_enr_4	Debt Service	Income Surtax Rate
math_test_4	General Fund Levies	Adjusted State Aid (35%)
mathpart_4	Total Property Tax Levies - All Sources	Income Surtax Dollars
math_fay_4	RETURNS	Property Tax Dollars
math_prof_4	GROSS INCOME	Total Dollars
mathProf_4	NTI	
read_enr_4	Personal CREDITS	
read_test_4	Dept CREDITS	
readpart_4	Computed TAX	
read_fay_4	out of state RETURNS	
read_prof_4	out of state CREDITS	
readProf_4	Average Tax Per Return	
Uniform Levy	Avg AGI Per Return	
Additional Levy	Average Taxable Income Per Return	
Addl Levy	Effective Tax Rate (AGI)	
SBRC Cash Reserve Levy (special education)	Income tax paid 2004	
Regular Cash Reserve Levy	FY06RPDC w/o Adjustment	
Educational Improvement Program	2004Taxable valuation with utilities	
Instructional Support Program	Budget Enrollment	
Balance to Reduce Levy	State Taxable Valuation Per Pupil	

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