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Estimating the efficiency of michigan's rural and urban public school districts

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ESTIMATING THE EFFICIENCY OF MICHIGAN'S RURAL AND URBAN PUBLIC SCHOOL DISTRICTS

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DEDICATION

I would like to thank my parents who have continually and consistently supported all of my decisions. Most of all, I want to thank my husband and my two daughters - their daily patience, support, and encouragement were my motivation to continue to pursue my true passion.

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CHAPTER ONE

Introduction

Each year hundreds of billions of dollars are spent by the public education systems in the United States to educate our nation's children. The Education Statistics Services Institute for the National Center for Education Statistics (NCES) reports that over 555 billion dollars in revenue was collected in 2007 by local, state, and federal government agencies to fund elementary and secondary public school education in the United States (Zhou, 2009). Most educators agree that more money would provide a better education for children, yet there is not much consensus among educators regarding how and where funding is best utilized (Odden & Picus, 2000). Over the past 30 years educational spending has nearly doubled, yet research indicates student performance has not improved much despite the efforts (Greene & Trivitt, 2008).

It is recognized that educational money is wasted at times, resulting in a need for educational outcomes to be aligned with resources (Grubb, 2009). Much of the increased funding received by schools over the past few decades has been allocated for the expansion of specialized school programs and specialized student services which never enter the general education classrooms, leaving student achievement levels relatively flat (Odden & Picus, 2000). Increases in school funding will not increase student performance if the money is not used appropriately (Grubb, 2009; Hacsi, 2003). When educators do not understand how to effectively use resources, or are unable to identify those which are most effective in improving student performance, additional funding increases will likely be wasted (Grubb, 2009). Numerous research studies relating student performance to resources have been published, and their conflicting or inconclusive findings have only fueled growing controversy regarding education policy (Hacsi, 2003; Hanushek, 1997).

There exists strong debate in educational, political, and judicial realms with regard to how much money is necessary for students to receive an adequate education in the United States. Nearly every state in the U.S. supports a school funding system in which children in some districts receive considerably less educational funding and resources than children residing in other school districts (Renchler, 1992). The few states that have reduced funding inequities have failed to equalize school resources and student performance as a result (Grubb, 2009). Some researchers debate the importance of identifying the minimum amount of money necessary to educate students, over identifying how to get the greatest efficiency from existing educational resources, to increase student outcomes (Darling-Hammond, 1999; Grubb, 2009).

Financial equity in education centers on financial resources, while adequacy in education centers more on student performance outcomes (Hacsi, 2003). Identifying the components that constitute an adequate education for students, as well as the costs of an adequate education, has not yet been determined because disagreement exists as to what constitutes adequacy in education (Hacsi, 2003). The states' constitutions include education clauses that have been the subject of school finance litigation in more than half the states across the U.S., yet reform efforts initiated in response to judicial mandates for either equity or adequacy judgments have failed to significantly impact overall student achievement (Greene & Trivitt, 2008). Some researchers question the ability of legislatures and school boards to make effective educational reform policies when anxieties over the possibilities for re-election can overshadow the decision making process (Greene & Trivitt, 2008).

School funding systems and student performance indicators are complex and varied, and the debate over the relationship between school resources and school effectiveness continues unabated (Odden & Picus, 2000). Measuring student performance through standardized testing

and high school graduation rates is the current and most common method of measuring school accountability in the United States. As the amount of public school aid continues to increase annually in the United States, an expectation of performance for the dollars put forth toward the education of the nation's children is apparent in legislatures' increased demand for accountability in student performance. This is evident in the reauthorization of specific legislation addressing student achievement and underperforming schools.

In 1994, Michigan voters passed Proposal A which increased the amount of funding received by the lowest funded of Michigan public school districts, yet large scale differences in per-pupil funding still exist. Moreover, how Michigan public school districts utilize their allocated resources varies greatly. The need to implement policy to create an education system that encourages thoughtful and purposeful spending may be more important than the level of spending the educational system receives (Greene & Trivitt, 2008).

The reauthorization of Title I in 1994 and the enactment of No Child Left Behind (NCLB) in 2001 were, in part, responsible for changes in how schools now report Adequate Yearly Progress (AYP) (History of AYP, 2008). To meet the federal requirements placed on schools under NCLB, in 2001 Michigan changed its requirements for schools to meet AYP requirements. These changes included higher competency standards in mathematics and English language arts (ELA), as well as meeting specific attendance and/or graduation rate requirements (History of AYP, 2008).

Furthermore, to comply with regulations set forth under NCLB, in 2005 the governors of all 50 U.S. states signed the National Governors Association Graduation Counts Compact which requires public schools to accurately report the number of students graduating from high school in four years or less (New accurate measure, 2008). Such changes in legislation, at both the

federal and state levels, only solidify the expectation of accountability for the tax dollars spent to educate children. A good deal of political support has accompanied the quest for increased accountability in student achievement, yet identifying the effects of programs established in response to new policies on student achievement remain uncertain (Clotfelter, Ladd, Vigdor & Diaz, 2004).

During the 2003-2004 school year, Michigan began tracking first time ninth grade high school students in response to the governors' 2005 agreement by which states' graduation rates are to be calculated only for students completing a regular high school diploma in four years or less (New accurate measure, 2008). The Center for Educational Performance and Information (CEPI) reported a 2007 "on-time" statewide graduation rate of 75.45 percent for the 2003-2004 cohort of freshmen students attending Michigan public high schools and public school academies (New accurate measure, 2008).

Legislative mandates, as found in the NCLB Act, require teachers to be certified, or considered highly qualified, in their content areas if they are to be employed by a public school system. The largest financial expenditure for public schools is student instruction, yet the quality of instruction can differ greatly among school personnel. Student outcomes are largely based on the effectiveness of a school's teaching, support, and administrative staff. However, situational variables such as a child's socioeconomic status, health, and home life could considerably affect student performance as well.

Nationally, salaries and benefits comprise about 80 percent of the total expenditures of school districts (Grubb, 2009). Michigan public school districts are individually responsible for how much compensation they will provide to their teachers. Within a district, teacher compensation is typically based on education and years of experience (Clotfelter et al., 2004).

Michigan public school teachers generally follow identical steps in their compensation salary schedules within their respective districts. However, teacher salaries and benefits can vary greatly between school districts due to the financial situation of the district and the dynamics of collective bargaining. In 2006, compensation for student instruction, which included the costs for teacher salaries, benefits, and support services, constituted 83.3 percent of core school spending nationally (CCSSO, 2009). In Michigan, 83.7 percent of core spending was allocated toward compensation for student instruction during the same time period (CCSSO, 2009).

When a school district has the ability to pay higher teacher salaries, it does not mean student achievement will be increased over lesser paying districts. A district paying less in teacher salaries may well have the same or better student outcomes than higher paying school districts. Salary increases for Michigan public school teachers are dependent on their years of service with their district and their level of education. Therefore, more experienced teachers, and teachers with higher education levels, receive higher salaries than teachers with fewer years of service with their district or less college education.

The geographic location of a district can also influence a district's salary scale if teachers perceive the district to be more or less pleasant than another district competing for qualified teachers (Fowler & Monk, 2001). Schools with more favorable school climates may be perceived by teachers as having better working environments and therefore could allow for a district to pay relatively lower salaries, consequently reducing district costs. School climate and the administrative stability of schools are associated with student outcomes which may also influence a teacher's decision to remain with a district (Grubb, 2009). Furthermore, salary, benefits, and the location of a district could influence a teacher's decision to remain with a

school district. Hence, some districts have lower teacher turnover and therefore, a more experienced teaching staff.

The financial resources available to children from federal, state, and local governments are only part of the resources that may affect student performance. A family's demographic structure and financial resources are also necessary measures when assessing the effects of socioeconomic status (SES) on a child's educational environment (Peoples, 1998). Aspects of the socioeconomic status of a family include the income of the family, the employment status and employment position of the parent(s), the education level of the parent(s), the social status of the family within their community, and the perceptions the community holds of the family (Demarest, Reisner, Anderson, Humphrey, Farquhar & Stein, 1993). Examining the overall financial well-being of the residents who make up the communities in which school districts are located is useful in determining the impact SES has on student achievement. The average adjusted gross income (AGI) of a community is one indicator of community wealth; property wealth is another indicator.

The affluence of a community still contributes to the overall resources of a school district in Michigan as a limited millage property tax is in place for all Michigan property owners based on the State Equalized Value (SEV) of their properties (Kearney & Addonizio, 2002). Some districts have a strong tax base and the ability to pass bonds for non-operational expenses within their districts. Furthermore, some districts are afforded higher per-pupil revenues than other school districts, creating a range of funding inequities in the Michigan school funding system. As part of Michigan's 1994 school finance reform package, provisions were made allowing some districts to receive more than the basic foundation allowance granted, as these districts were already receiving more state funding per-pupil than the stipulated minimum allowance.

Inequities in school finance among public school districts are a reality in nearly every state in this country, yet few states have successfully reformed their school finance system to address matters of adequacy, equity, or fairness of resources among their public schools and public school districts. The Michigan state legislature has taken steps toward greater equity and adequacy of school finance in instituting school finance reform under specific legislation in 1994. However, the per-pupil amount is still not equivalent for each Michigan public school district.

Research has not shown strong evidence of student achievement being positively related to the amount of financial resources a school district receives. Therefore, determining how current resources are used may be more important than increasing the amount of resources provided to schools (Hacsi, 2003; Odden & Archibald, 2001). Timothy Hacsi (2003) believes the most disadvantaged schools need to be adequately funded if real education reform is to occur. He also argues, if children are to receive a quality education, that it is necessary to identify what types of expenditures have been most effective in increasing students' academic performance. Simply increasing financial support to schools does not guarantee increased student achievement (Hanushek, 1997).

Purpose of Study

Urban, suburban, and rural are categories commonly used to identify schools by geographic location. It is quite common for policy makers and education researchers to use such categories to report student achievement outcomes. However, identifying urban and suburban schools has been more definitive in education research than identifying rural schools. Research involving rural education has been hindered due to the lack of a universally acceptable definition of "rural" (Rural Assistance Center, 2009). Rural is either completely ignored as a category or

suburban and rural are combined in education research and identified only as suburban. Recently, in a collaborative effort between the NCES and the U.S. Census Bureau, specific geographic codes have been identified which classify each school district in the U.S. into definitive categories of city, suburban, town, and rural.

The purpose of this study was to examine student achievement in Michigan public school districts to determine if rural school districts are demonstrating greater financial efficiency by producing higher levels of student achievement than other public school districts in similar socioeconomic circumstances. In comparison, children living in rural and urban communities demonstrate stronger similarities in SES than when compared to children living in suburban communities. This study examined socioeconomic variables at the community level, as well as expenditures from local, state, and federal sources to determine if specific financial variables had an impact on student achievement based on the geographic location of the school districts. The measures of student achievement in this study included 2007 Michigan high school student graduation rates by school district and proficiency rates for 11th grade students in mathematics and English language arts as reported by each school district on the 2007 Michigan Merit Exam (MME).

Research Questions

1. Do rural Michigan public school districts graduate greater percentages of high school students than urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?

2. Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in mathematics than students in urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?
3. Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in English language arts (ELA) than students in urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?

Operational Definitions

Adjusted gross income (AGI): utilized for federal, state, and local tax filings for individuals residing in the United States; the AGI is the yearly income of an individual or married couple that has been adjusted for allowed federal deductions to determine the taxable liability, or taxable benefit, of the individual or married couple. The AGI's utilized in this study were represented as an averaged AGI of all of the residents in an area public school district who filed 2007 tax returns.

English language arts (ELA) proficiency score: represents the combined scores students receive for the reading and writing portions on the Michigan Merit Exam

(MME). Student scores meeting or exceeding the proficiency requirements for the MME are averaged by district and reported as a percentage.

Hold harmless millage: statutory authority established in Michigan in 1994 to allow public school districts with per-pupil expenditures greater than $6,500, prior to the passing of Proposal A, to avoid loss of revenue under the 1994 Michigan public school funding reform initiative by passing additional local operating millage (Addonizio, Mills & Kearney, 1998).

Horizontal equity: in an educational setting, individuals of equal standing or circumstance will receive equal treatment in the allocation of educational resources.

Instructional expenditures: total expenditures of a district for instruction and instructional support services for basic education (pre-school and K-12), special education, compensatory education, vocational education and adult education (per Sec. 107 of the State School Aid Act) to carry out classroom instruction. This amount includes salaries and benefits for teachers, teacher aides, purchased services related to student instruction, extra and co-curricular activities for students, supplies, and textbooks. This amount does not include capital outlay.

Michigan basic foundation allowance: a guaranteed minimum or basic level of per-pupil funding allocated to public school districts levying property tax millage rates as set by the Michigan state legislature (Addonizio et al., 1998; Kearney & Addonizio, 2002).

Michigan State Equalized Value (SEV): Michigan's state equalized property values are assessed at 50 percent of the actual value of a home and the property on which the home is situated (Kearney & Addonizio, 2002).

Millage (mill): a unit of measure applied to property tax rates at one-tenth of one percent.

Operating expenditures: the total amount of paid and owed expenditures a district incurs for the daily operation of schools which includes instructional services, support services, purchased services, and supplies during a fiscal year. This amount does not include charges or expenditures for capital outlay, debt services, or community services.

Socioeconomic status (SES): may include the income level of a family, employment status, social status, education level of the parent(s), and a community's perceptions of a family (Demarest et al., 1993).

Support services: the expenditures for administrative, business, operations, maintenance, transportation, technical, and logistical support for student instruction. Also included in instructional support are speech therapists, counselors, nurses, and curriculum personnel. This amount does not include capital outlay.

Taxable Value (TV): calculated for a property in Michigan by taking the taxable value of the property from the previous year and multiplying it by 1.05 or the current rate of inflation. The lesser amount is applied to the property. When the TV is less than the SEV, the property is assessed an increase equal to the current rate of inflation, or five percent (5%), whichever is less. A property's TV cannot exceed its SEV in Michigan (Williams, 2009).

Vertical equity: in educational settings, individuals of unequal standing or circumstance will receive different treatment in the allocation of educational resources. Special needs students are an example of a subpopulation of students who typically receive a greater allocation of resources than the rest of the student population.

CHAPTER TWO

Literature Review

Introduction

Improving the academic performance of public school students in the United States is at the core of NCLB legislation. Some school districts exhibit higher levels of student performance as measured by standardized tests and graduation rates than other school districts. Why one district has the ability to outperform another remains unclear, and education researchers continue to examine possible variables contributing to the performance of students.

Research indicates children from disadvantaged backgrounds are at greater risk for low academic performance and therefore, the federal government has responded by providing schools with additional funding for programs targeted at helping students who meet eligibility requirements. Title I funding for elementary and secondary education is available to schools to help improve the academic achievement of disadvantaged students. During fiscal year 2007, 25 billion dollars in Title I funding was available to help schools improve the academic achievement of children of neglect, delinquency, migratory children, minority children, children whose families were at or below poverty level, children with limited or low English proficiency, and children with disabilities (U.S. Dept. of Ed., 2011). However, when districts with large populations of disadvantaged children are receiving less financial support from state and local governments than other school districts receive, Title I funding may not be enough to increase district resources to a level that would improve overall student performance.

Assessing student performance is most commonly done by examining standardized test scores and high school graduation rates. When student performance comparisons are made between school districts, it is helpful to examine districts with comparable financial resources.

Rural and urban areas exhibit more similar socioeconomic status at the community and district levels than when compared to suburban areas. At the community level, it is important to recognize the average AGI of the residents of a school district can have a financial bearing on the amount of money a school district receives because school funding is still partially based on property valuation in most states.

How a school district utilizes its funding is also important. Examining intervention programs targeting at-risk and special needs students from pre-school through secondary grades may be helpful in identifying the most effective use of resources for increasing student performance, high school graduation rates, and student success rates after the K-12 years. Furthermore, how districts allocate their financial resources for operational spending, instructional spending, and use of Title I funds for specialized student programs can contribute to the overall success of a school district. Identifying school districts that efficiently allocate financial resources to produce better student outcomes should prove beneficial in education research.

Rural and Urban - Classifying Public School Districts

Classifying a school district as urban, suburban, or rural has included identifying schools by the geographic location of the community in which the school is located, assessing the number of residents living in the community per square mile, or utilizing student enrollment. The U.S. Department of Education classifies rural as a school district with an average daily student body attendance of 600 students or less and/or counties with population densities of less than 10 people per square mile (Rural Assistance Center, 2009). This classification, however, was derived mainly as an identifier for a school district's eligibility to participate in a federally funded student achievement program called the Small Rural Schools Achievement (SRSA)

(Rural Assistance Center, 2009). Some researchers have defined "rural" districts as those with fewer than 1,000 or 1,200 students (NREA, 2004). Utilizing this type of measure to identify a district as rural is inconsistent, and may be inaccurate, as small school districts do exist in suburban areas.

For purposes of the 2000 census, the U.S. Census Bureau defined urban as both urban areas (UA) and urban clusters (UC). In terms of population, a UA is defined as containing a population density of 1,000 or more people per square mile; a UC is defined as containing a population density of 500 or more people per surrounding square mile of an indentified UA (U.S. Census Bureau, 2008). Rural areas are considered as all areas not identified as urban, and suburban is not defined at all (U.S. Census Bureau, 2008). Utilizing the geographic parameters set forth by the U.S. Census Bureau can be difficult when defining school districts by geographic location, as the terms urban and rural are provided for locale rather than for school districts.

In 2006, the National Center for Education Statistics (NCES), dissatisfied with the Census Bureau's definition of rural, created a classification system to better identify schools by location (NCES, 2009). The identification system created by the NCES, in collaboration with the Census Bureau, identifies schools as city, suburban, town, and rural. These four categories can be further broken down into large, medium, or small for city and suburban schools, and distant, remote, or fringe for town and rural schools (NCES, 2009; Rural School, 2007). The collaborative effort between the NCES and the U.S. Census Bureau to provide definitive geographic codes for school districts' geographic locations, rather than just the geographic locations of urban and metropolitan areas, should prove advantageous in education research.

Socioeconomic Status of Rural and Urban Public School Students

Over 26,000 schools exist in rural areas in the United States, and these schools educate almost 10 million students (Rural School, 2007). Furthermore, the concentration of rural students is remarkable in that only 12 states educate over 5 million rural students, or approximately half of the nation's rural student population (Rural School, 2007). In 2006, 21.4% of the children in the U.S. attended rural schools; 23.1% of students in Michigan attend rural schools (Rural School, 2007). Both rural and urban schools may have high concentrations of poor students, and urban schools often have high minority populations (Roscigno et al., 2006). While urban schools are larger, and therefore have higher minority enrollments, the proportion of minority students in some rural and urban schools can be quite comparable (Rural School, 2007). A number of rural areas have districts with higher percentages of minority students than found in some urban schools. Moreover, many rural districts are showing significant increases in Hispanic enrollment (Malhoit, 2005). Both rural and urban school districts educate sizeable populations of immigrant, English second language (ESL) learners needing specialized services. There are nearly twice as many ESL students in central U.S. city schools than in suburban schools (Jacob, 2007).

Rural schools generally receive lower per-pupil funding than districts in more populated geographic areas, including urban school districts (Roscigno et al., 2006). William J. Mathis (2003) reports rural school spending is approximately $2,000 less per pupil, nationally, than found in non-rural locations. The deficits experienced by rural schools are attributed to a lack of taxable property base, limited revenue from business and retail sources, higher transportation costs, limited support for schools (bonds) through local tax increases, and limited employment opportunities for rural residents (Dayton, 1998; Dayton 2003; Mathis, 2003). Geographic

location can be a contributor to higher district costs in some regions and therefore, policymakers need to be more conscious of regional costs incurred by districts when distributing resources if greater equity is to be achieved in education (Fowler & Monk, 2001).

Furthermore, funding inequities for many rural districts have increased under the NCLB Act of 2001 due to a shift in Title I funds from smaller to larger districts (Millions in Title I, 2007). According to the Congressional Research Service (CRS), NCLB legislation has a weighting system for Title I funding that is geared toward helping school districts with larger concentrations of disadvantaged children (Millions in Title I, 2007). Therefore, school districts can choose from a combination of reporting formulas to determine eligibility, either based on the percentage of eligible students, or based on the actual number of eligible students, reporting the higher of the two outcomes for funding advantages (Millions in Title I, 2007). Because this legislation permits school districts to utilize either reporting method, large districts can use actual enrollment rather than the percentages to determine student eligibility. Therefore, larger school districts - typically urban districts - have an advantage over many smaller school districts when competing for Federal Title I funds.

Federal funding accounted for 8.3% of the financial resources received by K-12 public schools in 2007 (U.S. Dept. of Ed., 2007). Approximately 10,000 smaller school districts lose about $245 million dollars annually in federal funding due to a shift of Title I funds to a mere 950 larger districts across the nation (Millions in Title I, 2007). Therefore, districts with students who demonstrate increased educational needs compete for the same federally limited financial resources (Dayton, 1998).

A study performed by Stanley, Comello, Edwards, and Marquart (2008) utilized national data from 185 predominately white communities, consisting of 167,738 middle and high school

students, and measured a range of variables at the individual, school, family, and community levels relating to school adjustment and student performance. Comparisons between some urban and rural communities between 1996 and 2000 found significant differences in income and parental education. Remote rural and distant rural communities had higher percentages of students whose parents were lower income and less educated, with greater percentages of students' eligible to receive free or reduced meals, when compared to some urban communities (Stanley et al., 2008). In 2005, 38.5 percent of rural public school students were eligible to receive free and reduced meals; 32.6 percent of rural students were eligible in Michigan (Rural School, 2007).

Because urban areas generally have more poor and minority residents, policymakers, interest groups, and the media are more attentive to school reform initiatives for urban communities than communities in other geographic locations (Dayton, 1998). Yet rural communities make up 244 of the nation's poorest 250 counties, with minorities in these areas exhibiting some of the highest levels of poverty in the nation (Mathis, 2003; Truscott & Truscott, 2005). John Dayton (1998, 2003) believes rural districts lack the political voice or the political backing that suburban and urban school districts possess. Political advantage over the decisions made regarding educational matters may be dependent on the geographical representation of the states' legislators and their ability to successfully assemble interest groups (Poorest rural districts, 2007; Reed, 2001). Rural school students account for over 20 percent of the nation's students, yet policymakers rarely acknowledge the educational needs of rural students (Beeson, 2001). Dayton (1998) further contends the poverty issues rural districts face are part of the history of these communities and therefore, this sort of "culture" is, in part, responsible for the disparities in financial resources that rural communities continue to experience.

In the U.S., the resources of a school district can vary greatly because the funding a district receives is generally based on property valuation (Odden & Picus, 2000). Although Michigan no longer relies heavily on local residential property taxes for public school funding, legislation enacted as part of Proposal A in 1994 allows major inequities in funding to exist between many of its public school districts. The foundation allowance system in Michigan does, however, guarantee the most disadvantaged districts in the state will receive, at the least, a basic per-pupil foundation allowance. In Michigan, as found in most states across the U.S., some of the most disadvantaged school districts are located in rural areas. Therefore, it is not surprising that rural Michigan public school districts received some of the greatest funding increases after Proposal A was adopted.

Students from middle class backgrounds generally cost less to educate than students from disadvantaged backgrounds (Hacsi, 2003). Rural and urban school districts are quite similar in their communities' socioeconomic environments in terms of the percentages of poor and/or minority families residing within these communities. While some differences exist between rural and urban schools such as school enrollment numbers, crime statistics, and political representation, for the most part, rural and urban school districts are more similar in socioeconomic circumstance than when compared to their suburban counterparts. Unfortunately, rural and urban school districts now have to compete for the same limited federal resources, such as Title I funding, which only further exacerbates the inequities between these school districts and the suburban school districts.

Community Resources: Rural and Urban School Districts' Residential Adjusted Gross Incomes (AGI)

Many researchers believe the academic success of a child can be hindered by insufficient household income, inadequate nutrition, poor health care, and poor housing (Belfield & Levin, 2007). Hence, the examination of poverty as a predictor of student achievement has been common. However, some recent studies question using poverty thresholds to categorize families by income. Children from economically disadvantaged families may be very close to poverty, but are discounted in many research studies as they are not "technically" considered poor. Concern regarding how the U.S. officially measures poverty is prevalent, yet the official definition of poverty in the U.S. has remained relatively unchanged for over 30 years (Blank, 2007).

The poverty limit was defined in 1963 by Mollie Orshansky, of the Social Security Administration, who rated poverty limits at three times the "subsistence" cost of food for a family (Blank, 2007; Ruggles 1990). Orshansky utilized estimates of human consumption of food, as set by the Department of Agriculture, allowing adjustments for sex, age, and size of a family (Ruggles, 1990). Orshansky then used a multiplier of three (3) to set a household's poverty threshold, ignoring other consumption needs of a family (Ruggles, 1990).

Only minimal changes to Orshansky's original measure have occurred since its implementation in 1963, and these adjustments have not kept pace with the nation's economic growth (Blank, 2007; Ruggles, 1990). In 1963, the limit set for poverty was slightly less than 50 percent of the median household income of a family in the U.S., but by 2005, poverty limits had been reduced to 28 percent of the annual median household income of U.S. families (Blank, 2007). According to Ruggles (1990), the current definition of poverty fails to accurately

conceptualize what it means to be "poor" in the United States. Criticisms of the official estimates of poverty in this country are widespread, especially among academic researchers, because the rates defined by the U.S. government do not include families nearing the official threshold of poverty. Ruggles (1990) believes measuring one's total resources, or lack of resources in comparison to others, is a better measurement than utilizing government established poverty thresholds.

When evaluating student performance, some measure of the financial resources available to children at the household level is necessary to better assess demographic and socioeconomic concerns surrounding a child's educational environment (Peoples, 1998). Median household income levels are relative measures of a family's economic status, as well as relative estimates of the socioeconomic challenges facing a community (Rural School, 2007). Children living in households where incomes are well below the level of the average family bring issues to school that can impact their education and their academic performance (Blank 2007; Ruggles 1990).

A 1999 study by Fan and Chen used three sets of student achievement data collected by the National Center for Education Statistics (NCES) for the years 1988, 1990, and 1992, as well as 1988 data from the National Education Longitudinal Study (NELS). Using multivariate analysis of variance, Fan and Chen analyzed data collected from students in the 8^{th}, 10^{th}, and 12^{th} grades for reading, math, science, and social studies. They found that the effect of poverty on student performance is significantly less in rural areas than in metropolitan locations, and that SES played less of a role in rural student achievement than it did for students in urban schools. Reeves and Bylund's (2005) study also concluded that the negative effects of poverty on student performance is significantly less in rural areas than in locations with higher populations.

When comparing rural versus metropolitan areas, Fan and Chen (1999) found rural student achievement was comparable to metropolitan student achievement in all four academic areas of reading, math, science, and social studies. Metropolitan is typically characterized as large urban or city areas which include adjacent or nearby suburban areas. However, their study did not definitively differentiate between urban and suburban areas, thereby utilizing metropolitan as an indicator, as many researchers have done, when they were unable to ascertain definitive classifications based on specific geographic locations. Fan and Chen concluded when analyzing school performance data on a national scale, while controlling for the SES of students, no significant deficit existed in the academic achievement of rural students based on their geographic location.

The socioeconomic status of a community is indicative of the financial stresses placed on that community in terms of unemployment rates, crime rates, poverty rates, and housing. Evaluating the median household incomes of the residents in an area can provide an overview of the economic welfare of its residents (Rural School, 2007). A child's readiness for school is often defined by their family's level of income (Rural School, 2007). Many factors can impact student achievement. A child's home environment, parenting, the community in which they reside, and society have prior affects on children before they enter the classroom, and learning is further impacted when a child experiences language differences, health issues, or poverty (Darling-Hammond, 1999).

Reeves and Bylund's 2005 study further reported Kentucky school districts receiving increased per-pupil expenditures, due to increases in specialized funding such as Title I funds, generally have lower performing students. They also found the percentage of spending devoted to student instruction is not a significant indicator of a school's performance, nor is the total

amount of per-pupil expenditures. Furthermore, the allocation of additional categorical funding to schools, such as Title I, is in response to the number of children in these schools who are living at poverty level, are considered low income, and/or are identified as low achieving students. Therefore, the additional funding schools receive from categorical funding is not necessarily going to produce substantial increases in the overall achievement of a student body, as this type of funding is allocated to these schools to assist the most disadvantaged students.

Some children live and go to school in economically poor communities, yet are not considered to be at poverty level. Evaluating a child's educational environment must include a measure of financial resources available to the child at a household level (Peoples, 1998). But the overall financial status of a community may also affect the educational environment of children. When a community has the financial ability to pass bond issues for the enhancement of school facilities, the educational environment is positively affected. When businesses or community members have the ability to donate funds, resources, or time to schools, the educational environment is positively affected. Disadvantaged communities often do not have the financial resources or political influence that wealthier communities have to contribute to the educational environment of their children. Therefore, the average adjusted gross incomes of residents living within the boundaries of a school district may be a good indicator of the community wealth contributing to the educational environment of the children.

Intervention Programs for Increasing Student Achievement: Economic and Societal Benefits

Researchers have not found substantial evidence that increases in district revenues at the secondary level increase student performance; however increasing educational spending for K-3 students is strongly associated with enhanced performance. (Odden & Picus, 2000). Clive Belfield and Henry Levin (2007) studied numerous reports on high school completion to identify

interventions that would potentially lead to increased graduation rates for high school students. These researchers found five studies that met their criteria to be used in their cost analysis study which examined the benefits of educational interventions on high school student completion rates. The intervention studies utilized included two preschool, one elementary, one high school, and one K-12 study. The following five studies met the randomization criteria and statistical design necessary for use in their cost analysis: The Perry Preschool Program (PPP) longitudinal study, the Chicago Child-Parent Centers (CPC) early childhood education and family support services, Project STAR classroom size reduction (CSR), teacher salary increase (TSI) which was a study performed by Loeb and Page (2000), and First Things First (FTF) high school reform intervention initiatives. Each program analyzed by Belfield and Levin (2007) had its own attributes for increasing student achievement and/or high school student graduation rates.

According to Belfield and Levin (2007), the implementation of the First Things First high school intervention program utilized small learning communities which demonstrated better student attendance, increased student achievement in both mathematics and reading test scores, and higher student graduation rates. The Perry Preschool Program showed significant graduation rate increases for minority students who were believed to be at a greater risk of dropping out of school. This program also had strong implications for positive post secondary economic and societal attributes for these graduates. Upon high school graduation, the PPP children demonstrated lower percentages of incarceration, welfare need, and teenage pregnancies while also demonstrating higher rates of employment and college entrance after graduation. Project STAR reduced classroom size which, in itself, Belfield and Levin (2007) believe, is not enough to improve student achievement. The Chicago Child-Parent Centers program substantially decreased special education needs and retention rates for its students, as did the Perry Preschool

Program. Lastly, the TSI study by Loeb and Page, which involved increasing teacher salaries, was found to generate little improvement in student graduation rates according Belfield and Levin.

The most successful intervention program Belfield and Levin (2007) analyzed was the Perry Preschool Program, although the program with the lowest costs per increases in student performance outcomes was the First Things First high school intervention program. The strongest features Belfield and Levin (2007) found in these intervention programs, leading to increases in high school student graduation rates, included parent involvement, smaller schools, schools with extended sessions, after school tutoring, personable and competent personnel, and high expectations for academic achievement (Belfield & Levin, 2007).

The purpose of the Belfield and Levin (2007) study was to recognize the economic and societal benefits of increased high school graduation rates for the U.S. However, the costs to implement such intervention programs, as described, are quite high. Especially when interventions need to be provided to all children, as one cannot predict the likelihood of which students will need interventions or drop out of high school (Belfield & Levin, 2007).

The pubic benefits of increasing student graduation rates are immense. The more educated people are, the more they earn, and therefore contribute more to tax revenues to pay for public services. When children drop out of high school, there exists a greater risk of mortality and health problems for these individuals and therefore, they are more likely to need publicly provided health care programs or public assistance payments (Belfield & Levin, 2007). Researchers of crime statistics find that the higher the level of educational achievement, the lower the rates of juvenile and adult incarcerations (Belfield & Levin, 2007).

Based on a lifetime average, Belfield and Levin (2007) report a public benefit cost savings of $209,200 per high school graduate by the time the graduate reaches 20 years of age. This figure is based on 2005 economic figures for taxes, welfare, public health care, and crime. This estimate does not include the public costs incurred to educate an individual through college (i.e., public contribution for public colleges and universities). The costs for the five intervention programs analyzed in Belfield and Levin's 2007 study ranged between $59,100 and $143,600 for each high school graduate. Therefore, any of these intervention programs would yield a net benefit to the public with every additional student graduate (Belfield & Levin, 2007). At the rate of approximately 700,000 dropouts annually, the public incurs costs near $150 billion dollars for students who do not graduate from high school. Therefore, if the interventions were implemented, and approximately half of the current number of high school dropouts was able to graduate from high school, the public benefit would still be about $45 billion annually (Belfield & Levin, 2007).

Hacsi (2003) believes schools need to be funded appropriately for real education reform to occur, especially if reform is to be successful in the most disadvantaged schools. How much money is appropriate or adequate however, is not clear. Hacsi believes it is necessary to look closely at the existing evidence to determine what works the most often, and is the most financially effective, to achieve quality in public education. If intervention programs could be targeted toward only at-risk students and probable high school dropouts, the public costs could be considerably less (Belfield & Levin, 2007). Investing in intervention programs aimed at increasing high school student graduation rates has considerable positive economic and societal benefits for our nation (Belfield & Levin, 2007). While increasing financial expenditures will

cost more during the pre-kindergarten through twelfth grade years, the economic and societal benefits, post-graduation, could be substantial.

Measuring Student Achievement

The increased emphasis on measuring achievement based on students' performance on standardized tests and student graduation rates has provided the public with an abundance of data regarding numerous aspects of school finance, student performance indicators, and allocation of school resources. However, research utilizing the same data bases has produced conflicting results with respect to student performance in urban, suburban, and rural schools (Reeves & Bylund, 2005). Specifically, Reeves and Bylund (2005) state the importance of the comparison groups in these studies, as some studies measure student performance in state-to-state comparisons, and other studies utilize within-state comparison groups.

Grissmer, Flanagan, Kawata, and Williamson's (2000) study concluded that when controlling for various socioeconomic factors in state-to-state comparisons of data from the National Assessment of Education Progress (NAEP), no significant differences were found in student performance based on geographic location. Yet a study conducted by Fan and Chen (1999) found students in rural areas performed as well as, or better than, metropolitan students when examining specific grade cohorts while controlling for specified socioeconomic factors. Each of these research groups used data reported for the 1988-1994 time period. However, the Grissmer et al. (2000) study used NAEP data whereas the Fan and Chen (1999) study used data from National Education Longitudinal Study (NELS). Time frames and data sets were closely related in the Grissmer et al. and the Fan and Chen studies, yet their results varied. Reeves and Bylund (2005) cite crucial differences in the results of research studies may be caused by differences in variables, research design, or the defining parameters of the study.

An analysis of data from the National Education Longitudinal Study (NELS) by Roscigno and Crowley (2001) reported students in rural schools have lower performance on standardized tests, higher dropout rates, and lower graduation rates when compared with students in metropolitan schools. This study reported utilizing 20.6 percent rural students in their sample, but stated a portion of their data was subjectively measured. One of the indicators these researchers relied on for identifying a portion of the rural schools was based on self-reported information provided by the principals of some of the schools included in their study, while another indicator was based on the definition of rural as provided by the 1992 NCES.

Defining variables in rural education research can be difficult when a universally acceptable definition of rural had not been available until recently. Differences in the definitions of rural, suburban, and urban have yielded conflicting results regarding student achievement and geographic location (Fan & Chen, 1999). Furthermore, the use of only two (rural and non-rural) rather than three (rural, suburban, and urban) variables in similarly structured studies can yield differing results (Fan & Chen, 1999).

The best way to assess student achievement is debated in education research. Currently, student achievement is most commonly measured by students' standardized test scores and/or high school student graduation rates. Standardized mathematics and reading tests are commonly utilized in research as a measure of student achievement, as these content areas can be tested with some level of accuracy (Mathis, 2004). Some researchers disagree with using standardized test results as a basis for measuring student performance. The motivation of students to perform well in school, and on standardized tests, varies greatly - an issue not recognized by legislation implemented under NCLB (NREA, 2004). Student motivation can be influenced by parents,

relatives, friends, grades, rewards, extracurricular activities, jobs, health, and/or a student's capacity to learn.

According to Mathis (2003), measuring student achievement based on test scores is an inadequate measure of student success as it does not predict the probability of graduation rates, students' preparation for social productivity, their preparation for the workplace, or their preparation for higher education. Mathis (2004) also contends reliance on standardized testing outcomes is creating a narrowing of "human knowledge" in the classroom by teachers and schools. The use of graduation counts to relate education costs to academic performance is a stronger indicator than relying solely on student performance on standardized tests, as test results only indicate student performance at that specific point in time, for a specified subject area (Stiefel, Iatarola, Fruchter & Berne, 1998).

Greene and Trivitt (2008), interested in the impact of education litigation on student performance, examined graduation rates in 48 states between 1992 and 2005 to determine if judicial rulings calling for school finance reform actually affected student performance. Their findings suggested that increasing financial expenditures to existing public school systems do not increase student achievement. Furthermore, Greene and Trivitt (2008) found evidence that judicial rulings on school finance actually lowered graduation rates. These researchers suspect the slight decrease may be due to increased standards brought on by school reform that occurred as a condition of court rulings. Their study analyzed both student graduation rates and standardized test scores as reported by the U.S. Department of Education's National Assessment of Educational Progress (NAEP).

Student achievement studies reach divergent conclusions when differences among variables, population samples, testing instruments, and defining parameters of location exist.

Therefore, definitively identifying which strategies are the most effective in promoting student achievement is difficult. Furthermore, the instruments and methods used to measure student achievement are just as varied, as the assessment instruments utilized often differ from state to state and from national assessments. Teacher quality is also deemed to be an indicator of student performance, yet which teacher attributes are most significant has not been definitively established (Fowler & Monk, 2001; Hanushek, 2007). Lastly, when judicial mandates required state or school district reform initiatives to be developed and implemented, most researchers have not concluded such efforts positively impact student achievement.

The Michigan Merit Exam

Standardized testing is a common form of assessing the academic achievement of students attending public schools in the United States. Federal mandates under NCLB require states to provide evidence of student performance in some form. Michigan has chosen its own standardized assessment in the form of the Michigan Merit Exam (MME), along with a common national assessment, the ACT Plus Writing college entrance exam, and the ACT WorkKeys. The ACT portion is accepted by a number of colleges and universities nationwide as a college entrance exam. The WorkKeys portion provides scored information to parents and students regarding the student's readiness in reading and applied mathematics for the workplace (Michigan Merit Exam Scores, 2008).

The MME was first administered to 11th grade Michigan public high school students in 2007. For the most part, the MME replaced the previous high school assessment - the Michigan Educational Assessment Program (MEAP). The MEAP is still given in Michigan to students in select primary grades for a variety of subject assessments, and it is still given to 9th grade students for social studies assessment. The MEAP assessment is not tied to the MME.

Michigan public school students are required to take all portions of the MME for reading, mathematics, writing, science, and social studies; students may retest only once by retaking all portions of the MME (Michigan Department of Education, 2008). The MME/ACT and MEAP fulfill student assessment requirements mandated by federal and state laws for public school children as mandated under NCLB legislation (Michigan Department of Education, 2008).

The Graduation Counts Compact

When a child requires specialized educational services and/or extended time to complete general education requirements, schools incur additional costs. Low performing schools, and schools with large numbers of students not graduating on-time, yield greater overall costs per graduate student to the school district (Stiefel et al., 1998). Schools demonstrating higher student graduation rates may be useful in identifying what educational practices best improve student performance (Mishel & Roy, 2006).

One approach to assessing student achievement is evident in the National Governors' Association Graduation Counts Compact of 2005. This approach utilizes a common method for computing the number of high school students graduating "on-time" from U.S. public school institutions since differences in calculating student graduation rates have been recognized at both the state and federal levels. In 2005, a commitment by the governors of all 50 states to track and report high school graduation rates using a common reporting method was signed into action as the Graduation Counts Compact.

Public schools are now required to track "first-time" ninth grade students over the subsequent four year period, adjusting for students transferring in and out of schools.[1] Upon entering the ninth grade for the first time, students completing graduation requirements within

1 A transfer student must be placed into a cohort, or removed from a cohort, even if the student only attends the school for one day (Curran, 2006).

four years or less are classified as "on-time" graduates.[2] The Compact formula is calculated by dividing the number of on-time graduates by the adjusted cohort of first-time ninth grade students from four years prior, adjusting only for students transferring in or out of the school within the specified cohort year (Curran, 2006). The Association recommends schools require the transferring students to produce transcripts from their previous school(s) to allow the new district to assign them to a specific grade level cohort. A limitation to the Graduation Counts Compact according to Curran (2006), is that any students leaving the state, leaving the country, transferring to a private school, or choosing home schooling are difficult to track.[3]

Increased demands for accountability in student performance from the federal government and NCLB legislation have spurred a number of changes to accountability measures at federal and state levels. The Graduation Counts Compact is an additional measure of student performance that may be used to enhance some of the more common measures of student performance, such as the assessment of students' scores on standardized tests. Improved accountability measures that are accepted as a standard in education are essential to accurately assess student performance and/or identify the validity of educational programs.

The Michigan Four-Year Adjusted Cohort – 2007 Graduation Rates

In compliance with the National Governors Association Graduation Counts Compact, and NCLB reporting requirements, the State of Michigan was able to publicly report, for the first time, student high school graduation rates for 2007 using the cohort methodology (Four-year cohort, 2009). The 2007 four-year cohort reported graduation rates for 565 Michigan public school districts and Michigan public high school academies (New accurate measure, 2008). For identification purposes, all Michigan public school students are assigned a Unique Identification

2 Students graduating during the summer after the fourth year they entered the ninth grade for the first time may also be included as an on-time graduate for that specific year (Curran, 2006).
3 Students that become incarcerated, yet receive a high school diploma on-time, will remain in a state-level cohort (Curran, 2006).

Code (UIC) which is utilized by school districts to submit student data to the state of Michigan (Four-year cohort, 2009). Public school districts with alternative high schools include their alternative school graduate numbers in their district counts (Four-year cohort, 2009).

Student counts are reported by Michigan public schools in September, February, and at the end of the school-year (Four-year cohort, 2009). Three reporting dates allow CEPI to keep student counts updated while reflecting student transfers between schools. Students must be present for two count days to be included in building counts, and for at least one count day to be included in district counts.[4] Michigan assigns students transferring into a school system to a cohort, but students that leave a public school system to be home schooled, or to transfer to a private, non-public, or out-of-state school are removed from the cohorts and considered "exempt" (New accurate measure, 2008; Four-year cohort, 2009). Deceased students are also exempt from cohort counts (Four-year cohort, 2009).

The Graduation Counts Compact specifies a formula to be used by schools to calculate on-time graduates, or schools are allowed to utilize the tracking of first-time freshmen in a four-year cohort. Michigan, utilizing the latter, has instituted the UIC identifier to accurately track students who move from school to school, or district to district. The costs incurred by the state and local school districts when students do not graduate on-time can be substantial. The Graduation Counts Compact improves school accountability in reporting on-time graduates which may be useful in assessing future educational programs for Michigan public schools.

State of Michigan's Foundation Allowance Program and Federal Funding for Public Schools

School finance systems vary from state to state as it is the responsibility of each state to determine appropriate funding schemes for K-12 education as proposed under the Constitution

4 See the Consolidated State Application Accountability Workbook for a full description of student attendance requirements for count days in Michigan public schools and school districts (Four-year cohort, 2009).

(U.S. Dept. of Ed., 2007). Federal policies provide supplemental support, but are not responsible for establishing policies to reduce district inequalities in school finance systems throughout the U.S. (Renchler 1992; U.S. Dept. of Ed., 2007). Public school revenues represent different combinations of state and local sources. School districts' wealth varies greatly because the per-pupil funding of a school district is generally based on property valuation, which is government regulated rather than formulated from individual wealth or individual income (Odden & Picus, 2000). However, wealth and income can contribute to one's choice of residency, as well as limit residency choice, if property is unaffordable for the individual or family unit.

Michigan has been a leader in the U.S. in moving away from a heavy reliance on local property taxes to fund its public schools. In general, inter-district variation is reduced to the extent that state revenues contribute a larger percentage of total district revenues. Michigan's per-pupil foundation allowance program is supported by a voter approved, limited millage, property tax levy as set by the state legislature, as well as by revenue from other state taxes. The state levies six mills of property tax from all Michigan properties, and an additional 18 mills are collected locally from non-homestead properties (second homes and businesses) where voter approved (Addonizio et al., 1998; Kearney & Addonizio, 2002). State revenue to fund Michigan public schools also include portions of revenues received from retail sales, tobacco, liquor, transportation, casino, real estate transfer, business, individual income, and some additional Michigan tax sources (Kearney & Addonizio, 2002). Portions of the proceeds from the Michigan lottery and Michigan's general fund are responsible for the remainder of state funding necessary to support the public school systems in Michigan.

The per-pupil foundation allowance system in Michigan has created greater financial equity among public school districts since Proposal A was introduced in 1994. Under

Michigan's school finance system, the state legislature allocates school aid through a foundation system which guarantees each public school district will receive a minimum, or basic, foundation allowance for each student enrolled (Kearney & Addonizio, 2002). Each year, the amount of the basic foundation allowance varies dependent on Michigan's state budget.[5] The NCES reports that Michigan received over 17 billion dollars in revenue during the 2007 fiscal year to fund its public schools (Zhou, 2009).

Leslie Papke (2008) examined the mathematics performance of Michigan's fourth grade students on the MEAP between 1991 and 2004 to identify if financial increases to Michigan's school finance system, after the implementation of Proposal A, increased student performance rates. Her study found that the "leveling up" of Michigan's basic foundation allowance resulted in increased student performance across the board in fourth grade mathematics. Furthermore, schools in the lowest funding percentile, prior to the passing of Proposal A, achieved the largest increases in student performance.

The school finance system adopted by Michigan residents in 1994 is viewed by some as being considerably less stable than the previous system which relied heavily on local property taxes (Kearney & Addonizio, 2002; Reed, 2001). However, under Michigan's foundation allowance program, greater horizontal equity is maintained between school districts, and an improved level of funding has been established in what were Michigan's most financially disadvantaged school districts prior to 1994. The basic foundation allowance guarantees a minimum amount of per-pupil funding for every student in every public school district and public school academy in the state. Yet inequities in funding and resources still exist between Michigan public school districts, in part due to the limited millage property tax which is still

5 The per-pupil basic foundation allowance history for Michigan public school districts from 1995 through the present fiscal year can be found at http://www.michigan.gov/documents/fdtnall_49926_7.pdf

based on local SEV and the existence of hold harmless districts.[6] Hold harmless districts were originally created to avoid revenue loss by school districts that were already receiving funding amounts greater than the basic foundation allowance that was to be granted by the state when Proposal A was implemented (Addonizio, Mills & Kearney, 1998). Many of the hold harmless districts were in wealthy communities.

Federal funds also contribute to the revenues available to Michigan public school districts. Generally, federal funds for education are provided to specific student populations such as students at poverty level, students not meeting grade level literacy requirements, ESL learners, or gifted and talented students. Such funding is categorized as vertical equity which allows some students with special circumstances to receive additional educational services not provided to the general student population. Where and how vertical equity resources are best utilized is debatable. Odden and Picus (2000) identify three distribution categories for vertical equity based on the characteristics of children, school programs, and school districts. These researchers believe traditional uses of federal funding could be better utilized to increase student achievement for all students if the federal funds were available for school-wide programs.

A shift in funding from traditional programs and services to a reallocation of funds available for increasing instructional expenditures in the general education classrooms may be necessary to increase the overall academic performance of students (Odden & Picus, 2000). Some school administrators have requested waivers for Title I funds to be utilized for whole school programs in order to increase overall student performance (Odden & Archibald, 2001). It is expected that more efficient use of resources would likely improve student achievement;

6 Section 20j payments were established in Michigan under Public Act 119 to allow hold harmless districts, districts with foundation allowances in excess of the maximum allowance allowed by the state, to receive the full amount of the basic foundation allowance granted to each school district during a fiscal year. Michigan currently has 52 hold harmless districts, 40 of which were receiving funding under Section 20j in the amount of 51.8 million dollars in 2008. In 2009, Michigan's Governor vetoed Public Act 121-House Bill 4447 suspending 20j payments effective fiscal year 2009-2010 (Summers, 2009).

however it is not known if all children will have the ability to reach expected standards as set by the states with their current resource allocations (Odden & Archibald, 2001). Greene and Trivitt (2008) suggest that increasing educational expenditures in public schools, under existing school finance systems, will not increase student performance. Furthermore, Reeves and Bylund's 2005 study concluded that the total amount of per-pupil expenditures is not a significant indicator of student performance.

Public School District Costs for Student Instruction

Educational expectations and student outcomes are as varied as instructional approaches, which make it difficult to identify how much money is necessary to meet student performance standards (Odden & Picus, 2000). The environment of the school has as great an impact on student learning as a child's home environment (Darling-Hammond, 1999). A within-state comparison study by Grissmer and Flanagan (1998) utilized NAEP data between 1990 and 1997 to analyze student performance scores. When examining student achievement in mathematics, their study found the amount and allocation of expenditures on school resources can affect student performance outcomes. Two states, North Carolina and Texas, showing the largest increases in students' mathematics scores, were the subject of their case study. These researchers believe increases found in students' mathematics performance could be attributed to "systematic" school reform initiatives occurring within these two states.

The Grissmer et al. (2000) study found student performance gains in state-to-state comparisons were not specifically related to per-pupil expenditures, teacher salaries, student teacher ratios in higher grades, resources available to teachers, or public pre-school programs. However, they linked increased mathematics performance in within-state comparisons to school reform initiatives which included increased grade level standards, student assessments aligned to

new standards, internal accountability, and feedback to teachers and administrators about student performance (Grissmer et al, 2000). Additional results of the Grissmer et al. (2000) study found teachers with higher salaries, more experience, and higher levels of education were not associated with increased student performance over a three year period. A deregulation of the teaching environment also occurred during this period. It is not known, however, if the gains in North Carolina and Texas would be the same in all states. If teacher quality does influence student performance, identifying effective teachers from ineffective teachers has not yet developed into significant educational policy (Hanushek, 2007).

In a study by Hawk, Coble and Swanson (1985), student achievement was measured based on teacher knowledge in general math, algebra, and professional teaching skills. Math scores of 826 students were analyzed after students received five months of instruction by two groups of certified teachers. Eighteen teachers were math certified and 18 teachers were certified in other subject areas; all were assigned to teach mathematics. The Stanford Achievement Test was used to measure general math achievement, and the Stanford Test of Academic Skills was used to measure algebra achievement. Pretests indicated no significant difference existed in achievement scores between the students of math certified teachers and non-math certified teachers prior to initiation of instruction. The Carolina Teacher Performance Assessment System (CTPAS) was also utilized to measure 25 points of effective teaching practices of the teachers involved in the study. The study found that teachers who were math certified, and teaching in their content area, had students with significantly higher achievement scores in both general math and algebra than the students who were taught by non-math certified teachers. The CTPAS results from the study suggested instructional presentation and increased

knowledge in the teachers' content area allowed for more effective teaching practices - hence higher scores on standardized tests for those students taught by math certified teachers.

However, knowledge of subject matter may not be enough for teachers to be effective, rather teachers may need better understanding of the learning process to integrate purposeful instruction into a variety of learning styles (Darling-Hammond, 1999). Teachers with little experience and preparation, who are working in districts with little support and poor mentoring, are still learning how to teach, and therefore much of their energy is devoted to grading and the preparation of the daily lessons, allowing little time for professional growth (Darling-Hammond, 1999). If policymakers encouraged more purposeful and relevant professional development, teachers may continue the path of professional learning to become experts in their subject content (Darling-Hammond, 1999).

According to Hanushek (2007), popular views of what constitutes a quality teacher include a profound knowledge of content, desire to work with children, and a competent understanding of how to work with children. However, it is difficult to quantify teacher quality based on qualitative characteristics and therefore, commonly acceptable methods of measurement for such do not exist. Teacher quality continues to be the subject of extensive research, yet researchers have yet to find any significant evidence proving that teachers who possess such characteristics actually increase student achievement (Hanushek, 2007). According to Hanushek (2007), effective policies are not in place to measure teacher quality and/or assure quality teachers are being hired or being retained. Teacher experience, formal education, and teacher certification determine teacher compensation. Compensation currently is not based on any other measure of teacher quality in most school districts.

One way to measure teacher experience is to use salaries, as teacher salaries increase in scheduled increments for each year that teachers are employed by a district. In addition, teacher education can also be readily measured using teacher salaries, as teacher salaries also increase in scheduled increments within their district when they receive advanced graduate degrees or increase their graduate course credit hours. Therefore, teachers receive pay increases based on years of experience and level of graduate education, yet little evidence suggests student performance beyond the first two years of a teacher's career is directly related to teacher experience or teacher education levels (Hanushek, 2007).

A meta-analysis study performed by Cynthia Druva and Ronald Anderson (1983) examined how various characteristics and behaviors of science teachers related to student outcomes. These researchers found positive student outcomes were associated with teacher age, teacher preparation, and the teachers' academic and educational preparation. Furthermore, they found that cognitive student outcomes were positively related to teacher intellect (Druva & Anderson, 1983).

The differing results obtained in the Grissmer et al. (2000) study and the Druva and Anderson (1983) study were due to differences in the research design of each study. Differences in data gathering methods, time periods utilized for data collection, methods of analysis, and the subject matter student data was collected for all contributed to the varying results between the studies. The Druva and Anderson (1983) study primarily utilized data collected during the time period of 1966 – 1975, and their data sample was obtained from dissertations, journal articles, and unpublished studies. The Grissmer et al. (2000) study utilized NEAP data from the time period of 1990 – 1996 which focused on mathematics and reading assessment scores.

The No Child Left Behind legislation mandate of highly qualified teachers has been more difficult to achieve in rural and urban schools than in suburban schools. Attracting qualified teachers can be difficult in remote areas, especially when their suburban counterparts have the ability to offer better pay due to the greater wealth of many suburban school districts (Mathis, 2003). Because teacher qualifications are now mandated under NCLB, teachers must be "highly qualified" in their subject area(s) which includes being certified for specific content area(s) and a specific range of grades. Furthermore, teachers must pass state exams for their content area(s) and specified grade levels, or meet licensing requirements as further required under NCLB legislation.

The fragmenting of licensing to specific subjects under NCLB complicates rural and urban school districts' ability to attract qualified teachers. Prior to NCLB legislation, it was common for a science teacher to also teach mathematics. This now requires certification in each subject area under NCLB legislation (Mathis, 2003). Finding teachers with dual certifications, in already high demand subject areas, can be difficult. If dual certified teachers are not available for the specific needs of a school, a district may need to employ two teachers to meet the mandates of employing highly qualified teachers (Mathis, 2003).

Lower enrollments in rural schools may not support the costs of employing additional teachers as necessitated under NCLB (Mathis, 2003). Generally, rural and small school districts incur higher costs due to diseconomies of scale (Fowler & Monk, 2001). Unfortunately, classes and/or programs may have to be reduced or cut if schools cannot employ additional teachers. This problem is exacerbated in Michigan as student graduation requirements were greatly enhanced shortly after the passing of NCLB legislation. The employment of content area teachers (teachers who are certified to teach subjects required for high school graduation) often

take precedence over the employment of teachers who are certified in elective or non-core courses.

Rural and urban schools are also less likely than suburban schools to offer advanced placement courses in a broad range of areas (Beeson, 2001; Roscigno et al., 2006). Career and technical education programs can also suffer when core subjects take precedence due to "high-stakes testing" (Predmore, 2004) or other measures of student achievement as set forth in AYP legislation. Furthermore, schools may struggle to sustain career and technical education programs when teachers have the ability to earn higher salaries in their specialized fields (Predmore, 2004).

In a 1997 update involving an analysis of nearly 400 research studies on student achievement, Eric Hanushek (1997) confirms his prior affirmations, finding "no strong or consistent" evidence relating differences in school resources to student performance. Regardless of higher or lower levels of funding, schools have mixed student outcomes. Increases in teacher salaries, reductions in class sizes, and increases in specialized programs have not resulted in significant increases in student performance (Adams, 2008). However, the debate about increased school funding may be deceptive until comparisons are made between extreme cases of the very wealthy districts and the needs of a poorly funded district - then money matters (Hacsi, 2003).

Timothy Hacsi (2003) examines why studies of education finance vary so substantially, and explicitly criticizes specific methods of analysis utilized in education research such as the "vote counting" method utilized by Eric Hanushek in many of his earlier studies. Hacsi (2003) explains Hanushek's method of vote counting as taking a number of research studies indicating significantly positive student outcomes for various inputs (independent variables) and assigning

the results to what he believed to be truly significant, or only slightly significant; "downplaying" the significance of the researchers' findings and ignoring the details of their individual research designs. Hanushek's work is viewed as controversial; well-known and respected in some conservative circles, but considered to be "seriously flawed" by others (Hacsi, 2003).

The funding provided for mandated increases in student achievement such as required under NCLB is quite small, especially when the effects of poverty on a community and social system are ignored (Mathis, 2005). Mathis (2005) asserts singular success stories from schools that claim to be "bridging the achievement gap" do not necessarily continue down this road without setbacks in the successive year or later years. Mathis further states that there is little evidence that the types of programs these schools are implementing are, by themselves, increasing student achievement. Mathis also warns increased media attention on these occasional success stories only causes policymakers to look past the real societal obstacles faced by schools today.

Urban, suburban, and rural areas are all likely to have schools that could benefit from increased financial resources for school operations, facilities, or technology. The difficulty in school finance is in regulating how each school and school district utilizes its available funding and resources. While teachers and administrators would agree that more money is necessary to better educate children, getting educators to agree on the best way to allocate these dollars is unlikely (Odden & Picus, 2000). Reducing pull-out programs such as Title I and special education programs, and reallocating these resources to additional school-wide teacher positions could reduce student-teacher ratios, increase teacher planning time, and disburse teacher workloads to allow more individualized attention to students (Darling-Hammond, 1999). Districts with more students who require special services incur greater costs, as it is more

expensive to educate special needs students than general education students, and costs increase for special education students who cannot be mainstreamed into general education classrooms (Hacsi, 2003). While additional categorical funding is available to schools with disadvantaged children, depending on the resources available to the school, and the number of special needs children requiring additional services, the additional funding may not fully cover the actual costs schools incur to educate special needs children.

Odden and Picus (2000) cite as much as 25 percent more in school district resources is quite commonly allocated to secondary schools over elementary schools, as greater funding and resources are necessary to implement specialized programs such as science labs and vocational education at the secondary level. However, sometimes districts will increase allocation of funds to grades K-3 when investments in the early years are concentrated to reduce the need for remediation later (Odden & Picus, 2000).

Instruction is where school districts spend the majority of their money, yet sizable portions of instructional expenditures are reallocated to special needs services and pull-out programs which have not provided substantial evidence of increased learning for special needs students (Odden & Picus, 2000). Small categorical programs created by states require schools to fragment funding and staffing, such that program initiatives become difficult to organize and logically implement (Darling-Hammond, 1999). Categorical funds that are earmarked for specific uses may not increase student performance when plans for allocation of these funds are not fully developed or implemented to improve student instruction (Grubb, 2009). Therefore, much waste occurs when categorical funds are simply added to already financially constrained or ineffective school programs (Grubb, 2009). Allocation of school funds and school resources for

school programs must be thoughtful and purposeful if educators are to increase student performance outcomes.

Summary

Research has shown that students in suburban school districts academically outperform students in urban school districts, yet research on student performance in rural school districts is rare and poorly defined. Politicians and educators alike have accepted the notion that students in suburban school districts have greater academic performance outcomes due to increased financial resources and/or enhanced SES over students in urban school districts. Because research on rural students' academic performance has been limited due to the lack of definitive parameters to properly identify schools by geographic location, rural schools have been misrepresented or ignored in education research.

The NCES, in collaboration with the U.S. Census Bureau, now provides a geographic classification which offers a more accurate categorization of urban, suburban, town, and rural school districts. Furthermore, CEPI, for the State of Michigan, provides an abundance of performance and financial data for Michigan public school districts. The financial resources received by rural and urban Michigan public school districts at district and community levels are more similar than when compared to suburban Michigan public school districts. Moreover, the socioeconomic conditions of students living in the communities of rural and urban districts are more closely related than when compared to students in suburban school districts. Examining district-wide student achievement of students with similar SES in districts with similar financial resources should prove helpful in estimating the efficiency of Michigan's public school districts.

CHAPTER THREE

Research Design and Methodology

Purpose of Study

Children living in rural and urban communities demonstrate strong similarities in socioeconomic status. The income level of a family, the parent(s) employment status, education level of the parent(s), and the social status of the family all contribute to a family's SES (Demarest et al., 1993). This study examines student achievement in Michigan public school districts to determine if rural school districts are demonstrating greater financial efficiency than other public school districts with similar socioeconomic characteristics by producing higher levels of student achievement as assessed by high school student graduation rates and proficiency rates on the Michigan Merit Exam in 11th grade mathematics and English language arts. This study examined socioeconomic variables at the community level, and financial variables at the school district level, to determine if financial resources have different impacts on student achievement in rural as opposed to other school districts.

Population Sample

The population sample for this study included all K-12 public school districts in Michigan that graduated high school students. Alternative Michigan public high schools, with graduating high school students, were also part of this study's sample and were included by their sponsoring public school district. Five hundred and twenty-two (522) districts were identified that graduated high school seniors in 2007. Twenty-six (26) districts, or five percent of these districts, were removed from the original population sample due to missing data.[7] An omission

7 Rural school districts comprised the majority of the 5% omitted school districts as these districts did not report data such as advanced teacher salaries and/or MME results, and therefore were removed from this study.

of five percent of the original sample is acceptable for a study of this size. Therefore, 496 Michigan public school districts were utilized as the sample population for this study.

Method of Analysis

This study relied on archival data available to the general public through internet sources. Multiple regression analysis was used to estimate three models of educational achievement. Each model consisted of one (1) dependent variable and ten (10) independent variables. The models of student outcomes used in this study were estimated by weighted least squares (WLS), with each case (school district) weighted by the square root of its student enrollment.[8] WLS may be used when heteroscedasticity is suspected due to error terms being of unequal variance. *Predictive Analytics SoftWare 18* (PASW 18) was utilized to run each regression analysis as PASW software is widely utilized in education research and research in the behavioral sciences. Each WLS multiple regression analysis was performed using the enter method. The significance level or alpha (α) level was established at .05 for this study.

Dependent Variable - Graduation Rates

The graduation rates for each public school district that graduated Michigan high school students were obtained from CEPI which provides statistical data for the Michigan Department of Education. The data was obtained from the *State of Michigan 2007 4-Year Cohort Graduation and Dropout Rate Report*, which was published August 23, 2008. This report was also utilized to identify which Michigan public school districts graduated high school seniors, as not all Michigan school districts are K-12; some Michigan districts are only K-6 or K-8.

8 When heteroscedasticity is suspected due to error terms being of unequal variance, weighted least squares (WLS) is an appropriate method to use in a multiple regression analysis. School level data, such as the data examined in this study, is a common example of aggregate data where the dependent variable is represented by a mean value for a set of individual observations. Larger observations (i.e., schools with higher enrollments) may exhibit less variation of the true value of the data than smaller observations, which may lead to a difference in variance of the error terms. WLS is a common method used to deal with heteroscedastic circumstances in aggregate data. For further discussion see Hanushek and Jackson (1977).

Graduation rates, as reported by CEPI for seniors graduating in 2007, were obtained from district reporting methods for the 2003-2004 freshmen cohort. The computation utilized by Michigan public school districts takes the number of "on-track" graduated students for each district and divides this number by the 2007 cohort total of the district, and then multiplies it by 100 to receive the percentage of on-time graduates for each district:

$$[(\text{on-track graduates} \div \text{cohort total}) \times 100].$$

This is an acceptable method for reporting student achievement approved by the Governors' Association agreement for the Graduation Counts Compact of 2005.

Dependent Variables - Mathematics and English Language Arts Proficiency Rates on the Michigan Merit Exam

The MME is a required assessment for Michigan public schools to meet federal and state reporting requirements for student assessment. It is administered to Michigan's 11th grade students each spring. It has four performance levels: advanced, proficient, partially proficient, and not proficient. The state of Michigan considers student scores that are rated as proficient or advanced in a tested content area as meeting or exceeding proficiency on the MME. This study uses the percentages of students meeting and exceeding proficiency on the mathematics and English language arts portions of the MME as measures of student competency. These data were obtained from the Michigan Department of Education, *Michigan Merit Examination* 2007 report. ELA proficiency is a combined score of the reading and writing portions of the MME. In Michigan, the MME is an acceptable method of measuring student proficiency in specified content areas as mandated under NCLB and AYP legislation.

Categorical Variables for Each Statistical Analysis

Dummy variables were utilized to sort each district by geographic location. Data from the U.S. Department of Education - National Center for Education Statistics (NCES) was utilized for grouping Michigan public school districts into the categories of rural, town, suburban, and city. The school districts were classified into these categories through an identification system created by the NCES in collaboration with the U.S. Census Bureau.[9] This study utilized "city" as the identifier for urban school districts since the U.S. Census Bureau still identifies geographic locations in terms of "urban." The parameters set forth for these geographic location codes, as provided by the NCES, are in accordance with the original criteria set forth by the U.S. Census Bureau – Census 2000 which identifies populations and geographic locations. In each WLS multiple regression analysis of student performance, "town" was considered as the base-line or omitted variable in this study.

Parametric Independent Variables for Each Statistical Analysis

Adjusted Gross Income

The Michigan Department of Treasury, Office of Revenue and Tax Analysis, reports the AGI for the residents of area public school districts. The reported AGI is based on the residents' yearly tax filings which are averaged for each Michigan public school district. The AGI's utilized in this study were obtained from the *Michigan Income, Income Tax, and Property Tax Credits by School District* 2007, published in May 2009 for all residents who filed federal tax returns in 2007. The average AGI of school district residents is an indicator of the level of

9 The NCES provides for rural, town, suburban, and city categories to be further broken down into large, medium, or small for city and suburbs; remote, distant, or fringe for town and rural area districts (NCES, 2009).

community wealth that contributes to the educational environment of students attending Michigan public school districts.

Free and Reduced Price Meals

The percentage of students eligible to receive free and reduced price meals was obtained from the *Free and Reduced-Price Lunch Counts, District Summary for Fall 2006 and Spring 2007,* as reported by CEPI for the State of Michigan. The percentages utilized for this study were obtained by adding the number of students eligible to receive free meals to the number of students eligible to receive reduced-price meals in each district, then dividing the sum by the total count of students per district, and multiplying it by 100 to obtain a percentage:

$$[(\text{free meals} + \text{reduced meals}) \div \text{total number of students}] \times 100.$$

In educational research, student eligibility for Title I funding for free and reduced price meals is an acceptable method to use to identify the number of students that are considered lower income within a school district. Districts are given additional federal funding to be utilized under specific guidelines to enhance instruction for these students. The State of Michigan also provides supplemental funding to school districts for these students.

Current Operating Expenditures

The current operating expenditures (C.O.E.) for each school district were obtained from the *2006-2007 Bulletin 1014: Michigan Public School Districts Ranked by Selected Financial Data* report which was published in May 2008 by the Michigan Department of Education. The C.O.E. indicates the total amount of paid and owed expenditures each district incurred for daily operations which included instructional services, support services, purchased services, and supplies during the 2006-2007 fiscal school-year. The C.O.E. is reported as a per-pupil amount for each Michigan school district. This amount does not include charges or expenditures for capital outlay, debt services, or community services. The C.O.E.'s are allocated to each

Michigan public school district for school operations, and the amount varies across the districts. Therefore, utilizing the amount of C.O.E. a district received is a good indicator of the financial resources that contribute to the educational environment of students at a district level.

Expenditures for Student Instruction

The percentages for operating expenditures used exclusively for student instruction during the 2006-2007 fiscal year for each school district were obtained from the Michigan Department of Education *2006-2007 Bulletin 1014: Michigan Public School Districts Ranked by Selected Financial Data* report published in May 2008. This study used the total per-pupil instructional expenditures and divided each by the per-pupil C.O.E., also obtained from *2006-2007 Bulletin 1014*, and multiplied each by 100 to obtain the percentage of operating expenditures used exclusively toward student instruction in each school district during the 2006-2007 school-year:

[(total per-pupil instructional expenditures ÷ C.O.E. per pupil) × 100] =

% operating expenditures for instruction.

The total instructional expenditures of a school district include the costs for basic education (pre-school and K-12), special education, compensatory education, vocational education, and adult education to carry out classroom instruction. This amount does not include capital outlay. The percentage of operating expenditures that a Michigan public school district utilizes exclusively for student instruction may be a predictor of district-level student performance.

Beginning and Advanced Teacher Salaries

Data for the beginning and advanced teacher salaries for this study were obtained from the Mackinac Center for Public Policy at http://www.mackinac.org/depts/epi/ agreement.aspx which provides scanned copies of Michigan public school districts' authentic collective

bargaining agreements. Beginning teacher salaries were selected from the first step of each district's bargaining agreement, either level zero (0) or level one (1) depending on the structure of the district's agreement. Beginning teacher salaries were selected from the 0 or 1 level of teacher compensation which indicates no teaching experience and a maximum education level of a Bachelor's Degree. The advanced teacher salaries were obtained from the same bargaining agreement documents for each district. This study identified teachers with advanced salaries as those with 10 years experience in addition to holding a Master's Degree as a minimum level of education. Michigan public school districts individually bargain their teacher contracts and therefore, the structure of each district's compensation agreement varies slightly. The advanced salary level was chosen for this study as a "Master's plus 10" as this education and experience level represented the most abundant data available for advanced teacher salaries in Michigan public school districts' collective bargaining agreements.

Where available, this study used the actual 2006-2007 collective bargaining agreements to identify teachers' beginning and advanced salaries. For districts providing bargaining agreements for years other than 2006-2007, data for the next closest year was utilized and two percent (2%) annual salary increases, for both beginning and advanced teachers, were used to calculate 2006-2007 figures. Two percent was chosen as the interpolation for this study as this was the most common average salary increase that Michigan public school districts granted during the 2006-2007 fiscal year. For school districts with bargaining agreements that increased teacher salaries mid-year, the first semester salary, as reported for the 2006-2007 school-year, was utilized in this study. These salaries served as a proxy for the school districts' educational costs.

Enrollment Demographics for the Categorical Variables

Student enrollment numbers for each school district, as reported by CEPI for the State of Michigan during the fall 2006/spring 2007 reporting period, were utilized as the weighting factor by using the square root enrollment of each district for the multiple regression analyses in order to predict the relationships between each of the three dependent variables of student achievement and the set of independent variables. Larger observations, such as student enrollment numbers in urban school districts, may exhibit less variation about the true value than smaller observations, such as student enrollment numbers in rural school districts, which could lead to a difference in the variance of the error terms for each observation. When observations involve aggregates or grouped data such as school districts, and vary greatly in size (e.g., enrollment), and heteroscedasticity is suspected, WLS is an appropriate method to use in a multiple regression analysis.

Table one summarizes the elements of the statistical models to be discussed in chapter four. As noted, a total of 10 independent variables were used to estimate the values of three dependent variables of student achievement. Specifically, they are district graduation rates for high school seniors, and mathematics and ELA proficiency rates for 11^{th} grade students.

Table 1. Statistical Analysis

Research Questions	Variables	Statistical Analysis
1. Do rural Michigan public school districts graduate greater percentages of high school students than urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?	<u>Dependent Variable</u> District graduation rates of Michigan public high school students in 2007 <u>Independent (Categorical) Variables</u> Geographic location of each Michigan public school district represented by three (3) dummy variables: • Rural • Town (omitted category) • Suburban • Urban (city) <u>Independent Variables</u> • Average adjusted gross incomes (AGI) in 2007 of Michigan public school districts' residents • Percentage of students in each Michigan public school district who were eligible to receive free or reduced meals in 2007 • Operating expenditures per pupil in 2007 for each Michigan public school district • Percentage of operating expenditures that went directly toward student instruction in 2007 for each Michigan public school district • Starting teacher salaries (Bachelor's degree only) in 2007 per each Michigan public school district's collective bargaining agreement • Advanced teacher salaries (Master's degree with 10 years teaching experience) in 2007 per each Michigan public school district's collective bargaining agreement • Student enrollment numbers in 2007 for Michigan public school districts	Weighted least squares multiple regression analysis with categorical variables

2. Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in mathematics than students in urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?	<u>Dependent Variable</u> Math proficiency rates per district for 11th grade students on the MME in 2007 <u>Independent (Categorical) Variables</u> Geographic locations of each Michigan public school district represented by three (3) dummy variables: • Rural • Town (omitted category) • Suburban • Urban (city) <u>Independent Variables</u> • Average adjusted gross incomes (AGI) in 2007 of Michigan public school districts' residents • Percentage of students in each Michigan public school district who were eligible to receive free or reduced meals in 2007 • Operating expenditures per pupil in 2007 for each Michigan public school district • Percentage of operating expenditures that went directly toward student instruction in 2007 for each Michigan public school district • Starting teacher salaries (Bachelor's degree only) in 2007 per each Michigan public school district's collective bargaining agreement • Advanced teacher salaries (Master's degree with 10 years teaching experience) in 2007 per each Michigan public school district's collective bargaining agreement • Student enrollment numbers in 2007 for Michigan public school districts	Weighted least squares multiple regression analysis with categorical variables

3. Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in English language arts (ELA) than students in urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?	<u>Dependent Variable</u> ELA proficiency rates per district for 11th grade students on the MME in 2007 <u>Independent (Categorical) Variables</u> Geographic locations for each Michigan public school district represented by three (3) dummy variables: • Rural • Town (omitted category) • Suburban • Urban (city) <u>Independent Variables</u> • Average adjusted gross incomes (AGI) in 2007 of Michigan public school districts' residents • Percentage of students in each Michigan public school district who were eligible to receive free or reduced meals in 2007 • Operating expenditures per pupil in 2007 for each Michigan public school district • Percentage of operating expenditures that went directly toward student instruction in 2007 for each Michigan public school district • Starting teacher salaries (Bachelor's degree only) in 2007 per each Michigan public school district's collective bargaining agreement • Advanced teacher salaries (Master's degree with 10 years teaching experience) in 2007 per each Michigan public school district's collective bargaining agreement • Student enrollment numbers in 2007 for Michigan public school districts	Weighted least squares multiple regression analysis with categorical variables

Limitations of Study

The conclusions of this study were limited by the fact that only Michigan public school districts were included. The study was further limited by utilizing only public school districts in Michigan that graduated high school students. School districts that did not graduate high school seniors (i.e., districts that only educate K-8 students) were excluded from this study. Alternative public high schools graduating high school students were included in their sponsoring district data reports. Private, parochial schools, and charter schools were also excluded. Data from private and parochial schools is neither readily available nor reliable. In Michigan, private and parochial schools are not required to follow the same educational standards or reporting requirements as Michigan public schools and districts. Charter schools (public school academies) were also excluded from this study due to no available public data regarding teacher salaries in these schools. Lastly, this study utilized only aggregate data gathered for the 2006-2007 fiscal school-year.

CHAPTER FOUR

Analysis of Data

This study was a quantitative analysis of Michigan public school districts' 2007 student performance indicators with respect to high school graduation rates, 11th grade mathematics proficiency, and 11th grade English language arts proficiency on the Michigan Merit Exam. Both high school graduation rates and student achievement outcomes on standardized tests are common measurements of student performance. This study utilized 2007 Michigan high school student graduation rates as identified for the 2003-2004 freshmen cohort, as this is an acceptable methodology for assessing student performance that has been approved by the National Governors Association Graduation Counts Compact of 2005 (Curran, 2006). Furthermore, this study utilized 2007 MME proficiency percentage rates for each Michigan public school district's 11th grade students on the MME in mathematics and English language arts (ELA) as this is also an acceptable method for assessing student achievement.

As discussed in the previous chapters, the financial resources available to educate children are only partially responsible for student outcomes. Examining the overall financial well-being of the residents who make-up the communities of each Michigan school district was necessary to understand if finances at both district and community levels had an impact on student achievement. The reported adjusted gross income of residents, averaged for the residents of each Michigan public school district, was a good indicator of community wealth. The number of students eligible for free or reduced meals was a good indicator of the amount of students living in lower socioeconomic status in Michigan public school districts. Examining the per-pupil operating expenditures of Michigan public school districts was helpful in determining the amount of financial resources districts utilized in their day-to-day operations. Because student instruction is where the majority of school district costs are incurred (Odden & Picus, 2000) the

percentage of operating expenditures that were used directly for student instruction, as well as the teacher salary variables, controlled for education costs in this study.

Results of Data Analysis

Descriptive Statistics

Table 2 provides the descriptive statistics with regard to the 2007 enrollment demographics for each of the geographical categories identified in this study. There were 34 urban public school districts identified with an enrollment of 424,442 students or 26.4% of the overall student enrollment population utilized in this study. Suburban schools districts comprised 41.1% of the districts used in this study, enrolling 660,143 students. Rural Michigan public schools enrolled 319,722 students, or 19.9% of student enrollment. Rural districts made up 50% of the school districts used in this study for a total of 248 rural Michigan districts. Town, the base-line or omitted category in the regression models, enrolled 203,092 students for the final 12.6% of the student enrollment used in this study.

Table 2. Descriptive Statistics of District Enrollment Demographics by Geographic Category

District Category	N	% of Total N	Sum of Enrollment	% of Sum of Enrollment
Urban	34	6.9%	424,442	26.4%
Suburban	136	27.4%	660,143	41.1%
Town	78	15.7%	203,092	12.6%
Rural	248	50.0%	319,722	19.9%
Total	496	100.0%	1,607,399	100.0%

Source: National Center for Education Statistics (retrieved electronically August 28, 2009)

The descriptive statistics provided in Table 3 indicate the means and standard deviations for each variable, as well as their minimum and maximum thresholds according to N. The student performance indicators for graduation rates, mathematics proficiency, and ELA proficiency show rural districts outperformed urban districts in each of these areas, as well as outperforming both urban and suburban school districts for 2007 student graduation rates. The graduation rates for rural school students had a mean of 85.66 percent as opposed to 71.38

percent and 79.01 percent for urban and suburban districts, respectively. Furthermore, the mean for mathematics proficiency on the 2007 MME for rural school students was very close to suburban school students with means of 44.90% for rural students and 45.63% for suburban students.

The means for each of the financial variables indicated that rural districts had lower operating expenditures in 2007 than both urban and suburban districts, yet utilized a larger percentage of their funds solely for instructional purposes than either urban or suburban school districts. Rural districts had a mean of $8,132.27 per-pupil for operating expenditures in 2007, and used 63.91 percent of their C.O.E. strictly for instructional purposes. Urban districts' mean C.O.E. was $9,783.82 per-pupil in 2007, but utilized only 60.43 percent of their operating expenditures toward instruction. Suburban was similar to urban in that they allocated only 61.55 percent toward student instruction.

Rural districts had the lowest mean AGI of all the geographical categories at $42,688.73. This compares to urban school district residents' mean AGI of $47,986.65. Suburban school district residents' mean AGI was $55,199.24 in 2007. However, the mean percentage of students eligible for free and reduced meals was higher for urban districts than rural and suburban districts with urban school students at a 2007 mean of 48.77 percent; rural at 40.85 percent; and suburban at 32.64 percent.

The 2007 means for beginning and advanced teacher salaries were lowest for rural school districts with a mean of $32,761.74 for beginning salaries and $52,575.92 for advanced salaries. Beginning teacher salary means for urban and suburban districts were $35,818.96 and $36,195.32 respectively. Advanced teacher salary means for urban and suburban districts were $63,287.05 and $64,223.40 respectively. This is especially noteworthy as rural school districts

had the lowest mean C.O.E., but the highest percentage of C.O.E. utilized for student instruction, indicating rural school districts were utilizing their allocated resources differently than urban and suburban school districts in 2007.

Table 3. Descriptive Statistics of Variable Means and Standard Deviations (Total N=496)

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Urban Grad 2007	34	43.58	96.14	71.3835	14.72041
Suburban Grad 2007	136	17.42	99.02	79.0076	16.68949
Rural Grad 2007	248	38.24	100.00	85.6566	9.99767
Total Grad 2007	496	17.42	100.00	82.0434	13.09921
Urban Math 2007	34	9.00	74.40	37.8088	19.08413
Suburban Math 2007	136	1.60	84.50	45.6272	19.78405
Rural Math 2007	248	12.50	80.40	44.8540	12.16825
Total Math 2007	496	1.60	84.50	45.2377	15.25145
Urban ELA 2007	34	15.10	76.80	43.7618	17.47162
Suburban ELA 2007	136	8.10	85.70	50.2529	17.84778
Rural ELA 2007	248	18.20	83.40	47.4565	11.34974
Total ELA 2007	496	8.10	85.70	48.8028	13.82423
Urban COE 2007	34	$7,212	$13,800	$9,783.82	$1,424.804
Suburban COE 2007	136	$6,649	$14,115	$8,682.68	$1,277.373
Rural COE 2007	248	$6,262	$18,394	$8,132.27	$1,296.336
Total COE 2007	496	$6,262	$18,394	$8,356.69	$1,305.379
% Urban Inst Exp 2007	34	54.05	66.47	60.4253	3.40650
% Suburb Inst Exp 2007	136	47.10	72.73	61.5469	4.18565
% Rural Inst Exp 2007	248	51.66	73.03	63.9141	3.37192
% Total Inst Exp 2007	496	47.10	73.03	63.0789	3.77192
Urban AGI 2007	34	$29,664	$89,500	$47,986.65	$17,153.038
Suburban AGI 2007	136	$21,142	$196,428	$55,199.24	$24,795.009
Rural AGI 2007	248	$26,352	$84,390	$42,688.73	$9,084.915
Total AGI 2007	496	$21,142	$196,428	$46,814.04	$16,395.624
Urban Beg Sal 2007	34	$27,444	$42,772	$35,818.96	$3,178.423
Suburban Beg Sal 2007	136	$30,484	$44,686	$36,195.32	$2,538.246
Rural Beg Sal 2007	248	$26,561	$38,513	$32,761.74	$2,313.559
Total Beg Sal 2007	496	$26,561	$44,686	$33,934.88	$2,887.004
Urban Adv Sal 2007	34	$51,076	$78,700	$63,287.05	$8,146.019
Suburban Adv Sal 2007	136	$46,767	$86,070	$64,223.40	$8,512.393
Rural Adv Sal 2007	248	$35,845	$69,358	$52,575.92	$5,490.668
Total Adv Sal 2007	496	$35,845	$86,070	$56,662.60	$8,468.081
Urban Free/Red 2007	34	4.13	83.87	48.7662	24.31273
Suburban Free/Red 2007	136	.09	88.54	32.6441	21.32949
Rural Free/Red 2007	248	.62	88.84	40.8523	15.51455
Total Free/Red 2007	496	.09	88.84	38.6424	18.15347
Urban Enroll 2007	34	1,741	125,064	12,483.59	20,613.801
Suburban Enroll 2007	136	905	30,122	4,853.99	3,960.235
Rural Enroll 2007	248	55	8,017	1,289.20	935.148
Total Enroll 2007	496	55	125,064	3,240.72	6,482.524

Pearson Correlation Coefficients of Independent Variables

Correlations were run for all independent variables utilized in this study using PASW 18 software to identify any problems with multicollinearity between the independent variables prior to running the multiple regression analyses for each model of student achievement. Two sets of variables were found to have high probability of multicollinearity. Beginning and advanced teacher salaries were correlated at .683. Hence, advanced teacher salaries were removed from each multiple regression model. Furthermore, residents' average AGI's for each school district and the percentage of students eligible for free and reduced meals for each district had a correlation of .830. Consequently, the variable relating to eligibility for free and reduced meals was removed from each multiple regression model. Hence, the remaining non-categorical independent variables used in each multiple regression analysis were the averaged AGI of district residents, per-pupil operating expenditures, the percentage of operating expenditures used directly for student instruction, beginning teacher salaries, and student enrollment.

Summary of the Proportion of Shared Variance (R^2)

Table 4 shows the values for R and R^2. These values indicate each of the models could account for a substantial amount of district performance.[10] The model of graduation rates had an R^2 of .538 and an adjusted R^2 of .532, meaning 53.2% of the variation in the 2007 Michigan high schools' district graduation rates can be attributed to the variation in the combination of independent variables. The model of mathematics proficiency had an R^2 of .750 and an adjusted R^2 of .747, meaning 74.7% of variation in 11th grade district proficiency in mathematics can be attributed to the variation in the combination of independent variables. The model of ELA

10 The proportion of shared variance (R^2) indicates the amount of variation of the dependent variable that is predicted or explained by the independent variables collectively. The greater the value of R^2, the greater the explanatory power of the regression model.

Table 4. Summary of the Multiple Correlation Coefficient (R), Proportion of Shared Variance (R^2), Adjusted R^2 and F Ratio for Student Achievement

Dependent Variable	R	R^2	Adjusted R^2	F Ratio	Significance
2007 Graduation Rates	.734	.538	.532	81.305	.000
2007 MME Math Proficiency	.866	.750	.747	209.443	.000
2007 MME ELA Proficiency	.875	.765	.762	227.056	.000

proficiency had the highest proportion of shared variance of the three models with an R^2 value of .765 and an adjusted R^2 of .762. What is most striking here is how three relatively simple models of student performance could account for so much of district variation in all three measures of student performance.

Research Question/Model One - Graduation Rates

Do rural Michigan public school districts graduate greater percentages of high school students than urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?

Statistical Model for Graduation Rates

The following district-level model of student achievement for 2007 high school student graduation rates was estimated by WLS:

Graduation Rates = $b_0 + b_1$ AGI + b_2 operating expenditures + b_3 percent instructional expenditures + b_4 beginning teacher salaries + b_5 urban + b_6 suburban + b_7 rural.

The analysis was estimated by WLS (district enrollment) where each observation (school district) was weighted by the square root of its student enrollment. This analysis utilized 488 residual degrees of freedom at an α level of significance of .05 to establish a critical test statistic value of $t = 1.960$.

The most powerful relationship between high school student graduation rates was with the non-categorical, independent variable of average AGI of district residents. As indicated in Table 5, this variable had the most explanatory power with a β value equal to .549. Furthermore, per-pupil operating expenditures had a β value = -.236, the percentage of instructional expenditures devoted to student instruction had a β value = .175, and beginning teacher salaries with a β value = .111, exhibited the greatest overall explanatory power in this model. Rural school districts were also significant and had strong explanatory power with standardized coefficient and observed t values of .142 and 3.206, respectively, as did suburban districts with beta = -.108 and a t score of -1.994.

All the significant non-categorical independent variables had positive beta coefficients except for per-pupil operating expenditures. This indicates 2007 graduation rates were lower in districts with higher operating expenditures. Furthermore, the coefficients for the categorical variables of urban and suburban districts were negative. While urban was insignificant, the categorical variables of rural and suburban districts were found to be significant. Because the coefficient for graduation rates was positive and significant for rural districts, and negative and significant for suburban districts, this shows rural districts outperformed all other geographical categories with respect to graduation rates including the omitted category of town. This is especially significant when viewing the graduation rate means for rural schools in Table 3. Rural schools had the highest graduation rates of any of the geographical categories examined for 2007, with a high school student graduation mean of 85.66 percent, yet these schools had the lowest amount of C.O.E. in 2007 than any other geographical category.

Table 5. Beta (β) and Test Statistic (t) for 2007 District Graduation Rates

Variable	β	t	Significance
Urban	-.101	-1.695	.091
Suburban	-.108	-1.994	.047
Rural	.142	3.206	.001
Per-pupil Operating Expenditures	-.236	-4.953	.000
Percentage of Instructional Expenditures	.175	4.281	.000
AGI of District Residents	.549	15.253	.000
Beginning Teacher Salaries	.111	2.932	.004

The only observed independent categorical variables of geographic location that were found to be statistically significant for graduation rates were suburban and rural school districts, as each of these geographical categories exceeded the critical value. Table 5 indicates the test statistic values for each independent categorical variable of geographic location, and identifies both suburban and rural schools as being statistically significant at an α level of .05 with significance values of .047 for suburban and .001 for rural Michigan public school districts. The additional independent, non-categorical variables indicated four observed values of t that exceeded the critical value of 1.960. The average AGI of district residents, per-pupil operating expenditures, percentage of operational expenditures that went directly toward student instruction, and beginning teaching salaries were all statistically significant. The AGI had a significantly high t value of 15.253; per-pupil operating expenditures had a t value of -4.953; the percentage of expenditures for student instruction had a t value of 4.281; and beginning teacher salaries had a t value of 2.932. Each non-categorical variable was significant at .000 except for beginning teacher salaries which was significant at .004.

Research Question/Model Two – Mathematics Proficiency Rates on the MME

Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in mathematics than students in urban Michigan public school districts with similar socioeconomics and financial inputs in terms of district averaged

adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?

Statistical Model for Student Proficiency Rates on the MME in Mathematics

The following district-level model of student achievement for the 2007 Michigan Merit Exam proficiency rates in 11th grade mathematics was estimated by WLS:

Math Proficiency = b_0 + b_1 AGI + b_2 operating expenditures + b_3 percent instructional expenditures + b_4 beginning teacher salaries + b_5 urban + b_6 suburban + b_7 rural.

Each observation (school district) was weighted by the square root of each school district's student enrollment. This analysis utilized 488 residual degrees of freedom at an α level of significance of .05 to establish a critical test statistic value of t = 1.960.

The strongest relationship in the mathematics proficiency model was AGI with a standardized coefficient beta value (β) = .742. As indicated in Table 6, other statistically remarkable non-categorical independent variables were the per-pupil operating expenditures with a β value = -.352, and the percentage of expenditures devoted to instructional purposes with a β value = .159. The categorical independent variable of suburban school districts was the only variable of geographic location that was statistically remarkable for this model with a β value = -.120.

As in the case of the graduation rates, the only non-categorical variable with a negative beta coefficient was per-pupil operating expenditures, indicating high spending districts did not have higher student achievement in mathematics. Furthermore, each categorical coefficient for geographic location of urban, suburban, and rural was negative, indicating that the omitted category of town outperformed all other geographic locations in the regression model of student

proficiency in 11th grade mathematics. Consistent with studies performed by Eric Hanushek (1997), such findings are indicative of an ongoing relationship of higher educational spending and lower student achievement outcomes in K-12 education.

Table 6. Beta (β) and Test Statistic (t) for 2007 MME Math Proficiency

Variable	β	t	Significance
Urban	-.061	-1.406	.161
Suburban	-.120	-3.017	.003
Rural	-.060	-1.848	.065
Per-pupil Operating Expenditures	-.352	-10.054	.000
Percentage of Instructional Expenditures	.159	5.288	.000
AGI of District Residents	.742	28.023	.000
Beginning Teacher Salaries	.046	1.662	.097

The only observed variable of geographic location that was found to be statistically significant for mathematics proficiency was suburban location. Three of the five independent non-categorical variables were statistically significant. As was the case in the graduation model, the AGI of district residents had an exceptionally high t value of 28.023; the per-pupil operating expenditures had a t value of -10.054 and the percentage of expenditures for student instruction had a t value of 5.288.

Research Question/Model Three - English Language Arts Proficiency Rates on the MME

Do rural Michigan public school districts demonstrate higher rates of student proficiency on the Michigan Merit Exam (MME) in English language arts (ELA) than students in urban Michigan public school districts with comparable socioeconomics and financial inputs in terms of district averaged adjusted gross incomes (AGI), percentages of students eligible to receive free or reduced meals, per-pupil operating expenditures, expenditures for student instruction, and beginning and advanced teacher salaries?

Statistical Model for Student Proficiency Rates on the MME in English Language Arts

The district-level WLS model for student proficiency in English language arts on the 2007 Michigan Merit Exam was as follows:

ELA Proficiency = b_0 + b_1 AGI + b_2 operating expenditures + b_3 percent instructional expenditures + b_4 beginning teacher salaries + b_5 urban + b_6 suburban + b_7 rural.

The multiple regression analysis was estimated by WLS (district enrollments) where each observation (district) was weighted by the square root of its district enrollment for the dependent variable of 11th grade student proficiency in ELA on the MME. This analysis utilized 488 residual degrees of freedom at an α level of significance of .05 to establish a critical test statistic value of t = 1.960.

Consistent with the previous two models of student achievement, the independent variable with the greatest explanatory power for model of ELA proficiency on the MME was AGI of district residents with a β value = .778. Furthermore, as indicated in the previous models, per-pupil operating expenditures were the only negative non-categorical variable with a β value = -.346, indicating that high spending districts did not have more ELA proficient students in 2007. Also significant for the non-categorical variables was the percentage of instructional expenditures devoted to student instruction with a β value = .135. The categorical variables of location for suburban and rural school districts were both negative and significant with β values equal to -.141 and -.098, respectively.

As was true for graduation rates and mathematics proficiency, the ELA proficiency model indicated 2007 per-pupil operating expenditures as the only negative beta coefficient of the non-categorical variables, suggesting a negative association between the 2007 C.O.E. and student achievement in ELA proficiency on the MME. It should also be noted that the test

statistics for both ELA and mathematics proficiency were above 10. This combined with the negative beta coefficients of the categorical variables are further evidence of the association between educational spending and student achievement outcomes. Each categorical coefficient for geographic location of urban, suburban, and rural was negative for the ELA model, indicating that the omitted category of town outperformed all other geographic locations.

Table 7 indicates the beta and test statistic values for each independent variable. The categorical variables of location found to be statistically significant were rural and suburban school districts. Rural districts had an observed t value of -3.117 and suburban districts had an observed t value of -3.670. Both rural and suburban locations were statistically significant with values of .002 and .000 respectively. The independent, non-categorical variables used in the WLS multiple regression analysis of ELA proficiency indicated that four of the observed values of t exceeded the critical value of 1.960. The AGI of district residents had an exceptionally high t value of 30.271, consistent with the other models of student achievement for this study. The per-pupil operating expenditures had a t value = -10.176; the percentage of operating expenditures for student instruction had a t value = 4.638; and beginning teacher salaries had a value of t = 2.409. Each non-categorical independent variable was statistically significant at .000 except for beginning teacher salaries at .016.

Table 7. Beta (β) and Test Statistic (t) for 2007 ELA Proficiency

Variable	β	t	Significance
Urban	-.054	-1.273	.204
Suburban	-.141	-3.670	.000
Rural	-.098	-3.117	.002
Per-pupil Operating Expenditures	-.346	-10.176	.000
Percentage of Instructional Expenditures	.135	4.638	.000
AGI of District Residents	.778	30.271	.000
Beginning Teacher Salaries	.065	2.409	.016

Unstandardized Coefficients B

Table 8 indicates the values for the unstandardized coefficients (B) and the standard errors for each model. Coefficients were found to be significantly positive for each non-categorical independent variable with the exception of per-pupil operating expenditures which were significant and negative for each model. As stated previously, the negative coefficients for the 2007 C.O.E.'s indicate higher level district spending did not enhance student achievement levels.

Table 8: Unstandardized Coefficients B and Standard Errors

Variable	Graduation Rates	MME Math Proficiency	MME ELA Proficiency
Urban 2007	-3.238	-2.567	-1.977
	(1.910)	(1.827)	(1.553)
Suburban 2007	-3.111	-4.501**	-4.654**
	(1.560)	(1.492)	(1.268)
Rural 2007	5.043**	-2.780	-3.986**
	(1.573)	(1.504)	(1.278)
C.O.E. 2007	-.002**	-.004**	-.004**
	(.000)	(.000)	(.000)
Percent Inst. Exp. 2007	.648**	.765**	.571**
	(.151)	(.145)	(.123)
AGI 2007	.000**	.001**	.001**
	(.000)	(.000)	(.000)
Beginning Salaries 2007	.001**	.000	.000*
	(.000)	(.000)	(.000)

(standard errors in parentheses)
*p < .05, **p < .01

Summary of the Multiple Regression Analyses of Student Achievement

Each of the models of Michigan student achievement had substantial explanatory power. Between half and three-fourths of Michigan high school student achievement could be accounted for by the relatively small number of variables included in the analyses. The R^2 value was particularly high in the case of the mathematics and ELA proficiency models.

The most powerful predictor of how students performed in 11^{th} grade mathematics and ELA, as well as high school graduation, was the relative affluence of those living in a given

school district as indicated by the positive coefficient beta (β) of the district residents' AGI. This finding is consistent with other research on this topic. The next most powerful and significant predictor was per-pupil operating expenditures, but such spending was negatively associated with student achievement. Controlling for other variables, higher spending districts did not necessarily have higher performing students. Because AGI, the percentage of instructional expenditures that went toward student instruction, and beginning teacher salaries had positive coefficients in these models, but negative coefficients for the C.O.E., it is indicative of the association between higher spending and lower student achievement.

Each categorical variable of location had negative coefficients, with the exception of the rural districts' graduation rates which were positive. Rural districts had higher graduation rates than non-rural districts, controlling for other variables, although the explanatory power of "rurality" was less than the positive relationship of AGI and the negative relationship of C.O.E. to graduation rates. Rural districts did not perform significantly better than non-rural districts when student mathematics and ELA proficiency were the dependent variables of interest (See Tables 6 and 7 above). A second important finding regarding district location as a predictor of student performance was that school districts in suburban locations did less well with respect to graduation rates when controlling for other factors. Finally, urban districts do not perform less well than other districts by virtue of being located in urban areas.

It should be noted that in terms of mathematics achievement, when each regression model was run using the original 10 variables prior to removing free and reduced meals and advanced teacher salaries due to problems with multicollinearity, rural schools were found to be significantly higher in 11^{th} grade mathematics proficiency as well. The difference in significance

of the t statistic between the mathematics proficiency model run with 10 variables and the mathematics proficiency model run with eight variables was .031 and .065, respectively.[11]

11 An additional set of regression models were run utilizing all independent variables initially chosen for this study. These models included the advanced teacher salaries and the free and reduced meals which had been removed from the actual models utilized in this study due to problems with multicollinearity. It should be noted that when utilizing all variables for the regression models, rural schools were significant for all three categories of student achievement including mathematics proficiency on the 2007 MME at a significance level of .031. The t statistic was -2.166; beta was -.060; the unstandardized coefficient B was -2.796; and the standard error was 1.291. When the variables of advanced teacher salaries and free and reduced meals were removed from the mathematics proficiency model, the significance level for rural schools was .065, just slightly above the alpha threshold of .05 chosen for this study. Furthermore, the t statistic was -1.848; beta was the same at -.060; the unstandardized coefficient B was a -2.780; and the standard error was 1.504. The significance of running the original ten variables in each of the three regression models shows 2007 mathematics proficiency on the MME was significant for rural schools, but when the two variables were removed from the models due to problems with multicollinearity, the significance value fell just outside of the alpha threshold set for this study.

CHAPTER FIVE

Conclusions and Recommendations

Summary

This study was undertaken to identify if students in rural Michigan public school districts have higher graduation rates and greater proficiency in 11th grade mathematics and 11th grade English language arts than do students attending schools in other geographic locations - controlling for other potential explanatory factors. In addition to geographic location, this study examined per-pupil operating expenditures, the percentage of expenditures utilized directly for student instruction, beginning teacher salaries, and the averaged adjusted gross incomes of district residents. Urban districts sometimes face unique challenges that may not be as common to rural and suburban school districts. However, by modeling educational achievement at the school district level, it was the intention of this study to determine if increased student achievement outcomes are associated with increased financial expenditures while controlling for students' socioeconomic status and the cost of educational resources.

Michigan's school finance system provides a minimum amount of per-pupil funding to school districts to educate students, regardless of the wealth of the community where the school district resides. During the 2006-2007 fiscal school-year, the minimum foundation allowance provided to Michigan public school districts was $7,108 per-pupil (State of Michigan, 2011). Three hundred and forty-two (342) of Michigan's 552 school districts received this amount. Therefore Michigan was a good choice to study the impact of financial resources at district and state levels on student achievement, especially those districts educating student populations with more similar socioeconomic statuses such as found in rural and urban districts. Furthermore, the academic performance indicators of graduation rates and 11th grade proficiency rates on the

Michigan Merit Exam are considered acceptable methods for evaluating student performance outcomes as mandated by the National Governors Compact of 2005, NCLB, and AYP legislation.

Findings

The results of the multiple regression analyses of student achievement in this study found no significance ($p < .05$) for urban district status in student achievement for any of the three dependent variables of student achievement examined. Therefore, urban school districts were not found to be significantly different than the omitted category in this study. However, rurality of a school district was positively related to high school graduation rates, but negatively significant for 11th grade ELA proficiency, and had no significant relationship with mathematics proficiency. Furthermore, while this study found the suburban school districts to be significant in all three regression models of student achievement, the coefficient for this geographical category was found to be negative for each model, indicating lower achievement for students in these higher funded districts.[12]

The independent variables of AGI and the percentage of operating expenditures that went directly toward student instruction were found to be positively and significantly related in all three models of student achievement, while overall per-pupil operating expenditures were found to be negatively related to performance in all three models. The inverse relationship between C.O.E. and student achievement is common when poor and poorly performing schools and districts receive additional categorical funding. The independent variable of beginning teacher salaries was found to be positive and significant for the student achievement outcomes of graduation rates and ELA proficiency. For the student achievement variable of mathematics

12 Operating expenditures (C.O.E.) were checked for interaction effects and found to be insignificant in this study for all three categories.

proficiency neither urban nor rural district dummy variables were found to have any significance, nor were beginning teacher salaries a significant predictor. The Grissmer et al. (2000) study concluded similar results for students' mathematics performance in that teacher salary in higher grades is not a contributor to increased student performance outcomes in mathematics.

Conclusions

This study investigated student performance outcomes of Michigan public school districts by geographic location, financial resources, and student socioeconomic characteristics. Urban school districts were typical when the WLS multiple regression models were run for each measure of student achievement in this study. In the case of rurality, such location was found to be positively related to graduation rates, but negatively related to ELA proficiency. The pattern is similar to the findings for the suburban school districts. This is consistent with the findings by Fan and Chen (1999), but contradicts the Roscigno and Crowley (2001) findings that academic performance of rural school students is lower.

Implications

The results of this study suggest increased student achievement outcomes may have more to do with how school districts utilize their allocated financial resources rather than the total amount of financial resources received by each district. The performance of rural school district students, in terms of increased graduation rates and increased performance in ELA at the high school level is significantly higher than those of urban school students. Yet overall, the school districts in both of these geographic locations have less financial resources than suburban school districts. So if rural school districts are more comparable in socioeconomics, AGI's, and educational revenues with urban school districts, why do students in rural districts outperform students in urban school districts? Furthermore, why are rural school students performing as

well as, and sometimes better than, suburban school students in terms of graduation rates and ELA proficiency when suburban school students typically have higher SES, higher AGI's, and attend schools that generally have higher per-pupil operating expenditures and beginning teacher salaries?

The implications of this study provide evidence of the ability of rural school districts to "do more with less" in terms of financial resources. One plausible explanation for this may be that because rural school districts do not have the financial resources that many suburban school districts enjoy, these districts must concentrate their financial expenditures more on instructional resources and instructional programs than do school districts in other geographic locations with greater financial resources. The mean percentage of 2007 C.O.E. going directly to student instruction was higher in rural districts than in any other geographic location. This is especially remarkable given that rural schools received, on average, fewer financial resources overall than did urban and suburban school districts.

Rural districts also paid their teachers less well than both urban and suburban districts. Beginning teacher salaries served as a proxy for school districts' educational costs in this study. Urban districts had a beginning teacher salary mean of $35,818.96, and the highest advanced teacher salary mean of $63,287.05. Suburban had the highest beginning salary mean of the geographical categories at $36,195.32 and $64,223.40 for advanced teacher salaries. Rural district means were the lowest for beginning and advanced teacher salaries at $32,761.74 and $52,575.92, respectively. While rural school districts spend less to educate their students overall, the share of dollars devoted to non-instructional purposes must also target scarcer resources.

A plausible reason for ELA proficiency being slightly increased in rural districts over mathematics proficiency may be due to the implementation of district Reading Specialists funded

by additional Title I money. There is a lack of research supporting this theory, however. Future research might examine the employment rates of district Reading Specialists and compare it to the amount of resources implemented for mathematics interventions in all school districts when examining differences in student achievement outcomes.

In addition, when schools lack the funding to offer all of the courses and programs they would like to offer for their students, programs and courses are cut to meet budgetary restraints. Under NCLB, secondary education requirements for high school graduation have been greatly increased in Michigan. Hence when funding is more limited, the courses eliminated would be non-core, non-essential courses. It may be that rural school districts do not have the funding to provide the elective courses offered by school districts in other geographic locations and therefore, rural school students must take more coursework in the core areas of English, mathematics, science, and social studies, rather than elective courses such as foreign language, vocational education, music, or art; thereby increasing their performance in ELA, and possibly other core areas, to produce higher graduation rates.

Mathis (2003) indicates that school districts have varied circumstances, and this is not recognized by legislatures. Therefore, differences in school districts' funding levels should be related to differences in need and/or circumstance. The lack of available health care, dental care, and social services for students, increased need for special education teachers, and transportation costs for students in remote areas require additional consideration when allocating resources (Mathis, 2003).

The results of this study found urban school districts had lower student achievement despite their relatively high per-pupil funding levels. Urban schools' relatively low average performance outcomes may be due to other variables that are not directly tied to educational

finance. Such variables are more difficult to measure, such as a child's home environment, educational motivation of family members, nutrition, and health which may have more influence on urban student achievement outcomes than the amount of financial resources allocated to these districts. Adams et al. (2008) states that in order to meet the expectations held by the public of what should be accomplished in K-12 schools, it may be necessary to create a new system that utilizes financial resources to better support and develop student learning. The creation of more specialized curricula and the mere addition of money to current educational systems are not going to improve student performance outcomes (Adams et al., 2008). Rothstein (2004) contends that nonschool support for low-income households, such as the earned income tax credit, cash assistance, housing vouchers, and improved pediatric care, are essential for improved academic outcomes for poor children. This is supported by the explanatory power of AGI as a predictor of achievement in this study.

Recommendations

Identifying why student achievement in urban school districts lags behind student achievement in other geographic locations will be necessary to fully understand the importance of how school districts utilize their financial resources, regardless of geographic location. Some of the urban school districts identified in this study were actually at a financial advantage relative to many of the rural districts identified in this study as they are located in affluent areas, yet are considered urban due to population parameters.

Because some students are disadvantaged by income, housing, family employment status, health care, crime, and/or access to preschool education before they begin kindergarten (Mishel & Roy, 2006), it is recommended that future educational research - as it pertains to student achievement outcomes at the secondary level - include variables other than the financial

resources expended by a school district. Such variables may include - but not but are not limited to - crime rates, single parent homes, and exposure to early childhood education programs such as preschool. The Perry Preschool Program (PPP) longitudinal study demonstrated positive societal gains for child participants, post high school graduation, including higher rates of employment and college entrance, and lower percentages of incarcerations, need for welfare, and teenage pregnancies (Belfield and Levin, 2007). Furthermore, the Carolina Abecedarian Project (CAP) longitudinal study focused on providing preschool interventions to children from severely disadvantaged families for five years, beginning in infancy. The CAP program, much like the PPP, provided infants with nutritional meals, medical care, and vitamins, as well as educating their parents on various topics to transition their children into kindergarten. Researchers of CAP found that intensive educational interventions were predominately more successful during the preschool years, and interventions after preschool were not significant in increasing student achievement outcomes through age twelve (Campbell & Ramey, 1991). Similar results were found in the PPP as researchers found increases in student achievement outcomes leveled-off as students increased in age. However long-term, the interventions students received in each of these pre-school programs were long-lasting and beneficial to each group.

It may be necessary to reform state and federal funding initiatives to better align with the educational needs of children to include the social, health, and welfare needs of the families in urban communities (Adams et al, 2008). Statistically, urban schools face issues of crime and violence outside the school setting which are not as serious in schools in other locations (Predmore, 2004). Such factors were not identified in this study and may offer further insight as to why students in urban school districts do not perform as well as rural school district students when controlling for variation in socioeconomic conditions.

A study by Odden and Archibald (2001) examined a school which was able to reallocate its Title I funding for school-wide use rather than designated pull-out programs. The Title I funding, along with other grant funding, was used to increase school-wide professional development for staff which focused on training for all of their teachers, rather than training just a few teachers. Odden and Archibald state a reallocation of Title I funds could be used toward school reform initiatives, beginning with reallocation of school resources. However, appropriate methods must be identified to quantify difficult-to-measure variables such as how to identify the number of core classes that are taken as electives and correlating this number with a measurable form of student achievement.

Because the results of this study found achievement outcomes for rural school students to be comparable to suburban schools' students, it is highly recommended future research should examine the curricula of rural school districts, including elective courses - and compare these to those of districts in other locations. Identifying if rural school students are taking more core classes as electives due to financial restraints and/or lack of teachers available to teach elective courses may offer insight as to the reason student proficiency in ELA and high school graduation rates are higher in rural districts than in urban districts. It is also recommended that schools that are struggling financially explore how much of their operating expenditures are allocated solely for student instruction and how those resources are best used to support student learning and increased academic performance outcomes. Furthermore, research into the hiring practices of new teachers, for both urban and rural schools, may lend some insight into student performance outcomes in these districts. A final recommendation would be to examine student performance outcomes in districts with differing school finance systems outside of the state of Michigan and for a longer duration.

APPENDIX A

WAYNE STATE UNIVERSITY

HUMAN INVESTIGATION COMMITTEE
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Detroit, Michigan 48201
Phone: (313) 577-1628
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CONCURRENCE OF EXEMPTION

To: Rita Maranowski
College of Education

From: Ellen Barton, Ph.D.
Chairperson, Behavioral Institutional Review Board (B3)

Date: September 22, 2009

RE: HIC #: 097109B3X

Protocol Title: The Impact of Financial Expenditures on Rural and Urban Michigan Public High School Student Graduation Rates

Sponsor:

Protocol #: 0909007551

The above-referenced protocol has been reviewed and found to qualify for **Exemption** according to paragraph #4 of the Department of Health and Human Services Code of Federal Regulations [45 CFR 46.101(b)].

This proposal has not been evaluated for scientific merit, except to weight the risk to the human subjects in relation to the potential benefits.

- Exempt protocols do not require annual review by the IRB.
- All changes or amendments to the above-referenced protocol require review and approval by the HIC **BEFORE** implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the HIC Policy (http://www.hic.wayne.edu/hicpol.html).

NOTE:

1. Forms should be downloaded from the HIC website at each use.
2. Submit a Closure Form to the HIC Office upon completion of the study.

APPENDIX B

WAYNE STATE UNIVERSITY

HUMAN INVESTIGATION COMMITTEE
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NOTICE OF EXPEDITED AMENDMENT APPROVAL

To: Rita Maranowski
College of Education

From: Ellen Barton, Ph.D. E. Barton
Chairperson, Behavioral Institutional Review Board (B3)

Date: February 08, 2010

RE: HIC #: 097109B3X

Protocol Title: The Impact of Financial Expenditures on Rural and Urban Michigan Public High School Student Graduation Rates

Sponsor:

Protocol #: 0909007551

Expiration Date:

The above-referenced protocol amendment, as itemized below, was reviewed by the Chairperson/designee of the Wayne State University Institutional Review Board (B3) and is APPROVED effective immediately.

- Protocol - Addition of a publically available internet data source that will provide more specific data.

APPENDIX C

Pearson Correlation Matrix
(2-tailed)

		C.O.E. 2007	Percent Inst. Exp. 2007	AGI 2007	Begin Salaries 2007	Advanced Salaries 2007	Free/Red Meals 2007	Enroll-ment 2007	Urban Districts 2007	Suburban Districts 2007	Rural Districts 2007
C.O.E. 2007	Correlation	1	-.470	.144	.194	.297	.252	.216	.297	.154	-.172
	Significance		.000	.001	.000	.000	.000	.000	.000	.001	.000
Percent Inst. Exp. 2007	Correlation	-.470	1	-.064	-.107	-.222	-.118	-.189	-.191	-.250	.222
	Significance	.000		.152	.017	.000	.008	.000	.000	.000	.000
AGI 2007	Correlation	.144	-.064	1	.425	.418	-.683	.150	.019	.315	-.252
	Significance	.001	.152		.000	.000	.000	.001	.666	.000	.000
Beginning Salaries 2007	Correlation	.194	-.107	.425	1	.830	-.332	.275	.177	.482	-.407
	Significance	.000	.017	.000		.000	.000	.000	.000	.000	.000
Advanced Salaries 2007	Correlation	.297	-.222	.418	.830	1	-.278	.340	.212	.549	-.483
	Significance	.000	.000	.000	.000		.000	.000	.000	.000	.000
Free/Reduced Meals 2007	Correlation	.252	-.118	-.683	-.332	-.278	1	-.019	.151	-.203	.122
	Significance	.000	.008	.000	.000	.000		.678	.001	.000	.007
Enrollment 2007	Correlation	.216	-.189	.150	.275	.340	-.019	1	.387	.153	-.301
	Significance	.000	.000	.001	.000	.000	.678		.000	.001	.000
Urban Districts	Correlation	.297	-.191	.019	.177	.212	.151	.387	1	-.167	-.271
	Significance	.000	.000	.666	.000	.000	.001	.000		.000	.000
Suburban Districts	Correlation	.154	-.250	.315	.482	.549	-.203	.153	-.167	1	-.415
	Significance	.001	.000	.000	.000	.000	.000	.001	.000		.000
Rural Districts	Correlation	-.172	.222	-.252	-.407	-.483	.122	-.301	-.271	-.415	1
	Significance	.000	.000	.000	.000	.000	.007	.000	.000	.000	

Listwise N = 496

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ABSTRACT

ESTIMATING THE EFFICIENCY OF MICHIGAN'S RURAL AND URBAN PUBLIC SCHOOL DISTRICTS

by

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August 2012

Advisor: Dr. Michael Addonizio

Major: Educational Leadership and Policy Studies

Degree: Doctor of Philosophy

This study examined student achievement in Michigan public school districts to determine if rural school districts are demonstrating greater financial efficiency by producing higher levels of student achievement than school districts in other geographic locations with similar socioeconomics. Three models were developed using multiple regression analysis of student achievement for high school graduation rates and student proficiency rates for eleventh grade students in mathematics and English language arts as reported from the Michigan Merit Examination results. These models compared student achievement by geographic location which included a selection of 10 independent variables and a sample size of 496 Michigan public school districts that were identified as meeting the criteria for this study.

In model comparisons between rural, suburban, and urban school districts, with rural and urban the most closely related in terms of socioeconomic status, this study found rural districts are utilizing less money per-pupil than districts in other geographic locations. Furthermore, this study also found that rural districts allocated the greatest percentage of financial resources toward student instruction than any other geographical category. Rural school districts were found to have the highest graduation rates of any of the geographic locations examined in this

study, yet utilized the least amount of financial resources. Furthermore, students in rural districts had similar achievement outcomes in ELA proficiency when compared with suburban school students. Based on the findings of this study, rural school districts in Michigan are demonstrating the financial ability to "do more with less" by producing high school student graduation rates that surpass all other geographical categories, as well as ELA high school proficiency outcomes that are similar to those of students in suburban districts.

This study also identified urban school districts in Michigan as utilizing more financial resources than rural districts, yet student achievement in urban districts were found to be significantly lower. Based on the results of this study, schools that are struggling financially, or struggling to increase student achievement outcomes, should explore how much of their operating expenditures are allocated directly for student instruction, and how those resources are being used to support student learning and increase academic performance.

AUTOBIOGRAPHICAL STATEMENT

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