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An Investigation of the Relationship between District Wealth and Student Achievement

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Running head: DISTRICT WEALTH

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A dissertation submitted to the

Education Faculty of Lindenwood University

in partial fulfillment of the requirements for the degree of

Doctor of Education

School of Education

DECLARATION OF ORIGINALITY

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

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Signature:  Date: March 1, 2009

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN DISTRICT WEALTH AND STUDENT ACHIEVEMENT

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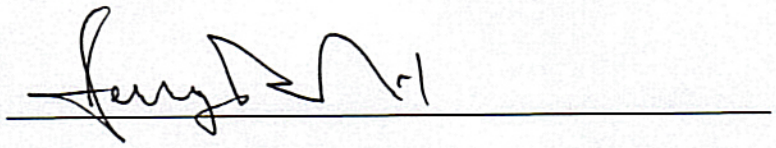

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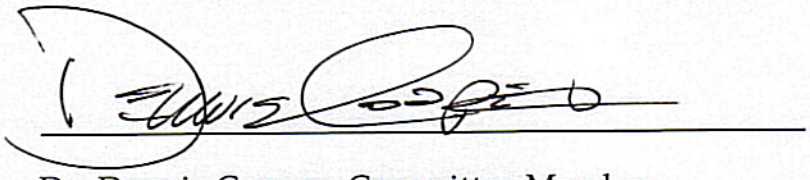
Dr. Terry Reid, Dissertation Chair — Date



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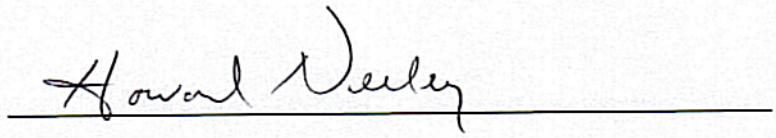

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Abstract

Since the state of Missouri has twice been sued by the Committee for Educational Equity, this study was undertaken to determine if district wealth or district expenditures have any statistical impact on student performance. All of the subjects are Missouri public school districts and all of the data reviewed was from the Missouri Department of Elementary and Secondary Education or from the internet school ranking site, Schooldigger.com. Two data sets were reviewed. First the Assessed Valuation per Pupil, the Expenditure per Pupil and the Annual Performance Report data from the time of the first lawsuit were reviewed for any correlations. Second, the Assessed Valuation per Pupil and the Expenditures per Pupil from the time of the second lawsuit were reviewed for potential correlation to the Schooldigger.com district ranking. The only significant correlation found was the negative correlation between Assessed Valuation per Pupil and Schooldigger.com ranking (-.263 with Sig. of .000). The study concluded that student achievement cannot be statistically tied to district wealth or expenditures, within the given parameters.

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KEY TO ABBREVIATIONS

ADA	Average Daily Attendance
APR	Annual Performance Report
AV	Assessed Valuation
CEE	Committee for Educational Equality
CFES	Coalition to Fund Excellent Schools
DESE	Department of Elementary and Secondary Education
EP	Eligible Pupil
LEP	Limited English Proficiency
MAP	Missouri Assessment Program
MECA	Missouri Education Coalition for Adequacy
MPI	Map Performance Index
MSIP	Missouri School Improvement Program
NCES	National Center for Educational Statistics
SB	Senate Bill
WADA	Weighted Average Daily Attendance

CHAPTER I – INTRODUCTION

An investigation of the relationship between district wealth and student achievement.

Statement of the Problem

Senate Bill 287 (Thalhuber, 2005) required the Missouri Department of Elementary and Secondary Education (DESE) to calculate a state adequacy target. “The "state adequacy target" amount, $6,117, was determined by calculating per-pupil expenditures from local and state funds by the "performance districts" in 2003-04 and will be used as the base for the formula in 2006-07. The fact that the formula provides for the amount of money expended by the districts that earned 100 points on the APR is a logical and legitimate educational calculation. The formula is designed to insure that all districts have at least this targeted amount of money to address student needs, if their general operating property tax rate is no less than $3.43. The state target will be allowed to increase beginning in 2009” (King, 2005). The adequacy target was defined as the minimum amount needed to educate each student adequately. To arrive at

that amount the Missouri Department of Elementary and Secondary Education was directed to "identify certain high performing districts (performing districts) [sic] and extrapolate the amount that those districts spent on educating their students" (Thalhuber, 2005, ¶ 2). DESE is further instructed to recalculate that amount every two years based on the then current performing districts. The author intends to examine the correlation between district wealth and district expenditures against district performance. Two questions then become readily apparent. First, *Does the available wealth of a school district influence the success of that student?* Second, *Does increasing the amount of money spent per pupil increase the success of that student?* Although the very similar work of Parrish, et al was very helpful, the scale of their project would be excessive for the direct application used here (Parrish, 1995). The study undertaken will be limited to the public schools of the state of Missouri.

Rationale for the Study

In 2005 the Missouri General Assembly passed Senate Bill 287 (Thalhuber, 2005) creating a new foundation funding formula for the public schools of the state of Missouri. This study was undertaken in an effort to determine the accuracy and relevancy of the state adequacy amount (King, 2005) reasoning as derived by the General Assembly of

Missouri Senate Bill 287. This study will be of importance to school administrators, school district patrons and to members of the General Assembly. Jim Kreider, former Representative to the General Assembly from the 142nd District told the author that "it was always valuable to have current statistics, especially from outside the Department of Elementary and Secondary Education, or the statehouse, to use in committee work as the ever changing foundation funding formula is being reviewed" (personal communication, January 14, 1997). There is much ongoing debate on the issue of adequacy and equity in school funding which will benefit from independent study of the funding adequacy issue. An example of this is the current resurgence of the Committee for Educational Equality. This group of "240 School Districts, 5 Professional Organizations & 2 Donors" (CEE Memorandum, December 14, 2003) did,

> "On January 6, 2004…file the lawsuit on behalf of the Committee for Educational Equality (Committee for Educational Equality, et al. v. State of Missouri, et al., 2007) against the State of Missouri and necessary state officials to challenge the current system of funding elementary and secondary education in Missouri by the state because such funding is inequitable and inadequate" (CEE Memorandum, December 13, 2003).

That suit was filed to, again, attempt to force the state of Missouri to rewrite the school funding formula to ensure equity for every student, and then, to fund that new formula fully. (Committee for Educational Equality, et al. v. State of Missouri, et al., 2007).

> "These various plaintiffs allege that Missouri's system of education funding violates: (1) a State constitutional requirement for adequacy in education funding; (2) the equal protection and due process guarantees of the federal and state constitutions; (3) Article X of the Missouri Constitution ("Hancock Amendment") by failing to provide the state's required share of the costs for state-mandated programs;[1] and (4) a constitutional requirement for equal assessment practices[2]" (2007, p. 2).

Data Collection Design

All numerical data regarding district expenditures, assessed valuations and annual performance report scores for this study were gathered from the Missouri Department of Elementary and Secondary Education. The Annual Performance Report score was chosen since it is a common denominator to all schools and school districts in the state of

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[1]This claim is only asserted by the CEE and CFES plaintiffs.

[2]This claim is only asserted by plaintiff CFES.

Missouri. Further, the APR is a goal that every school district attempts to meet in order to maintain or increase their accreditation status. This goal is plainly stated by the Missouri Department of Elementary and Secondary Education in their *Guide to Understanding your APR* (Missouri Department of Elementary and Secondary Education, 2008, p. 1) which states

> "During the 4th MSIP Cycle, performance determines the accreditation level of a school district. Performance standards will be evaluated using status and progress measures to determine if a standard is met. Status and progress points are combined to determine if a standard is met, unless no progress points are possible. Progress points toward meeting a standard are earned for the method awarding the maximum number of points for the district…"

Each school administrator who has the goal of a higher, or perfect, APR score has the potential, and some would say the responsibility, to increase the district's expenditure per pupil to the level necessary to achieve that goal. This should then reflect student achievement, which is the stated goal of DESE and, presumably, of schools in general. This is, again, spelled out in the *Guide to Understanding your APR*:

MAP PERFORMANCE INDEX (MPI)

> For each subject in each grade span, MSIP uses the index approach to compare improvement on the MAP. The index approach is based on a composite of the performance of all students across all MAP achievement levels. The assessment results in each subject tested for each year are converted to index points, and these index points are used to measure improvement from year to year. (Missouri Department of Elementary and Secondary Education, 2008, p. 4)

Conversely, since the expenditures could be manipulated, the author believed it was important to gather data which is not generally used by school administrators. To that end, then, the author collected the ranking of Missouri school districts, as reported by Schooldigger.com, (Claarware, LLC, 2009), an independent reporting agency which ranks schools and school districts nationwide. Schooldigger.com is primarily used by real estate personnel and home buyers who may be interested in purchasing a house in a given area, based on an assortment of parameters which the home buyer may find individually important. Schooldigger.com describe themselves as the place to "start your search for a great school … We have test scores, rankings, district boundaries, student/teacher ratios, ethnic makeup, and scores of other useful metrics and information for

over 120,000 elementary, middle, and high schools in the United States!" (Claarware, LLC, 2009, ¶. 1) Further, although the school administrator still controls the expenditures per pupil made, and could conceivably manipulate the expenditures to increase the chances of a higher ranking on Schooldigger.com, this is highly unlikely, given the fiscal pressures of operating a school district, and given that Schooldigger.com has no bearing on the school district's continued viability. Thus Schooldigger.com provides, essentially, an independent set of data for comparison.

The primary data collecting source (from DESE) was email attachments in a commonly workable format, such as Microsoft® Excel spreadsheets. The single data collecting source for rankings by Schooldigger.com is file download from the company web site. The Hyper Text Markup Language (HTML) which is commonly used in web site development typically contains tables of data. These tables then may be downloaded and converted in to a workable format within Microsoft® Excel.

Limitations of the Study

This study was limited to public school districts within the state of Missouri and makes no attempt to generalize beyond these boundaries,

but it is a nearly comprehensive list of Missouri schools. Secondly, the financial data provided by Missouri Department of Elementary and Secondary Education for analysis with the APR Score reports is not new data (Data Set 1). However, the study design was based on data for the same school year of 2003-2004 for all schools, and that was the school term immediately prior to the filing of the second CEE lawsuit (Committee for Educational Equality, et al v. State of Missouri, 1993). Schooldigger.com rankings and the accompanying financial data in those tables are from the 2007-2008 school year, which is the most recent data available from Missouri Department of Elementary and Secondary Education.

One other limiting factor to be noted was the exclusion of data from one specific school district, in the 2003-2004 DESE data, that was allowed to lapse by the Missouri State Board of Education on June 30, 2005, after having gone Unaccredited for two years. That district received 39 Annual Performance Report (APR) points, while needing 46 to be accredited provisionally, but "state education officials did not award the district any points toward accreditation in two areas – high school MAP test results and high school dropout rates-because of doubts about the reliability of the district's data for these two indicators." (Missouri Department of Elementary and Secondary Education, 2005, ¶ 10) The author also

excluded the Missouri special schools due to the extraordinary cost per pupil and subsequently skewed Assessed Valuation and Expenditure per Eligible Pupil data that would have resulted from their inclusion. In that the remaining schools represent all sizes of schools from throughout the state, the author believes this study to be relevant on a statewide basis.

The limitation given in the Schooldigger.com data set (Data Set 2) from 2008 is that the author had no control over the districts listed and ranked by Schooldigger.com. Their intent was to include every 'regular' [sic] district in the state.

> "Schooldigger.com only ranks schools that are designated as "'Regular' elementary, middle, or high schools by the U.S. Department of Education. Schools labeled as 'Other' or 'Alternative' are not included. We only rank schools that have current published test scores from that state's Department of Education. Private schools are not listed since they are usually not required to administer state tests" (Claarware, LLC, 2009, ¶ 2).

But once repeats and voids were eliminated from the 2007-2008 DESE data to mirror the Schooldigger.com data, the final list contained 491 public school districts in Missouri being ranked and evaluated. Schooldigger.com collect their data for ranking from the National Center

for Educational Statistics (NCES) and from the Missouri Department of Elementary and Secondary Education, so the author must assume some school data were lost or corrupted in transmission or translation. To that end, then, any school district whose data may have been in question was eliminated. The pairing data available from the Missouri Department of Elementary and Secondary Education was then pared down to match the districts Schooldgger.com had also evaluated. Thus, the final list of 491 districts evaluated out of the possible 525 in existence in 2007-2008 (Missouri Department of Elementary and Secondary Education, 2008) represents 93.52 percent of the school districts in Missouri at that time.

Definition of Terms

The following terms are defined to clarify the meaning and scope of key words used in this study:

Accreditation Status. The accreditation of the school districts in Missouri is based on standards met in a review by the Missouri Department of Elementary and Secondary Education School Improvement and Accountability section. While the measurement changes the current (2008) ranking of school districts is based on standards met and which yield the following currently accepted accreditation levels--Accredited, Provisionally Accredited, or Unaccredited.

Assessed Valuation (AV). The Revised Statutes of the State of Missouri (RSMo.) §48-010 states "For the purposes of this chapter, "assessed valuation" shall mean the valuation of all real and personal property as determined and finally established by the state agency charged with the duty of equalizing assessments" (Missouri General Assembly, 2008). In Missouri the Assessed Valuation of a district is thus the sum total of all real and personal property within a school district, as determined by each individual county assessor.

Data. This study contains a variety of *data sets* which are defined as "a collection of data values," whereas a *data value*, or *datum*, shall be defined as "a value in a data set." This is an important review, since the study will also deal with a variety of *data array,* which are defined as "a data set that has been ordered." All of the data definitions that guided this study were based on material in *Elementary Statistics: A Step by Step Approach* (Bluman, 2007).

Defendants. It should be noted that, while the State of Missouri, et al. is the primary Defendant in CEE v. State of Missouri, et al, there were also the Defendant Intervenors of Schock, Sinquefield & Smith.

Eligible Pupil (EP). This count is calculated as Average Daily Attendance (ADA) for the regular school term and summer school plus summer

school ADA added a second time (Missouri Department of Elementary and Secondary Education, 2002, p. 21)

Expenditure per Average Daily Attendance (ADA). "This expenditure per pupil calculation is based on the aggregate attendance of a school, school district, or state during a reporting period (normally a school year) divided by the number of days school is in session during this period. Only days on which the pupils are under the guidance and direction of teachers should be considered days in session. ADA is not a count of students per se, but rather the average attendance for the year. It is calculated by summing the attendance figures for each day of the school year and dividing by the number of days of the school year" (National Forum on Education Statistics, 2007, p. 56).

Expenditure per Eligible (or Enrolled) Pupil. The current operating expenditures per eligible pupil do not include Capital Outlay, Debt Service or Adult and Community Education (Missouri Department of Elementary and Secondary Education, 2005). That would leave, in the state of Missouri, those monies expended from Incidental, or General, Fund and from the Teacher Fund.

Fiscal Effort. "Fiscal effort is the ratio of revenue (or expenditures) to the tax base. Effort = Revenue (or Expenditure) ÷ Tax Base" (Alexander & Salmon, 1995, p. 174).

Governmental Fund Types. While not every state has exactly the same governmental fund types, there is enough similarity that the National Center for Education Statistics Clearinghouse put together the information presented below (Governmental Fund Types) in their *Forum Guide to Core Finance Data Elements* (National Forum on Education Statistics, 2007, p. 84). It is, essentially, reproduced from its original tabular format for the reader's clarification.

1. General (or Incidental) Fund: This fund is the chief operating fund of the school district. It is used to account for all financial resources of the school district, except for those required to be accounted for in another fund.
2. Special Revenue Fund: This fund is used to account for the proceeds of specific revenue sources (other than trusts or major capital projects) that are legally restricted for specified purposes.

3. Capital Projects Fund: This fund is used to account for financial resources to be used to acquire or construct major capital facilities (other than those of proprietary funds and trust funds)
4. Debt Service Fund: This fund is used to account for the accumulation of resources for, and the payment of, general long-term debt principal and interest.

Plaintiff. It should be noted that throughout this study, while the Committee for Educational Equality, et al (CEE) is the Plaintiff (in 2003 and in 2007), there were also two Plaintiff Intervenors—the Coalition to Fund Excellent Schools, et al (CFES) and the Board of Education of City of St. Louis, et al.

CHAPTER II – REVIEW OF LITERATURE

History

The preface to William Rebore's *A Guide to Missouri School Finance* (Rebore, 1992) sets the tone for school finance in the early 1990s which eventually led to the courtroom:

> The recession of 1992 has focused national attention on the funding of education throughout the United States. While the President of the United States and the Nation's Governors debate the educational agenda of the twenty-first century, many school districts find themselves on the brink of bankruptcy. Recent budget cuts in Missouri have forced districts to curtail and/or eliminate many programs to balance their budgets. With very little relief imminent from the federal government, Missouri school districts will have to wrestle with the appropriate funding of education at both the local and state levels (Rebore, p. *v*).

Rebore's comments came just prior to the lawsuit that ended the formula then in place (Committee for Educational Equality, et al v. State

of Missouri, 1993) and which had been in place for several years. The basic component of that appropriations distribution system was the Minimum Guarantee which was composed of the "minimum foundation formula and the guaranteed tax base add on (GTB)" (Rebore, 1992, p. 85). Both of these were designed to fund the state's share of local education costs through the legislative appropriation system, and both were designed to reduce inequities between school districts, with respect to their ability to support the educational process. In fact, "the primary function of the Minimum Guarantee Funding Program is to provide fiscal equity between schools based on size, and the individual wealth of each district" (Rebore, 1992, p. 85). The theory of that formula was that districts of greater wealth should receive less state aid than districts of lesser wealth. The foundation of that funding formula was the guarantee that school districts would receive a minimum amount per student to guarantee equal access and services to all. Thus state aid fills the gap between what a local school can provide and what is needed to fulfill that guarantee. The formula was also sensitive to those districts that raised their tax base to raise additional local revenues. This was the Guaranteed Tax Base that allowed districts to raise additional monies, should they desire to spend above the minimums. This combined formula designed for

equity of funding was not without its critics as Rebore (1992, p. 87) notes, "many economists argue that since property taxes are paid from personal income, property wealth alone is not an accurate measure of ability to pay or district wealth." However, that formula also contained a pupil-weighted levy to adjust for this seeming disparity technically.

An interesting portion of that funding formula was the Cost of Education Index which was part of the same initiative measure that included Proposition C (designed to relieve some of the property tax burden by shifting a portion of school funding to a sales tax). That portion of the formula, based on twenty-six factors relative to cost of operations, was designed to compare teacher salaries (statistically) across the state and react in a manner similar to the Consumer Price Index. "These factors were then statistically analyzed until a best model emerged." That best model was distilled down to a "square multiple correlation coefficient of .08520. This means that eight variables account for 85.2% of the variation in average salaries among Missouri school districts. The eight variables selected from the twenty-six are

1. Percent of female teachers;
2. Percent of teachers with Master's Degrees or above;
3. Average years teachers employed in District;

4. Type of district;

5. Average personal income within district;

6. County population density;

7. District enrollment; and

8. Average teacher salary in county." (Rebore, 1992, p. 90)

Interestingly, this entire calculation, which was designed to reduce inequities, was never implemented or used by DESE. "Insufficient funding of the formula has not allowed this factor to be fully implemented. As a result, the Cost of Education (COE) index in the formula is figures [sic] at 1.0 for all districts" (Rebore, 1992, p. 90). At that time Dr. Rebore also commented on the folly of projecting district apportionment too early, since school funding was dependent on the Missouri General Assembly to appropriate money to the formula and that then, like now, appropriations bills tend not to be finalized until the waning days of the annual session. He also notes that appropriations could be "vetoed or withheld by the governor. This has occurred twice in the past eight years: 1983 and 1991" (Rebore, 1992, p. 93). This happened again in 2003, when (then) Governor Holden also withheld funding from the foundation formula in an effort to balance the state budget.

Legal Actions

CEE v. Missouri, 1993

Later, on January 15, 1993, Judge Byron Kinder issued a decision that the system in place at that time for financing "the public schools of Missouri [did] not pass *constitutional muster* [emphasis in original]" (Missouri State Board of Education, 1994, p. 3). This decision was based, partly, on the fact that there were "vast disparities … in the funding and resources available for education in the approximately 540 school districts in the Missouri school system – with the available annual revenues on a per pupil basis ranging from $9750.53 down to $2653.04, one of the most disparate situations of any state in the United States, and with facilities ranging from the "golden" to the "god-awful" (1993, p. 23). Kinder's decision resulted from a three-week long trial during September and October of 1992 of the Committee for Educational Equality, et al. v. State of Missouri (No. CV 290-1371CC). The lawsuit was brought by two groups of plaintiffs, the Committee for Educational Equality (89 school districts and representative students) and the Lee's Summit Plaintiffs (35 school districts and representative students) who were challenging the foundation formula of the Missouri Department of Elementary and Secondary Education (DESE). They contended that the formula used to

distribute nearly one billion dollars per year to local schools was unconstitutional in that it created, perpetuated, and aggravated inequitable funding and educational opportunities among school districts (Missouri State Board of Education, 1994, p. 4). They also challenged the adequacy of the money that had been allocated to the formula by the Missouri General Assembly. This three-week long trial, in essence, led to Senate Bill 380, the "Outstanding Schools Act" (Missouri Department of Elementary and Secondary Education, 2008). Judge Kinder had given the Missouri General Assembly 90 days past the adjournment of the 1993 session to come up with a formula that would be acceptable; thus that session was dominated with efforts to replace a funding system that had been in place since 1977. The Outstanding Schools Act (Thalhuber, 2005) contained, in addition to a new funding formula, a $390 million dollar tax increase and a host of requirements aimed at school improvement. This funding formula served Missouri schools until September 5, 2003, when history repeated itself. In a memo to members of the *revived* [emphasis added] Committee for Educational Equality, Alex Bartlett, lead attorney, begins by revisiting Judge Kinder's comment that "cuts in state funding of elementary and secondary education have resulted in the Missouri school system being inadequately funded and have exacerbated inequities in the

funding of Missouri's schools. The current school finance system as presently funded does not pass constitutional muster" (CEE Membership Memorandum, December 2003).

The 1993 foundation formula included a provision that all school districts must have a minimum local levy of at least $2.75 for the 1994 tax year and beyond, and further, if a school district did not have a $2.75 tax levy by September 1, 1997, it would be rated as *Unaccredited* by the State Board of Education. This would be unacceptable, since the Outstanding Schools Act states that any district that goes unaccredited for two successive years would lapse. The district then could be closed down and the students reassigned to surrounding districts. In that most communities would find this unacceptable, the General Assembly also put in place some requirements for local school districts to "hold their own," as it were, by making the foundation formula responsive to the local levy. These two provisions, then, were the basis for rectifying the funding inequities decided in Committee for Educational Equality, et al v. State of Missouri. This led to the question, in 1997 as the new formula had become 100% implemented, "Has the Outstanding Schools Act produced funding equity on a per-pupil basis among the school districts of the state of Missouri?" The current Committee for Educational Equality would

contend that that formula contained built-in inequities, which were exacerbated by a downturn in the economy after September 11, 2001 terrorist attacks. As the state's revenues shrank, the General Assembly was forced to lower the amount of funding appropriated to the Missouri Department of Elementary and Secondary Education and thus, in turn, to the schools of Missouri. This subsequently forced the Missouri Department of Elementary and Secondary Education to calculate a percentage of the original funding formula that could be sent to schools. Literally, it is a factor of "the dollars available compared to the dollars needed" (Missouri Department of Elementary and Secondary Education, 2002, p. 54). This proration factor ranged from the upper .90s to the lower .80s (on a scale of 1.00 or, 100%) and had dire effects on certain districts. Those districts that were not able to maintain adequate fund balances, variously defined as a percentage of operating costs which typically range from 12% to 35%, were found to be in financial distress, as state revenues dried up. As an example, one sampled district lost $42,285 for every one percent reduction in the proration factor of that formula.

CEE v. Missouri, 2005

A combination of those factors ultimately lead to the resurrection of the Committee for Educational Equality (CEE) and a revised lawsuit, filed November 22, 2005. After "representatives from nearly 70 of the 257 members" (CEE Memorandum to Members, 2005) met to vote on pursuing the lawsuit even after the passage of Senate Bill 287, which was supposed to "transition the state away from this tax-rate driven philosophy to a formula that is primarily student-needs based. Currently, the state's education formula is, essentially, an equalized tax-rate driven formula, meaning that the formula provides a certain amount of money per student, per penny of tax rate (Thalhuber, 2005). The revised lawsuit contains new provisions which directly address concerns with Senate Bill 287, even though concerns which had been voiced in the original CEE lawsuit had apparently been addressed in the new SB 287 formula. Judge Byron Kinder, writing in his 1993 decision, specifically addressed the concern he had with a system that had "almost since its adoption in the late 1970's… been massively underfunded by the legislature" (West, 2003), which forced an ever greater reliance on the local resource pool and which then further exacerbated the fact that historically "those disparities are not because of differing student needs, but instead are associated with local

property wealth or are simply irrational." He wrote that "the present system of financing the public schools of Missouri does not pass constitutional muster" (West, 2003, ¶12). The final *Summary of Bill* (Thalhuber, 2005) specifically addressed the shift to student-based versus tax-based allotment of monies to school districts. Donald Thalhuber (2005, ¶ 3) wrote that

> The formula assigns additional weight to districts' student counts based on certain student characteristics, specifically, to students who qualify for free and reduced lunch, receive special education services, or possess limited English language proficiency. The department will identify the aggregate percentage of the performance districts' free and reduced price lunch, special education, and limited English language proficiency populations in order to create threshold percentage amounts. Any district with student populations above the threshold percentages in any of the weighted characteristic areas will be assigned additional "weight" for the number of the district's students above the threshold amounts. These additional weights will be added to the district's student population in order to arrive at that district's weighted average daily attendance [WADA – Ed.].

> Further, the act contains a proxy variable for the relative purchasing power of a dollar, the dollar value modifier. The modifier is an index corresponding to the wage-per-job (on a regional basis) that captures 15% of the percent deviation from the state's median wage-per-job.

Even with this information in hand, the CEE Plaintiffs elected to forge on with their lawsuit. Tyler Laney, CEE Chairman, was quoted at that time as saying, “We believe if CEE walks away from this lawsuit and does not continue to pursue the goal of equity and adequacy for all children, then neither will occur” (Means, 2005). However, Judge Richard Callahan’s decision was, apparently, not that for which the CEE members had hoped. In fact,

> …the trial just concluded was unusual in two respects. First, three taxpayers were allowed to intervene for the defense and, in the process, raise important questions concerning the efficiency of school spending and broader questions of school reform. Second, the outcome at the circuit court level, which focused nearly entirely on points of law, was a complete victory for the defense. However, this is but one milestone in a long road of litigation stretching back more than a decade. In this regard Missouri is hardly unusual.

> Many other states have experienced prolonged litigation surrounding school finance. What made the Missouri case unusual – indeed, unique –was the fact that a group of three taxpayers intervened for the defense. This not only raised the overall vigor and quality of the defense, it also provided a vehicle for raising questions about efficiency with which schools use their current funds, and opened the door, at least a crack, for testimony about market-based school reforms and value-added measures as alternative remedies to the complaints of the plaintiffs. (Podgursky, Smith, & Springer, 2007, p. 1)

Note: It should be fairly noted that Michael Podgursky is a Director of the Show-Me Institute (for whom that study was undertaken) and that the President (Rex Sinquefield) and Secretary (Bevis Schock) of the Show-Me Institute are named as Defendant Intervenors in the case (Committee for Educational Equality, et al. v. State of Missouri, et al., 2007) described above.

This ruling, combined with ongoing efforts at school reform, has then necessitated the continued study of actual spending amounts compared to student achievement. Podgursky, et al, go on to submit that they "show that efforts to specify an 'adequate' level of K-12 spending per

student by reference to student test scores are a hopeless endeavor. It is simply not possible to identify a statistically reliable relationship between district spending and student achievement" (Podgursky, Smith, & Springer, 2007, p. 5). Matthew Samberg reported on January 11, 2007 that "three members of the Show-Me Institute, a conservative think tank, recently intervened on the side of the state defendants in Committee for Educational Equity v. State, Missouri's school funding lawsuit. In addition to arguing that education funding is a political question and does not belong in the court system, these defendant-intervenors have been instrumental in *procuring expert witnesses to provide testimony that there is no relationship between school funding and student achievement* [emphasis added]" (Samberg, 2007, ¶ 1). Podgurskey's work in this area was limited to the correlation between 8th Grade MAP Scores in 2006 and the then-current expenditures per pupil (Podgursky, Smith, & Springer, 2007, p. 33). Michael Rebell opines, on the other hand, that these cases are still "alive and well." "For the past 18 years, plaintiffs in education adequacy litigations have had a remarkable record of success, prevailing in 20 of 27 decisions of the states' highest courts (or unappealed trial court decisions)" (Rebell, 2007, ¶1). Rebell takes this stance in opposition to an opinion article by Alfred A. Lindseth in *Education Week* (Lindseth, 2007, p.

2). Lindseth believes that 2005 was a watershed year for school funding litigation for a number of reasons, and that that was the point at which the tide shifted toward the idea, "more money does not guarantee better schools or more educated students," as expressed in a Texas court (which Lindseth does not identify or cite). He further asserts that prior to that time that courts had routinely rejected research "concerning the lack of a relationship" between school district spending and student achievement. Lindseth leaves the door ajar for further research, though, when he excepts Massachusetts, as a court that had, in fact, received actual research showing a correlation between student achievement and the injection of huge sums of money into the system. Rebell reports in that case that "The Massachusetts Supreme Judicial Court, noting that the State had implemented the extensive reforms contemplated by its previous order, had increased education spending by over $6.5 billion, and had achieved remarkable progress in terms of academic improvement in recent years" (Rebell, 2007, ¶ 9). Notably, Mr. Lindseth also discusses overtures to the school systems' seeming need for reform as he discusses the fact that the courts (notably Texas and Massachusetts) discussed, not whether or not schools were able to get students to some arbitrary high level of performance, but whether they were making any progress at all in

student achievement as an attempt to overcome other socioeconomic and social barriers, for instance. Rather than concentrating on absolute achievement levels, which could be attributable to many causes beyond the schools, they have begun to examine outcome measures, such as gains in test scores, over which schools should be expected to have more influence (Lindseth, 2007). Lindseth also counters the work done in past litigation, which attempted to "cost out" the educational system. Before further reviewing cost out discussions, notice that it says in the byline to the cited *Education Week* article, "Alfred A. Lindseth is a senior partner with the law firm Sutherland, Asbill & Brennan LLP, in Atlanta. He specializes in representing states in complex school finance litigation, and has participated in "adequacy" lawsuits in such states as New York, Connecticut, Florida, Georgia, Minnesota, Missouri, and North Dakota" (Lindseth, 2007). This includes the current case under review, in which this firm was hired to consult with the Missouri Attorney General's office. Then Attorney General Jeremiah Nixon discontinued the consulting agreement with this firm in October 2004.

Lindseth claimed that "Pre-2005, a number of courts (in Kansas, New York, and Arkansas, for example) relied on "costing-out" studies to order huge increases in education spending, influenced by the promise

that these studies could reliably determine what an "adequate" education should cost. However, there has been increasing criticism of such studies by scholars, and judges have begun to lose faith in the easy answers they purport to provide to complex questions" (Lindseth, 2007, p. 3).

An education adequacy costing-out study determines the amount of money actually needed to make available all of the educational services required to provide every child an opportunity to meet the applicable state education standards (Access Week, 2006). There are several approaches to this costing out analysis such as,

1. *Professional Judgment Studies* that try to assimilate all of the components of an education program such as cost of staff and cost of making extra time for extraordinary populations; and which is based on the professional judgment of educational authorities around the state.
2. *Expert Judgment (or Evidence-Based) Studies* which tend to be more research based and instead of a group of practicing educational professionals, it tends to be a smaller group of education experts who have analyzed the relevant data and make subsequent recommendations (Odden, Goetz, & Picus, 2007).

3. *Successful School District Studies* are essentially a statistical modeling approach that calculates the cost of an adequate education based on specific data regarding resource inputs, student test scores, and other precisely defined outcome measures (Access Week, 2006, *Methodologies*).
4. *Cost Function Studies* attempt to determine how much a district would have to spend in order to meet a predetermined set goal, based on performance standards and local indices.

Both the "successful schools / district and cost function approaches provide an estimate of the adequate expenditure per pupil level (and adjustments for various pupil needs) but do not suggest how those dollars should be used. By contrast, the professional judgment and the evidence-based approaches specify in some detail a set of programs and strategies" (Odden, Goetz, & Picus, 2007, p. 4). Augenblick, Palaich, and Associates have been hired by counties, state legislatures, and state departments of education to review the efficiency of school funding systems and to offer recommendations for changes that may be required to implement reforms. Augenblick, Palaich, and Associates have also developed a series of "efficiency screens" to identify appropriately districts that not only

achieve at a high level, but do so in an efficient fiscal manner (APA Consulting, 2009, p. 1). *The Education Adequacy Study in Missouri* was undertaken by Augenblick, Palaich, and Associates in the fall of 2002, at the request of the Missouri Education Coalition for Adequacy (MECA), to provide an education adequacy study specifically for Missouri. The purpose of the study was to provide Missouri policymakers with an estimate of the resources needed to help all students reach state established (and nationally reinforced) academic standards (Augenblick & Silverstein, 2004), with the following results. "In 2001-02, Missouri's 522 districts spent $5.81 billion dollars for the functions related to adequacy. We estimate that the school districts would need to have spent $6.53 billion in order to reach adequacy" (Augenblick & Silverstein, 2004, p. 6). They reported that 484 districts had spending levels below adequacy and 38 districts had spending levels above adequacy. Either number could be used to set the base. But that number varies as well, depending on which one of the two numbers Augenblick, Palaich, and Associates reported as "base costs." The first was a figure of $5,664 per student based on the Successful Schools approach while the Professional Judgment came in at $7,832. The difference was explained by Augenblick -- "[T]he Professional Judgment number probably more closely represents the amount needed to

meet the full state and federal standards in 2013-14 [whereas] the Successful School District number more closely reflects the amount needed to meet current state and local standards. The Professional Judgment Approach also produced adjustment figures for Special Education, At-Risk, LEP, and District Size" (Augenblick & Silverstein, 2004, p. 3). Missouri eventually declared that $6,117 would be the state adequacy target. Dr. Kent King, Missouri Commissioner of Education, at that time, announced the new formula in a newsletter that stated in part, "This formula is designed to assure that all districts have at least the 'state adequacy target' to spend for each student's education. The current formula is driven by tax rates rather than student needs," he said. "For the 2006-07 school year, the "adequacy target" will be $6,117 per student, an amount that will be achieved through a combination of state and local funds" (King, 2005, *New Foundation* ¶4).

Appeal to the Missouri Supreme Court, 2009

The Committee for Educational Equality appealed Judge Callahan's decision to the Supreme Court of the state of Missouri with briefs filed in January 2009 as Supreme Court No. SC89010, Cole County Case No. 04CV 323022 (Committee for Educational Equality et al, Coalition to Fund Excellent Schools, et al, Board of Education of the City of St. Louis, and

the Special Administrative Board of the City of St. Louis, 2009). CEE essentially disputes Judge Callahan's findings with reference to the constitution of the state of Missouri, which specifically requires 25% of the states monies to go to public education. The Missouri School Board Association, Education Justice at Education Law Center, The National School Boards Association, and The Rural School and Community Trust filed amici curiae in support of the appellants, i.e. "a friend of the court" under the following *Interest of Amici:*

> The Missouri School Boards' Association (MSBA) is a nonprofit organization representing publicly elected school board members and public school districts in Missouri. MSBA has 391 member districts educating over 90% of the student population in Missouri. Representing the governors of public education who are accountable for individual school districts' budgets and the success of Missouri's public school students, MSBA is keenly interested in matters impacting public school funding (2009, p. App. 544).

The amicus curiae brief filed by the Missouri School Board Association sums up the essential points upon which the case was appealed:

1. The trial court erred in holding that the Missouri Constitution does not require adequate state funding for free public

schools beyond the 25% "minimum" of Article IX, § 3(b), because the Article IX, § 1(a) requirement of a "general diffusion of knowledge and intelligence …essential to the preservation of the rights and liberties of the people" is a paramount duty of the state, in that the words of § 1(a), as used in American state constitutions since the founding of the Republic, and as interpreted by high courts across the nation, embody a fundamental mandate for state government to provide a system of school funding sufficient to provide all school children a substantive opportunity to learn that meets quality standards.

2. The trial court erred in holding that the Missouri Constitution does not require adequate state funding for free public schools, beyond the 25% "minimum" of § 3(b), because § 1(a) requires that the General Assembly provide a system of school funding sufficient to provide all school children a substantive opportunity to learn that meets quality standards, and the courts of Missouri are empowered to establish explicit standards and parameters to guide the General Assembly in enacting appropriate legislation to remedy the

constitutional defects, a scheme that has often led to successful educational reforms and academic improvement in other states.

3. The trial court erred in refusing to recognize that clear standards have been key to the successful resolution of "adequacy" cases by courts in sister states. (Committee for Educational Equality et al, Coalition to Fund Excellent Schools, et al, Board of Education of the City of St. Louis, and the Special Administrative Board of the City of St. Louis, 2009)

Adequacy Issues

Background

A second portion of the appeal by the CEE et al is the adequacy issue. Although this study is primarily concerned with equity issues, a brief review of Adequacy Measures is valuable, nonetheless, and may be found at the National Center for Education Statistics' web site at http://nces.ed.gov/ (National Center for Educational Statistics, 2007). The study, definition, and measuring of adequacy in school finance is relatively new. In recent decades, equity was the major focus of study. In several instances, state funding systems were found to be equitable, using

within-state comparisons. However, having a fair or equivalent funding distribution does not always mean that the amount given is enough or adequate. Recently, school finance litigation and research has begun to apply more of its focus to the adequacy of funding. Although subtle in several instances, there are key differences between equity and adequacy. Equity deals with inputs. The concern, as discussed in an earlier section, is providing equitable resources to students, regardless of the local school district's wealth. Equity is related to the assumption that equal or equitable dollars provide an equitable opportunity to learn. Adequacy, on the other hand, deals with outputs. The concern is whether the amount of funding accomplishes a set goal or standard, such as increasing test scores, increasing graduation rates, decreasing dropout rates, or similar standards. The goals of equity and adequacy also differ. Legislators and policymakers set a goal of redistributing tax dollars to bring about equity, usually providing additional dollars in an inverse relationship to fiscal capacity. While student learning is implicitly the end result, the explicit goal is fair distribution of funding. Adequacy, on the other hand, begins with establishing a targeted standard for student achievement. Funding in this case is based upon providing the resources necessary to bring all students up to the established standard. The explicit goal is fair funding

of sufficient resources. A major area of concern in the area of adequacy is which of the measures or standards should be targeted. Output measures focused on so far have been achieving defined levels of proficiency on some test, usually a state-developed criterion reference test. However, in some lawsuits regarding adequacy, the courts have developed a list of abilities that students should possess upon exiting the K-12 public school system. The list developed with the Kentucky lawsuit (Rose v. Council for Better Education, 1989) called for sufficient skills in communication, reading, making informed choices, and other areas. A more recent lawsuit over funding of New York City Schools (Campaign for Fiscal Equity, Inc. v. State) raised the bar even higher. New York decided that, in addition to other knowledge and skills, students should be able to serve on a jury, and, therefore, understand such things as DNA evidence and election campaign reform. Other states have decided to identify the school district that is producing the desired outcome and fund all districts at the level of this identified district (National Center for Educational Statistics, 2007).

Current Status

As a part of the appeal to the Supreme Court the law firm of Husch & Eppenberger, LLC (representing CEE et al) commissioned an equity analysis study to be done for the fiscal years 1993 to 2005. They employed Richard G. Salmon and Lisa G. Driscoll to conduct the study of the Missouri system of public school finance. The two purposes of the study were to look to see if SB 380, after Judge Kinder's decision, had fulfilled its promise of providing more adequate and equitable funding of public schools, and if that level of funding had been maintained. Their resulting four fundamental questions are

1. Have inter-district disparities in adjusted state and local expenditure per eligible pupil been reduced?
2. Is post-legislation revenue (after FY 1998) more equally distributed among eligible pupils (as evidenced by adjusted state and local expenditures) then pre-legislation revenue (prior to FY 1998)?
3. Has the relationship between a district's fiscal capacity, i.e. ability-to-pay for education, and its respective per eligible pupil adjusted expenditure for education diminished over the time period of this study?

4. When pupils are weighted (in accordance with Senate Bill 287, Missouri 2005 Methodology), have inter-district disparities in adjusted state and local expenditure per pupil been reduced? (Salmon, 2006, pp. A-544)

Their results may be fairly summarized as,

1. The gap in funding for education between high and low fiscal capacity school districts in the State of Missouri began to close as the funding changes were implemented (FY 1996) and reached its best level of equity in FY 1999. Since FY 1999, the general trend by all the indicators of statistical equity appears to be a general decline in the level of fiscal equity, although the level is not as egregious as it was during the FYs 1993 through 1996. Nevertheless, the equity statistics registered by Missouri still place it among those states providing the most disparate systems of public education in the United States.
2. While all deciles of eligible pupils experienced slight gains in adjusted state and local expenditure per eligible pupil, when compared to pre-legislation law, the highest fiscal capacity school districts (1st decile) experienced a very modest 3.6

percent growth rate in adjusted state and local expenditure per eligible pupil under the changed finance system, while the lowest capacity districts (10th decile) experienced a robust 31.5 percent growth rate for the decade, FYs 1994 to 2004.

3. The statistical relationship between fiscal capacity and adjusted state and local expenditure per eligible pupil, characterized as relatively strong, declined slightly; for FY 1993 the *R* squared accounted for 53 percent of the variance in expenditure per eligible pupil and, by FY 2003, only 37 percent of the variance was explained, but increased to 42 percent by FY 2005. The disparity among school districts, as measured by adjusted state and local expenditure per eligible pupils, has widened since FY 1999, and the link between district fiscal capacity and resources has strengthened, both signs of a deteriorating system of school finance.

4. For the weighted analysis only five fiscal years were analyzed, FY 2001 through FY 2005. The analysis of the descriptive statistics for the weighted pupils indicated slightly increasing adjusted state and local expenditure per weighted pupil amounts over the study interval, with regard

> to the mean, median, range, and restricted range, consistent with those exhibited in the unweighted analysis. The analysis of the equity statistics (the Federal Range Ratio, the Coefficient of Variation, the Gini Coefficient, the Theil Index, and the McLoone Index) indicates an essentially flat trajectory in fiscal equity improvement over the five years (FY 2001 through FY 2005) analyzed. Finally, the statistical relationship between fiscal capacity and adjusted state expenditure per weighted pupil characterized as strong (R-squared accounted for 52% of the variance in FY 2001 and 46% in FY 2005) and persistent - thus, indicative of a system of school finance that is highly inequitable. (Salmon, 2006, pp. A-548)

Whether these findings of fact purported by Salmon, and others, that the system is inadequately funded and inequitably distributed will remain to be seen as this case goes before the Missouri Supreme Court. The defendant intervenors will, no doubt, present their side, as noted earlier, that the courts have no right to legislate funding, and that there continues to be no discernible relation between the system for financing public schools and the performance of students within those schools.

Summary

Nonetheless, given the research and analysis debate, the current foundation funding formula contains a per pupil expenditure target as legislated. As stated earlier, one of the items of ongoing concern is the Expenditure per Pupil target amount of $6,117 and the justification for that dollar figure. In that this figure has been a critical item within the CEE lawsuit, and continues to be a critical line item in the continued funding of the basic foundation formula to fund schools in the state of Missouri, the author elected to undertake a review of district wealth, as measured by Assessed Valuation per Pupil and by actual expenditures, i.e. Expenditures per Pupil, in order to determine what affect, if any these would have had on student achievement and, indirectly, on district performance when the most recent Committee for Educational Equality lawsuit was brought. Second, the author determined to verify or refute these state generated data by developing a comparison model of non-parametric tests, based on a comparison of public perception scoring versus expenditures per pupil and district wealth.

CHAPTER III – METHOD

Introduction

Based on a lawsuit between the Committee for Educational Equality and the State of Missouri, et al (Committee for Educational Equality, et al. v. State of Missouri, et al., 2007) with regard to the adequacy and equity of public school funding in spite of the revamped system, that went in to effect after the passing of Senate Bill 287, the author elected to determine if a correlation existed between district wealth and student achievement. Two independent sets of two questions were posed to frame the study: Data Set 1, question one, "Does the available wealth of a district influence the success of that student?" Data Set 1, question two, "Does increasing the amount of money spent per pupil increase the success of that student?" Data Set 2, question one, "Does the available wealth of a district influence student success as mirrored by public perception?" Data Set 2, question two, "Does increasing the amount of money spent per pupil increase the success of that student on a public perception scale?" For clarity the DESE data sets, and subsequent treatments & review, will be

referred to as primary (i.e. Data Set 1) and the Schooldigger.com data will be referred to as secondary (i.e. Data Set 2), so the reader may more easily follow the progression of the work.

Subjects

The subjects for this study were the public school districts and the public school children of the State of Missouri. Given the ability of a Microsoft Excel® spreadsheet to handle huge quantities of data, no attempt was made to sample within either of the available populations which yielded, for all practical purposes, data sets comprised of the complete population in each case. Thus sampling error, defined as the difference between the sample mean ($\bar{X}$) and the population mean (μ) "due to the fact that the sample is not a perfect representation of the population" (Bluman, 2007), has been eliminated. A confidence interval is defined as "a specific interval estimate of a parameter determined by using data obtained from a sample and the specific confidence level of the estimate" (Bluman, 2007). One then additionally eliminated the necessity to calculate confidence intervals for any of the means of the various data sets which were used as well. The study thus encompasses 521 Missouri school districts within the Missouri Department of Elementary and Secondary Education Department data sets and 491 Missouri school

districts within the Schooldigger.com data sets. No attempt has been made to sort or stratify the data sets in any way, since the (nearly) entire population has been analyzed.

Procedures

After having reviewed two Adobe Acrobat® files available from DESE's web site at *Missouri Department Of Elementary And Secondary Education School Finance Section 2003-04 Equalized Assessed Value per EP* (Missouri Department of Elementary and Secondary Education: School Finance Section, 2005) and *Missouri Department of Elementary and Secondary Education School Finance Section Current Expenditures and Eligible Pupils Data* (Missouri Department of Elementary and Secondary Education: School Finance Section, 2005) the author requested the same data from DESE in an Excel® spreadsheet format. This allowed the author to make some conversions to the data presented, to make it uniform for every school district across the state of Missouri. Further, based on that scenario the author then sought out an independent school ranking source to verify the results. Eventually the author settled on Schooldigger.com and downloaded the data appropriate to this study, then converted what amounted to an HTML table (comprised of tab delimited columns) into data sets within Microsoft Excel®.

The dependent variable in both of the primary, DESE, scenarios reviewed was that of student and district performance, as measured by each district's Annual Performance Report (APR) score. For all K-12 schools, this was a raw score based on 100 points possible. For K-8 districts, however, this was a raw score based on 54 points possible. The author converted each district's raw APR score to a percent score by dividing the individual raw scores by the points possible. In this fashion every school reviewed would have an Annual Performance Report *percent* score, which could be treated and compared statistically. The districts were then sorted by their county district code, as assigned by the Department of Elementary and Secondary Education. While the sort has no effect on the data or the computations, this is a convenient way to match up three lists that must be reviewed for correlation. The three subsequent data sets in the primary test are the:

1. Assessed Valuation per Pupil of each school district;
2. Expenditures per Pupil for each school district;
3. Annual Performance Report score.

The dependent variable in both of the secondary data sets, from Schooldigger.com, was the ranking of the districts. Their ranking of districts is a multi-step process that begins by ranking each school

building, then compiling those building scores into a final district variable. Schooldigger.com describes its building level process as:

> We rank schools based on the most recently reported test scores. Our ranking system for most states [Missouri is included in this process based on MAP results—Ed.] is as follows: we take all the schools that have test scores for Math and English. We take the average Math score across all the grades, and the average English score across all the grades, and add them together to make a combined score. That combined score is then sorted. The highest combined score is ranked #1, the second highest #2, and so on. (Claarware, LLC, 2009, ¶1)

After the buildings are ranked, then a treatment can be applied to the scoring to yield district rankings in this fashion—"for each district, we

School	Rank	Rank Percentile
Lincoln Elementary	15th of 100 Elementary Schools	.85
Jefferson Elementary	25th of 100 Elementary Schools	.75
Jackson High School	5th of 50 High Schools	.90
Average rank percentage (Rank Score):		.8333

Figure 1
Schooldigger.com Percentile Ranking Calculation

determine a Rank Score by averaging the rank percentile of the schools within each district. For instance, take this example of one district: This calculation is made for all districts, and then the list of districts is sorted by Rank Score. The district with the highest score is ranked #1" (Claarware, LLC, 2009, ¶1). The author then took each school district thus ranked and sorted the entire data set alphabetically by district, so as to simplify the addition of the columns of independent variables used in the final analysis. Those columns of district data are the district expenditure data and the district assessed valuation data received from the Missouri Department of Elementary and Secondary Education. Since the School digger.com data is rank order data, then, in order to make an effective comparison, the DESE data also needed to be rank ordered. This was done by sorting the districts from greatest Assessed Valuation per Pupil to lowest, then assigning an ordinal number to each from 1 to 491. At that point the Assessed Valuation per Pupil column is deleted and the data is sorted again – this time on the Expenditure per Enrolled Pupil. The same process is then followed, of assigning sequential numbers, then deleting the column of raw dollar-value data. The final result is a list of school districts, typically arranged alphabetically, that have three rank scores

assigned per district. In this fashion the observer can easily see where each district ranks in each category.

Statistical Treatment

Primary Data Set

The Pearson product moment correlation coefficient (PPMC) is the correlation coefficient used for the primary data set. "The correlation coefficient computed from the sample data measures the strength and direction of a linear relationship between two variables. The symbol for the sample correlation coefficient is *r*. The symbol for the population correlation coefficient is ρ (Greek letter rho)" (Bluman, 2007, p. 533). The range of the correlation coefficient is -1 to +1. If there is a strong linear relationship between the variables, the value of *r or* ρ will approach 1, either positively or negatively. The following figure of range of values (Bluman, 2007, p. 533) illustrates the point.

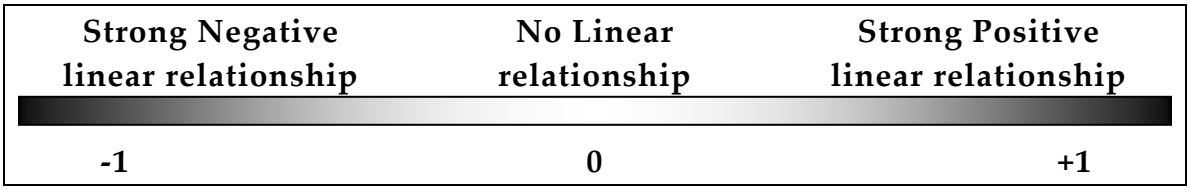

Figure 2
Range of Linear Relationship

"Formally defined, the population correlation coefficient ρ is the correlation computed by using all possible pairs of data values (x, y) taken

from a population" (Bluman, 2007, p. 537), and, given the following assumptions, r can be used to accurately assume ρ.

1. The variables x and y are linearly stated.
2. The variables are *random* variables.
3. The two variables have a *bivariate normal distribution*.

(Bluman, 2007, p. 537)

The primary data set of APR Scores v. District Wealth and APR Scores v. Expenditures per Pupil meet all of these criteria—thus the Pearson product moment correlation coefficient (PPMC) was selected as the appropriate analysis tool.

Given that the correlation coefficient is a measure of linear association between two variables, the Assessed Valuation per Pupil of each district was compared to their Annual Performance Report score, to accept or reject the first hypothesis (DS_1H_1). Namely, "The assessed valuation per pupil of a district will not significantly impact scores on the annual performance report of that district." Secondly, the Expenditure per Pupil was compared to the Annual Performance Report, to accept or reject the second hypothesis (DS_1H_2), which was, "The expenditures per pupil of a district will not significantly impact scores on the annual performance report of that district." Finally, to review the intuitive, the author

compared the assessed valuation per pupil of each district to the amount expended per pupil, to check to see if the two correlates were normally distributed. In other words, "Do districts with a greater assessed valuation per pupil tend to spend more per pupil as well?"

Secondary Data Set

Because the Schooldigger.com result is essentially a ranking of school districts, then, the assumptions noted above for PPMC, which yield accurate estimation of population, are not valid. Specifically the ranking of districts violates the maxim of *random* variables and thus a randomly distributed data set. To that end, then, one must look to non-parametric data to consider the ordinal data. The researcher may use nonparametric tests and statistics "in place of their parametric counterparts (z, t, and F) when the assumption of normality cannot be met. However one should not assume that these statistics are a better alternative than the parametric statistics. There are advantages and disadvantages to both" (Bluman, 2007, p. 661). Bluman lists the advantages as,

1. They can be used to test population parameters when the variable is not normally distributed.
2. They can be used when data are nominal or ordinal.

3. They can be used to test hypotheses that do not involve population parameters.
4. In most cases, the computations are easier than those for the parametric counterparts.
5. They are easy to understand.

He then goes on to list and discuss the disadvantages as follows:

1. They are less sensitive [sic] than their parametric counterparts when the assumptions of the parametric methods are met.…
2. They tend to use less information [sic] than the parametric test.…
3. They are less efficient [sic] than their parametric counterparts when the assumptions of the parametric methods are met. That is, larger sample sizes are needed to overcome the loss of information.…

Pursuant to Bluman's discussion, the disadvantages listed are not applicable to the Schooldigger.com ranking data set. Disadvantage 1 is not applicable, since the rank order of findings in and of itself voids the use of the parametric data. Disadvantage 2 is a *tendency* [emphasis added] among researchers to use less information, which may limit the accuracy

of result, when considered in conjunction with Disadvantage 3. However, in this study the *n* of districts ranked and compared is not only 491 school districts, but those 491 school districts represent approximately 95% of the districts available for review. Given the unreachable parameters of parametric analysis in the secondary ordinal data set, then, the Spearman's rank correlation coefficient, denoted by r_s, is thus the correct correlation coefficient to be used for the secondary data set. The Spearman should be used when all the data are arrayed in a rank order.

> The computations for the rank correlation coefficient are simpler than those for the Pearson coefficient and involve ranking each set of data. The difference in ranks is found, and r_s is computed by using those difference. If both sets of data have the same ranks, r_s will be +1. If the sets of data are ranked in exactly the opposite way, r_s will be -1. If there is no relationship between the rankings r_s will be near 0 (Bluman, 2007, p. 687).

Bluman illustrates this within the Range of Linear Relationship (Figure 2).

Summary

All statistical treatment of data within this study was calculated with Analyse-it for Microsoft Excel (Analyse-It Software, Ltd., 2008) or

with SPSS, both manually and as a pre-programmed function, to reduce the possibilities of computational errors. Other than insignificant

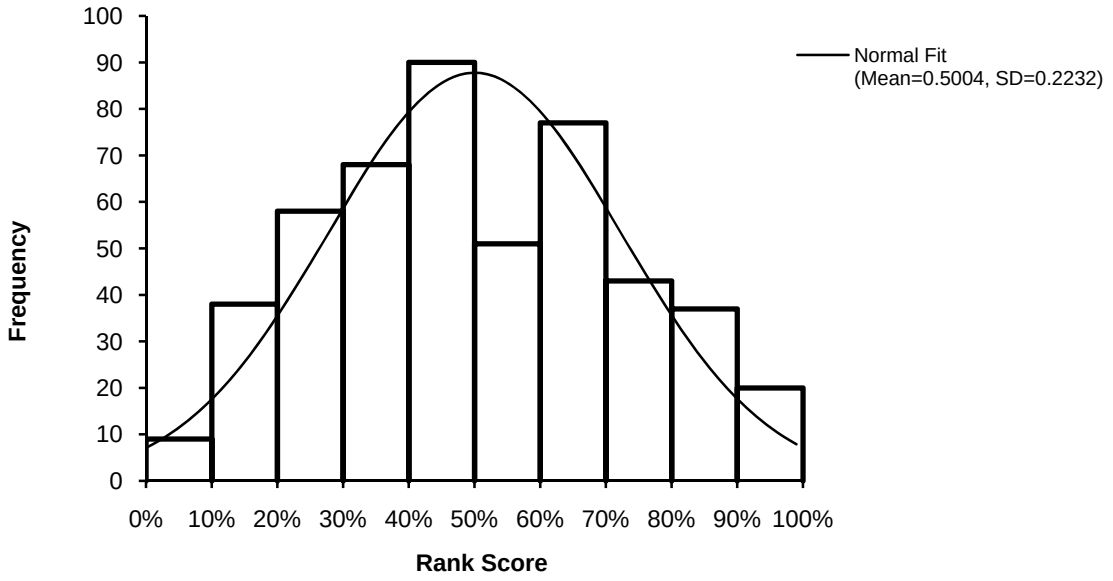

Figure 3
Frequency of Rank Scores

rounding errors at the 4th decimal place, all computations matched, so the manual calculations were dropped in favor of the more easily readable Analyse-it reports and/or SPSS graphic representations. Finally, as a refresher, Figure 3 is the distribution of the Rank of Scores from the Schooldigger.com web site. Naturally, when one ranks a set of scores in numerical order from 1 to 491, the result is a normal distribution curve as seen in Figure 3.

The only possible skew is, if the sheer number of scores that convert are not also in pure linear order, one actually ends up with a mean

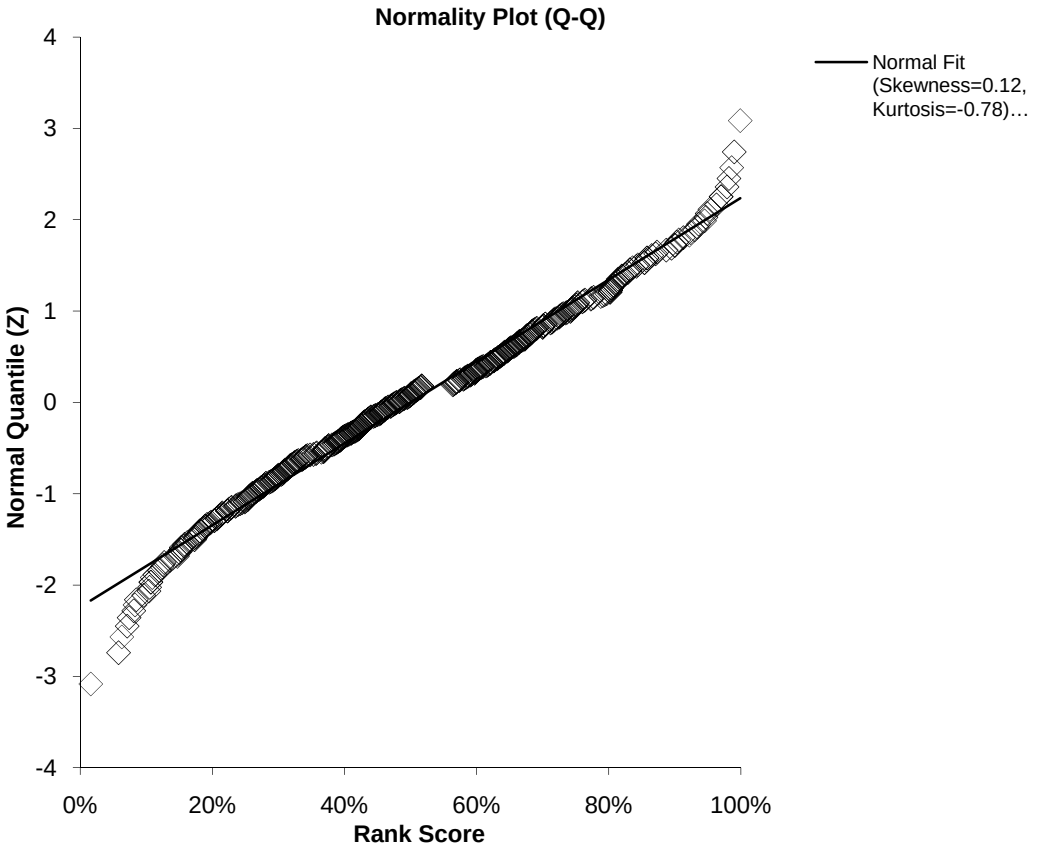

Figure 4
Normality of Rank Score

that is not exactly .5 out of a range from 0.0 to 1.0 (i.e. 0% to 100% possible score), but note that the mean returned in Figure 3 is .5004 with a standard deviation of only .2232. Further, as noted in Figure 4, an example of a nearly perfect plotting of normality one can see that the Kurtosis of .78 and the Pearson PI coefficient of skewness of .98 indicate

that this curve is nearly a perfect example of “normal distribution” which, recall, is defined as “a continuous, symmetric, bell-shaped distribution of a variable” and that a “standard normal distribution is a normal distribution with a mean of 0 and a standard deviation of 1” (Bluman, 2007, p. 289).

CHAPTER IV – RESULTS

Introduction

Primary Data Set

Given the first hypothesis (DS_1H_1) of *The Assessed Valuation per Pupil of a district will not significantly impact scores on the Annual Performance Report of that district*, where the independent variable is the Assessed Valuation per Pupil of the district and the dependent variable is the district's Annual Performance Report score, and given that the Pearson product moment correlation coefficient (PPMC) is -.044, this hypothesis then is not rejected. Given the second hypothesis (DS_1H_2) of *The expenditures per pupil of a district will not significantly impact scores on the annual performance report of that district*, where the independent variable is the Expenditures per Pupil and the dependent variable is the Annual Performance Report score of the district, and given that the Pearson product moment correlation coefficient (PPMC) is -.062 this hypothesis is also not rejected.

Analysis of Primary Data Set

As is seen in Table 1, the correlation coefficient, which measures the linear association between two scale variables, in this case, the Assessed Valuation per

		AV per EP	Expenditure per EP	**Percent Score**
AV per EP	Pearson Correlation	1	.294**	**-.044**
	Sig. (2-tailed)	.	.000	**.315**
	N	521	521	**521**
Expenditure per Eligible Pupil	Pearson Correlation	.294**	1	-.062
	Sig. (2-tailed)	.000	.	.161
	N	521	521	521
Percent Score	Pearson Correlation	-.044	-.062	1
	Sig. (2-tailed)	.315	.161	.
	N	521	521	521

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1
Correlation Coefficient of the Primary Data Set (DS_1H_1)
Assessed Valuation per Eligible Pupil to Percent Score

Pupil and the district's Annual Performance Report score was a very low -.044. The correlation reported in the table is negative, although not significantly different from zero, which suggests that there is no linear relationship between assessed valuation per pupil and district performance scores. This notion is further reinforced by the significance level of the correlation of .315. While $p \geq .50$ is considered large enough to definitely be considered as not significant, the given $p = .315$ may be considered significant in this case, given the fact that the data are taken

from an entire population. However, the Pearson correlation coefficient works best when the variables are approximately normally distributed and have no outliers. A scatter plot can reveal these possible problems. As is evident in Figure 5 the data has a skewed distribution toward the

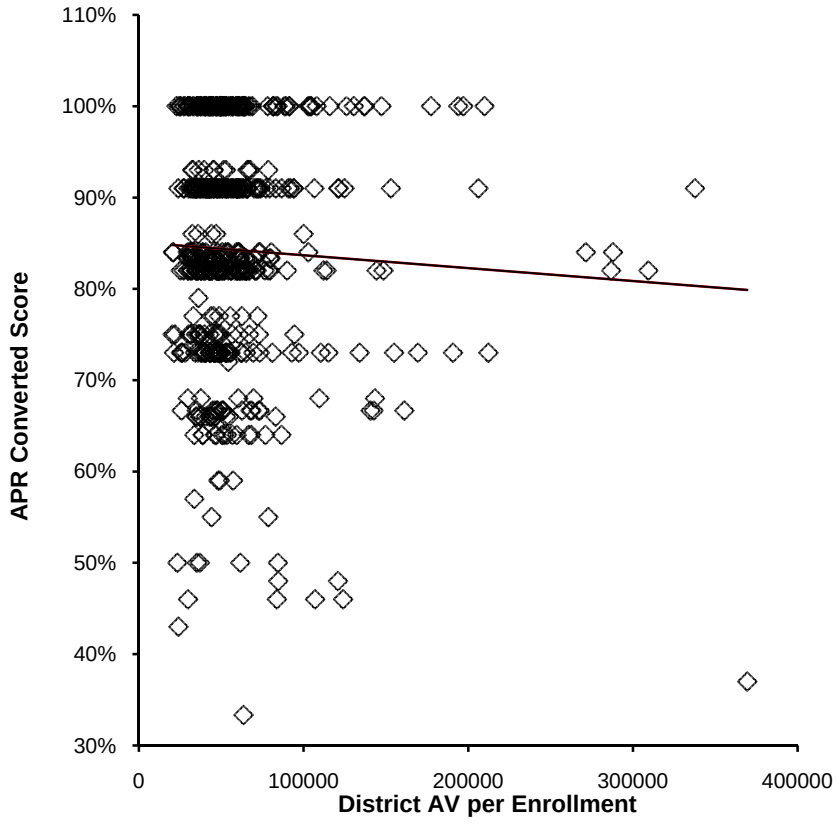

Figure 5
Percent score v. Assessed Valuation per EP

positive Percent Score, where the mean is 84.2%, while the Assessed Valuation is skewed to the lower end of the scale, with a mean of $60,548. This can be clearly seen in Figure 6, with the predominant number of Assessed Valuation per Eligible Pupil being below the mean, with a very

few outliers to the high end. Thus the review of data both statistically and empirically reveals no linear correlation between the Assessed Valuation per Pupil and the Annual

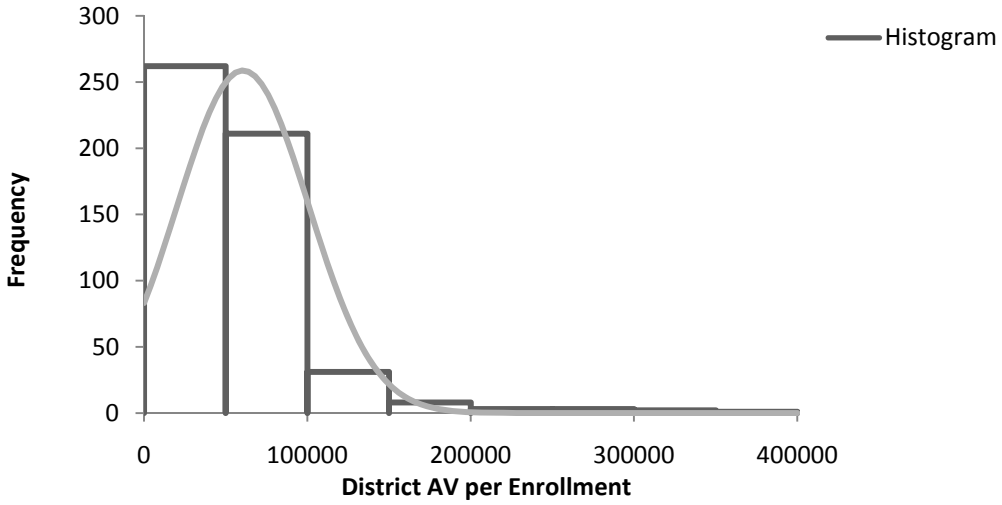

Figure 6
Distribution of Assessed Valuation Across All Districts

Performance Report scores, so that DS_1H_1 can be accepted with an alpha level of confidence of .01.

The second hypothesis (DS_1H_2) taken in consideration of this study was the potential correlation of Expenditures per Eligible Pupil to the district's Annual Performance Report score (see Table 2). One can note that the correlation coefficient between the independent and dependent variables was a mere -.062 with p = .161, so it can be concluded that these

		AV per EP	Expenditure per EP	**Percent Score**
AV per EP	Pearson Correlation	1	.294**	-.044
	Sig. (2-tailed)	.	.000	.315
	N	521	521	521
Expenditure per Eligible Pupil	Pearson Correlation	.294**	1	**-.062**
	Sig. (2-tailed)	.000	.	**.161**
	N	521	521	**521**
Percent Score	Pearson Correlation	-.044	-.062	1
	Sig. (2-tailed)	.315	.161	.
	N	521	521	521

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2
Correlation Coefficient of Primary Data Set (DS_1H_2)
Expenditure per Eligible Pupil to Percent Score

two variables also do not have a significant linear relationship. However, unlike the previous example, it should be noted that the Expenditure per Pupil is nearly evenly distributed across the spectrum (see Figure 7) and contains many more outliers than does Assessed Valuation per Pupil in Figure 5. It should also be noted that the Expenditures per ADA are very slightly skewed toward the lower end of the scale, as seen in Figure 8. In fact, the skewness for Expenditures per Pupil data, Figure 8, is 1.719.

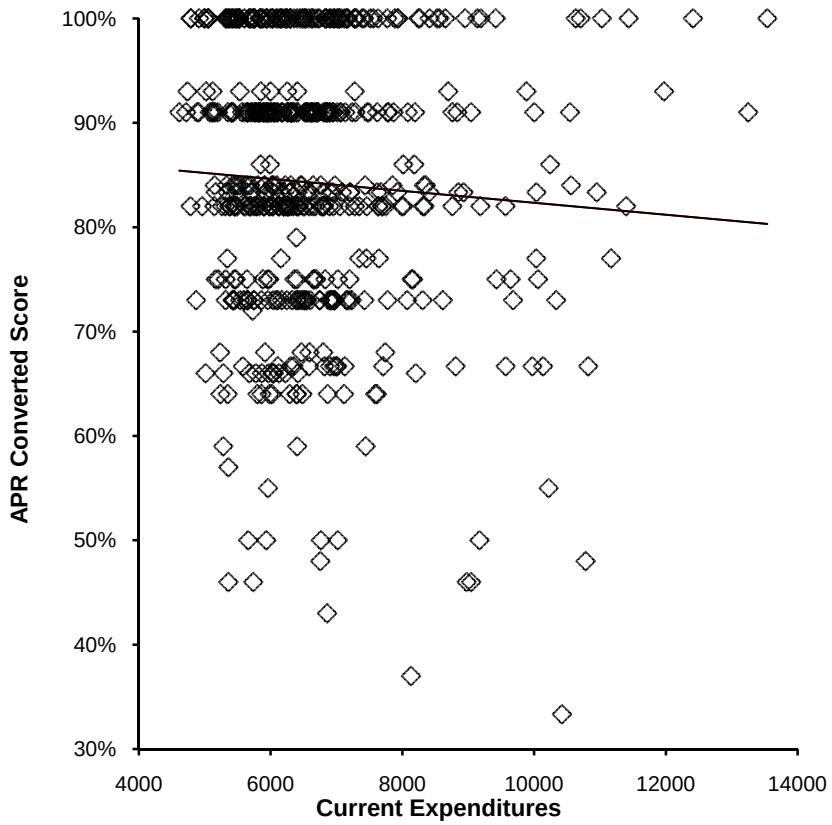

Figure 7
Annual Performance Report Percent Score by Expenditure per Eligible Pupil

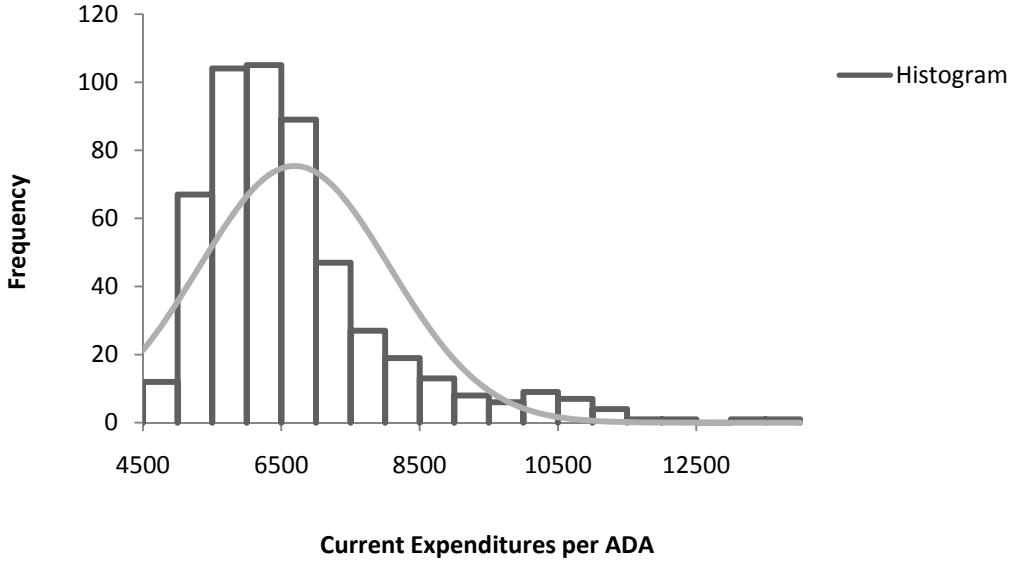

Figure 8
Distribution of Expenditures per Pupil

Recall that anything over 1.000 indicates a distribution that differs significantly from the normal (SPSS, 2001), but then the kurtosis (s4) of that data is 3.750 (+/-.214), i.e. any s4 "distribution …wherein the data are gathered close to the mean and there are few distant from the mean" (Runyon, 2000). This kurtosis, then, could truly be considered "mesokurtic, or much more closely related to bell-shaped" (Runyon, Coleman, & Pittenger, 2001, p. 388) or "normally distributed," especially compared to a data set such as Assessed Valuations (Figure 6), where the s4 is measured to be 19.247 (+/- .214). Thus one can deduce that, even though the Expenditure per Pupil data are skewed to the lower expenditure levels they are relatively closely packed around the mean. Given that bivariate correlations assume a normal distribution, one can expect this data set to yield more reliable analyses of data.

Secondary Data Set

Given the first hypothesis (DS_2H_1) of *The assessed valuation per enrolled pupil of a district will not significantly impact the rank of that district on a public perception scale*, where the independent variable is the rank of the Assessed Valuation per Enrolled Pupil of the district and the dependent variable is the district's ranking on Schooldigger.com, and, given that the Spearman's rho correlation is -.263, this hypothesis, then, is

rejected. Given the second hypothesis (DS_2H_2), *The rank of expenditure per average daily attendance (ADA) of a district will not significantly impact the rank of that district on a public perception scale*, where the independent variable is the rank of Expenditure per Average Daily Attendance and the dependent variable is the rank of that district on a public perception scale, and, given that the Spearman's rho correlation coefficient is .015, this hypothesis is not rejected.

Analysis of Secondary Data Set

As seen in Table 3, the correlation coefficient, in this case the Spearman's rho, which measures the linear relationship between two variables, Rank of Assessed Valuation

			Rank Score	Rank of Exp. Per ADA	Rank of Dist. AV per Enr.
Spearman's rho	Rank Score	Correlation Coefficient	1.000	.015	-.263**
		Sig. (2-tailed)	.	.746	.000
		N	491	491	491
	Rank of Exp. Per ADA	Correlation Coefficient	.015	1.000	.309**
		Sig. (2-tailed)	.746	.	.000
		N	491	491	491
	Rank of Dist. AV per Enrolled Pupil	Correlation Coefficient	**-.263****	.309**	1.000
		Sig. (2-tailed)	**.000**	.000	.
		N	**491**	491	491

**. Correlation is significant at the .01 level (2-tailed).

Table 3
Correlation Coefficient of Secondary Data Set (DS_2H_1)
Assessed Valuation per enrolled Pupil to Rank Score

per Enrolled Pupil to Rank Score, the Rank Score versus the Rank of Assessed Valuation per Enrolled Pupil is .263, and, further, with a significance level (2-tailed) of an incredible .000, it becomes quite obvious that one can confidently state there is a significant correlation. Note as well that in the secondary data set all independent variables were converted to rank order sets to match the original Schooldigger.com district rankings, and to allow the data to be scrutinized carefully and consistent with the non-parametric analyses, as discussed in Chapter III. Especially in that "a significant p-value implies that the sample is from a non-normally distributed population" (Analyse-it, 2009), it would then follow that the ranking of the data would be an appropriate response.

The first hypothesis of the Secondary Data Set can be graphically interpreted in a variety of fashions, to ensure that the researcher is not guilty of committing a Type I error. "A Type I error occurs if one rejects the null hypothesis when it is true" (Bluman, 2007, p. 397). A scatter plot of the data points in any given set is the beginning of analysis, as the researcher looks for grouping of the data. This can be seen in Figure 9, as no obvious trends are seen unless one adds the calculated trend line, which then appears to have a linear regression that moves away from the central tendency. Obviously, then, the trend line would be flat, or nearly

so, since the closer any given correlation moves to zero, i.e. no correlation whatsoever, the flatter the line of best fit becomes. Further, the trend line in this case slants downward, indicating to the reader that there is a definite trend and

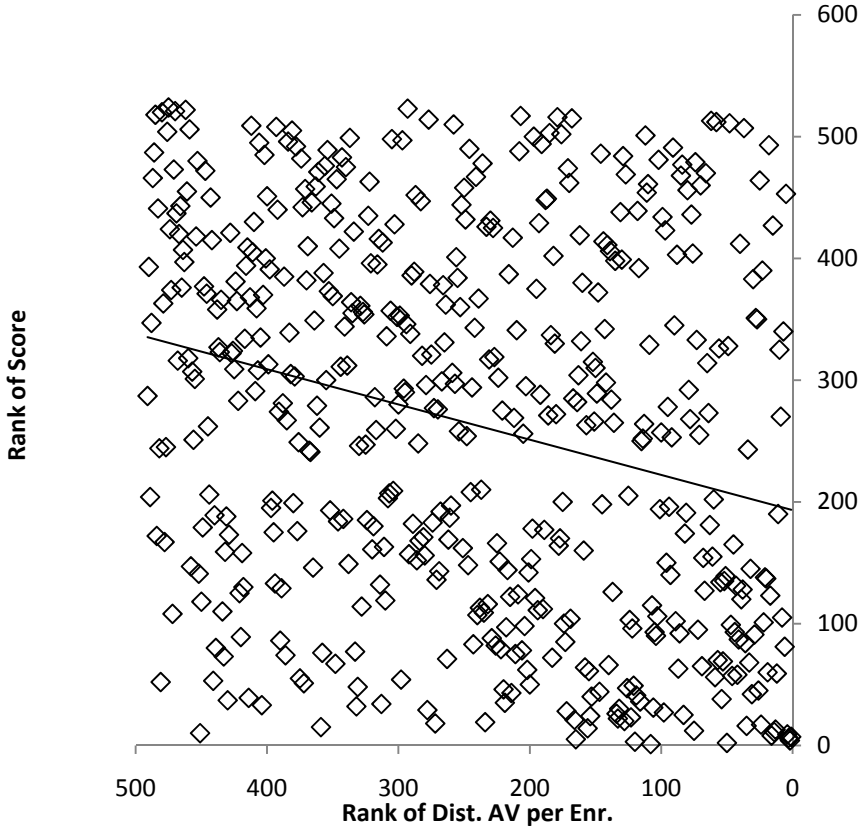

Figure 9
Rank of District Assessed Valuation v. Rank of Score

that trend is then negative. The reader should note that the axes of Figure 9 have been reversed to make the negative trend of the line more readily discernible, since, when ranking the data points, '1' is the highest score

and '521' is the lowest. Both graphically and statistically, then, it can be seen that there is a negative correlation between the district's rank on the Assessed Valuation per Enrolled Student scale and the district's rank on the Schooldigger.com scale of successful districts. In a word, it appears as if wealthier districts would tend to be the less successful districts, as measured and ranked by Schooldigger.com. The researcher is extremely confident in believing that a Type I error has been avoided, given the perfect p-value of .000 that the correct Spearman's rho correlation analysis has returned. The researcher further believes that the Spearman's rho was the correct tool of analysis, given the inability to meet the requirements Bluman (2007) gives, to use a fully parametric analysis. One of those requirements given was that the data be normally distributed. As is

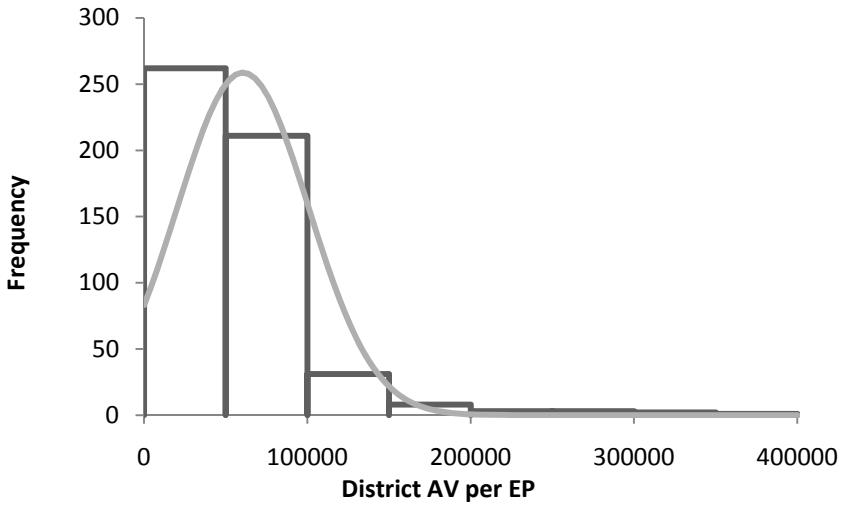

Figure 10
District Assessed Valuation per Enrolled Pupil

obvious from Figure 10, the data points representing the Rank of Assessed Valuation per Enrolled Pupil are anything but normally distributed. With a mean value of $60,548 per enrolled pupil and median value of $49,779, notice that this distribution curve is extremely skewed to the positive. "A measure to determine the skewness of a distribution is called the Pearson coefficient of skewness. The values of the coefficient usually range from -3 to +3. When the distribution is symmetric, the coefficient is zero; when the distribution

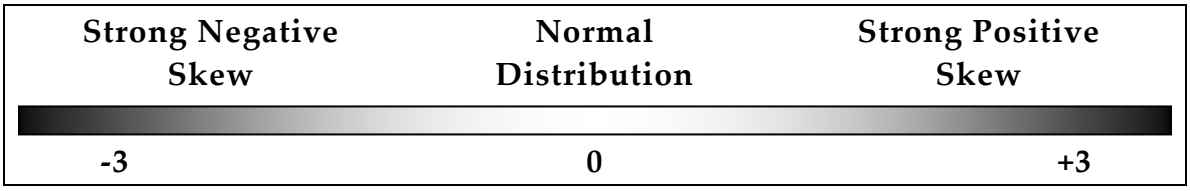

Figure 11
Pearson's Coefficient of Skewness (Bluman, p. 318)

is positively skewed, it is positive; and when the distribution is negatively skewed, it is negative" [sic] (Bluman, 2007, p. 57). Using Bluman's description, the reader can see how positively skewed the data points are, given the result of Pearson's index PI of skewness (Figure 11) of 3.78, which is obviously substantially outside the range for normal amount of skew. The data points are also extremely condensed as they

cluster tightly around the mean. Given that the population standard deviation (σ) is $40,174, with a range of $1,613,917,728, a Kurtosis of 19.25 (Figure 12) is not at all surprising.

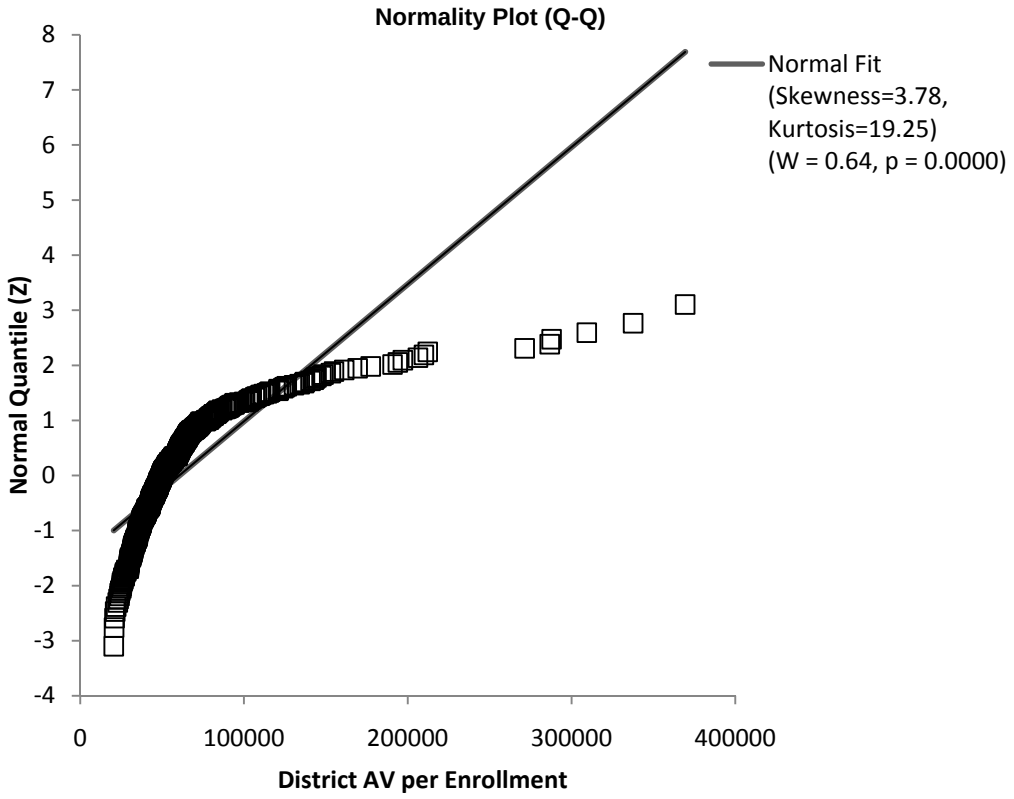

Figure 12
Normality of District Assessed Valuation per Enrollment

The second hypothesis of the Secondary Data Set (DS2H2) can be interpreted in a similar manner. Recall that hypothesis as, "The rank of Expenditure per Average Daily Attendance (ADA) of a district will not significantly impact the rank of that district on a public perception scale."

			Rank Score	Rank of Exp. Per ADA	Rank of Dist. AV per Enr.
Spearman's rho	Rank Score	Correlation Coefficient	1.000	.015	-.263**
		Sig. (2-tailed)	.	.746	.000
		N	491	491	491
	Rank of Expenditure Per ADA	Correlation Coefficient	**.015**	1.000	.309**
		Sig. (2-tailed)	**.746**	.	.000
		N	**491**	491	491
	Rank of Dist. AV per Enrolled Pupil	Correlation Coefficient	-.263**	.309**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	491	491	491

**. Correlation is significant at the .01 level (2-tailed).

Table 4
Correlation Coefficient of Secondary Data Set (DS_2H_2)
Rank of Expenditure per ADA to Rank Score

As is seen in Table 4, with a correlation coefficient of only .015 and an astronomical significance level of .746 (almost a perfectly insignificant 1.000), one can easily see there is no correlation between the Rank of Expenditure per ADA and the Rank of Score. This can be compared graphically in Figure 13, as the indicators are literally all over the place. In fact, the result of plotting the points of the scatter plot is nearly shaped in a square. Compare this to Figure 12, where the plot points are very tightly grouped on the line of best fit which one typically sees when a

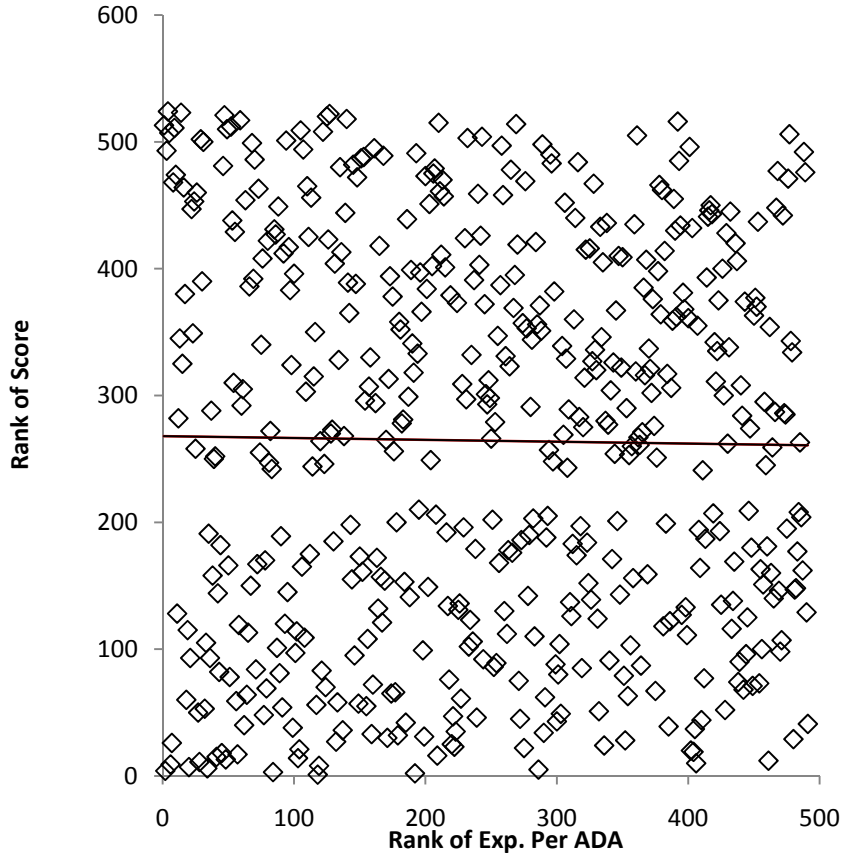

Figure 13
Rank of score v. Rank of Expenditure per ADA

regression line of best fit indicates some sort of correlation. The data points will be, to some degree, gathered about that line, or at least give the general indication of the presence of a direction. Therefore, it is quite obvious in Figure 13 there is no line of regression and thus no correlation. In fact the plot points are nearly uniformly spaced, and the line of best fit appears to be flat, which one would expect, given the Spearman's rho of .015. Further, given that non-parametric data are selected when data

points are rank ordered to overcome the handicap of their not necessarily being distributed about the mean within the group. This can be seen in Figure 14, where the current expenditures are fairly tightly clustered about the mean, yielding a Kurtosis of 3.75 and a positively skewed distribution

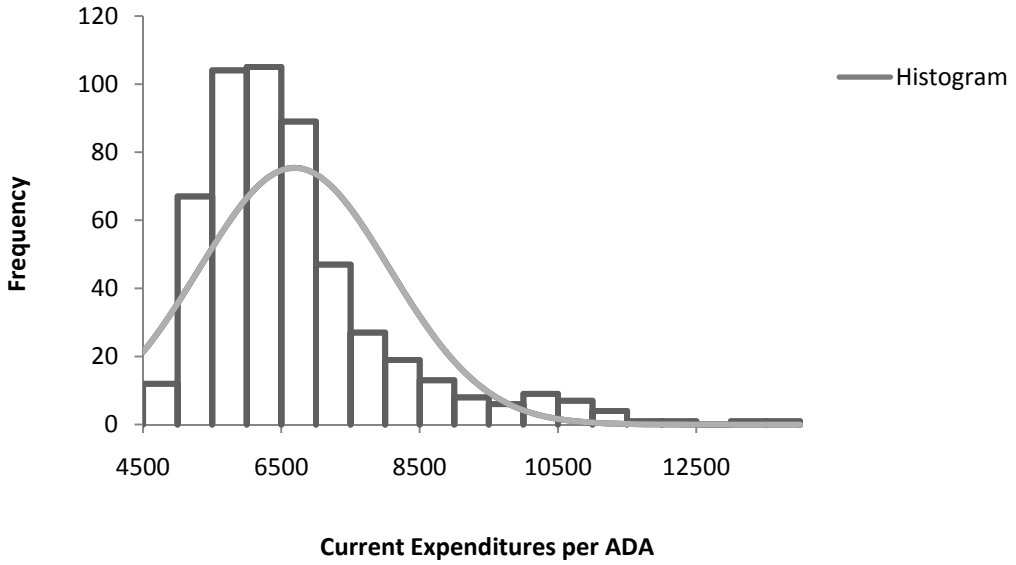

Figure 14
Current Expenditures per ADA

with a skewness factor of 1.72. In other words, relative to a 'normal' distribution, this collection of data points would be a "reverse-J distribution" (Gall, Borg, & Gall, 1996, p. 112) and rather tall. One may also utilize a good graphic organizer to view when the researcher is specifically looking for normalcy within a set of data points. Figure 15

indicates just that-- given that a 'normal' distribution would then follow the "Normal Fit" (Analyse-It Software, Ltd., 2008) line exactly.

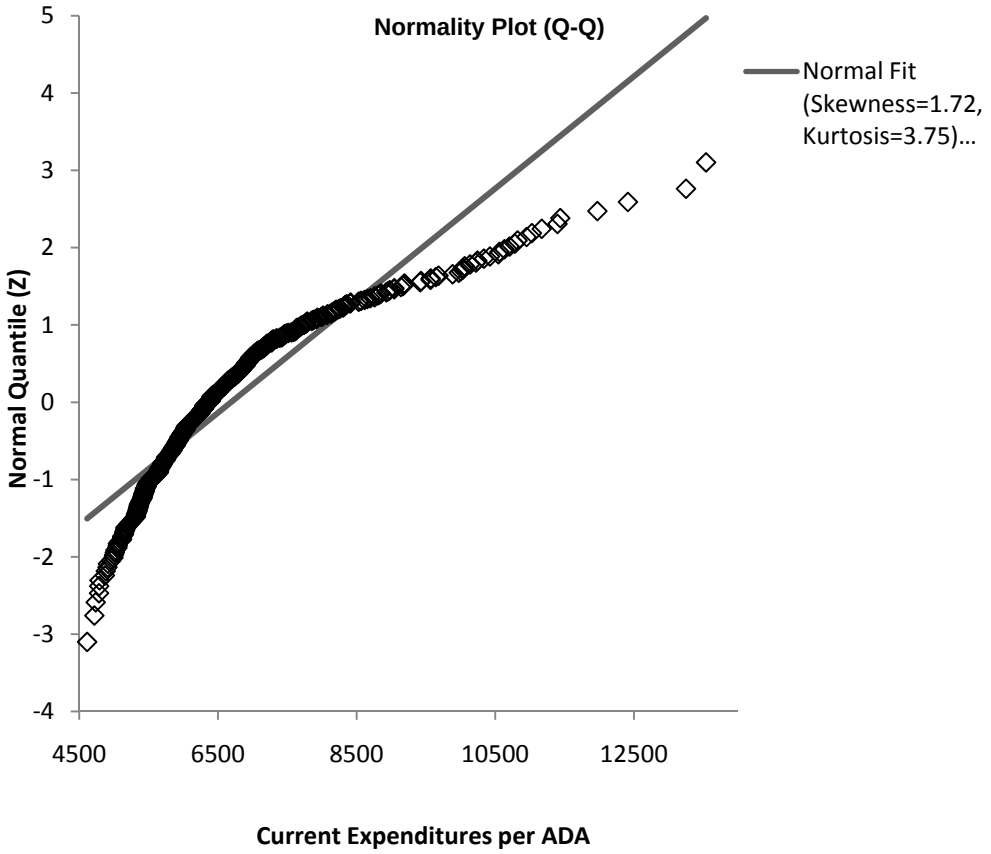

Figure 15
Normality of Expenditures per ADA

However, in this case the data points are slightly skewed. As noted earlier, in Bluman's (2007) discussion of the range of skewness, skew generally ranges from -3 to +3 (See Figure 11), with zero being not skewed; so it is seen that this data set is somewhat skewed at 1.72 (57.3% of Bluman's *normal* range in Figure 11). As one can see, the data points, as

plotted, start somewhat below the line of best fit, then curve near, and remain near, until it once again flows well away from the line.

Summary

The sheer volume of cases within the hypotheses gives them merit for accuracy, even though actual reflections may be small, compared to a normally distributed set of variables within a calculation. These data projections also do not reflect any measure of sampling error, which further reinforces the accuracy within the population, and not just within a sample data set. Note too that the smaller the p-level, the greater the chance of significance, and that p-level ranges from an insignificant .746 to an incredible perfect .000. Given the circumstances described above, it is quite reasonable to <u>not reject</u> the following hypotheses:

1. *(DS_1H_1) "The assessed valuation per pupil of a district will not significantly impact scores on the annual performance report of that district."*
2. *(DS_1H_2) "The expenditures per pupil of a district will not significantly impact scores on the annual performance report of that district."*

3. *(DS_2H_2) "The rank of expenditure per average daily attendance (ADA) of a district will not significantly impact the rank of that district on a public perception scale."*

Given the circumstances described above, it is quite reasonable to reject the following hypothesis, since there is a statistically significant negative correlation between Assessed Valuation and Rank Score:

1. *(DS_2H_1) "The assessed valuation per enrolled pupil of a district will not significantly impact the rank of that district on a public perception scale."*

CHAPTER V – DISCUSSION

Introduction

The data reviewed in this study should be used as only one piece of evidence when trying to ascertain the factors that go into a successful school and into student success. This study was undertaken to determine if the relative wealth of a district, and, to a certain degree, how that wealth is used, impacts the success of that district, as measured on the Department of Elementary and Secondary Education's Annual Performance Report. Recall from the discussion in Chapter IV, the ability to look at the correlation between Assessed Valuation per Pupil (DS_1H_1)and APR Scores is tenuous at best, since the data are so widely scattered. However if one merely takes a look at the descriptive aspect of the data, such as the range ($348,962), and the fact that the sample standard deviation(s) is extremely large ($40,173), as is evidenced not only by the amount, but by the fact that s is 66% of the mean($60,547), this measure alone, then, indicates there must be a huge gap in the relative wealth of one district, as compared to next. This would empirically

indicate that school funding, then, is either not equal across the student spectrum, or that the foundation formula has no counterbalancing effect to encourage equity. However, simple descriptive data are always open to debate, which is why it was important to take the next step, analysis of actual expenditure per student (DS_1H_2). In this instance, the actual ability to accept the null hypothesis, *The expenditures per pupil of a district will not significantly impact scores on the annual performance report of that district*, is much easier to establish, as noted in Chapter IV. However, the Expenditure per Pupil to Annual Performance Report Score correlate may bear further review, since, although it is definitely not in the range that is typically considered to be a statistically significant correlation of linear relationship, the 2-tailed test of significance is very small (.161) it may well be approaching a significant level. If the correlations were reviewed after having undertaken "a log transformation [which] can make a skewed distribution more normal" (SPSS, Ver. 11), it may very well turn out to be significant after all.

Implications

In the analysis of the two Data Sets of this study, i.e. Assessed Valuation of the District and Expenditures per Pupil versus APR Scores, or Schooldigger.com ranking, there was one statistically significant

correlation discovered. That discovery, admittedly, came about due to the way the SPSS data analysis software formats tables. Notice in Table 5 that SPSS considers the Assessed Valuation, the Expenditures per Pupil, and the Percent Score to be *three*

		AV per EP	Expenditure per EP	Percent Score
AV per EP	Pearson Correlation	1	.294**	-.044
	Sig. (2-tailed)	.	.000	.315
	N	521	521	521
Expenditure per EP	Pearson Correlation	.294**	1	-.062
	Sig. (2-tailed)	.000	.	.161
	N	521	521	521
Percent Score	Pearson Correlation	-.044	-.062	1
	Sig. (2-tailed)	.315	.161	.
	N	521	521	521

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5
Complete Correlation Coefficients of the Primary Data Set

variables. The same relationship is seen in Table 6, where SPSS considers the Rank of Score, the Rank of Expenditures, and the Rank of District Assessed Valuation, to be three variables as well. Thus when one calculates for correlation the calculations are made as follows:

'a to a', 'a to b', 'a to c',

'b to a', ' b to b', 'b to c',

'c to a', 'c to b', 'c to c'.

			Rank Score	Rank of Exp. Per ADA	Rank of Dist. AV per Enr.
Spearman's rho	Rank Score	Correlation Coefficient	1.000	.015	-.263**
		Sig. (2-tailed)	.	.746	.000
		N	491	491	491
	Rank of Exp. Per ADA	Correlation Coefficient	.015	1.000	.309**
		Sig. (2-tailed)	.746	.	.000
		N	491	491	491
	Rank of Dist. AV per Enr.	Correlation Coefficient	-.263**	.309**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	491	491	491

**. Correlation is significant at the .01 level (2-tailed).

Table 6
Complete Correlation Coefficients of Secondary Data Set

This is why there is a perfect correlation of 1 presented diagonally. Any variable will, of course, be perfectly correlated to itself. The study reviewed only "*a to c"* and "*b to c"*, in Data Set 1 (see Table 5), and "*a to b*" and "*a to c*", in Data Set 2 (Table 6). However, the data set of the Assessed Valuation per Pupil compared to the Expenditure per Pupil in Table 5 returned a significant correlation, as did the Rank of Expenditures per ADA and the Rank of District Assessed Valuation per Student in Table 6. It is interesting to note that, while this was not only a significant correlation (p=.000) and the only positive correlation, it was also the strongest correlation within each table. Recall that the "absolute value of the correlation coefficient indicates the strength, with larger absolute

values indicating stronger relationships" (SPSS, Ver. 11). This can also be seen clearly in Figure 2, where the linear relationship strengthens toward each end of the range.

This anomaly also supports the corroborative efforts of the Spearman rho correlation work within Data Set 2. As was mentioned earlier, the possibility always exists that district staff will work hard to maintain their APR Score but would have little or no control of their rankings within Schooldigger.com. Statistically this is borne out in the data. Notice in Figure 6 that school districts are quite densely clustered just below the mean of $60,547 of Assessed Valuation per Pupil, and just as densely clustered just below the mean Expenditure per Pupil of $6,690 in Figure 8. It is also noteworthy that, while Figures 6 and 8 both indicate that school districts are densely clustered at the lower end of the Assessed Valuation and Expenditure scales, Figure 16 clearly indicates that most school districts are densely clustered at the higher end of the Performance scale. So much so in fact that the standard deviation (*s*) is only 12.8 percentage points.

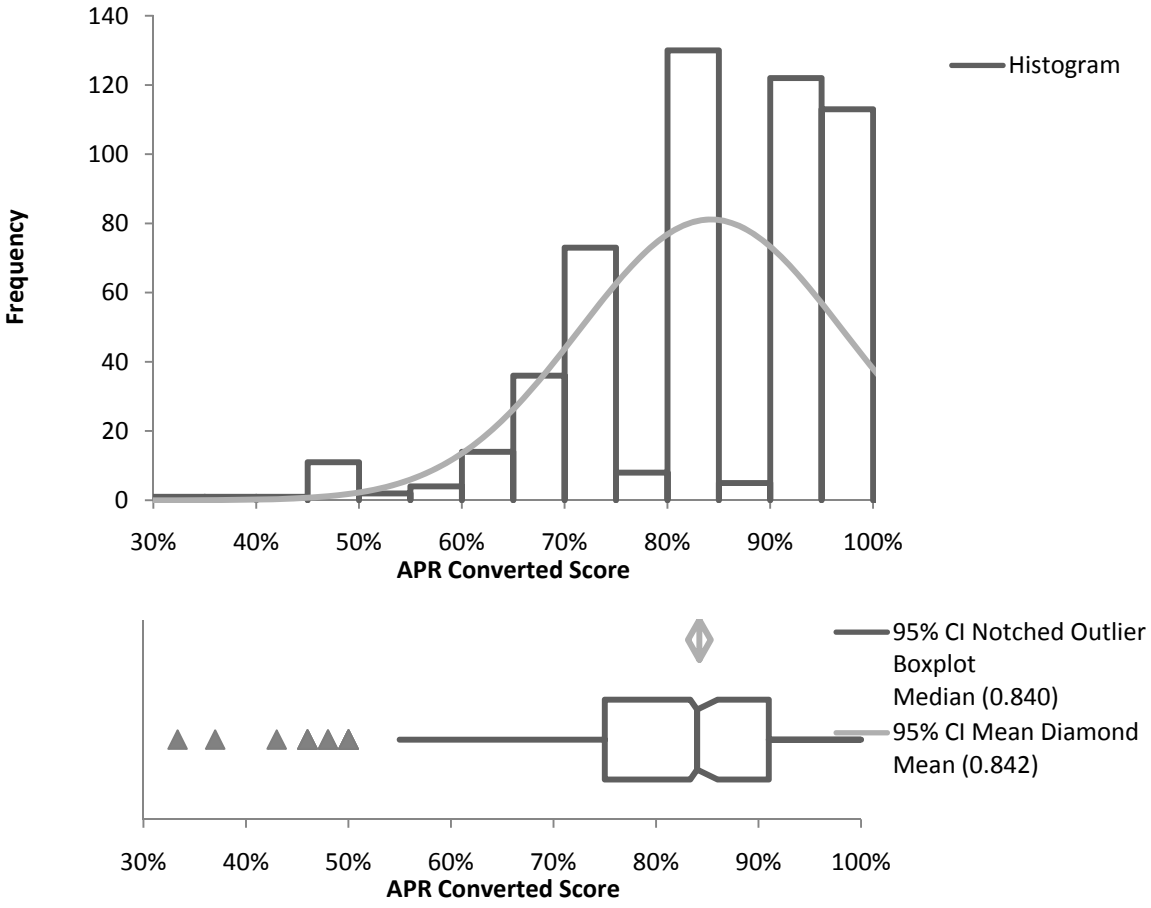

Figure 16
Performance Scores

So, if one takes the range from plus one standard deviation (97%) to minus one standard deviation (71%), one will have covered 338 of the 521 schools. As noted, administrators try very hard to get a perfect score, so the 113 schools that scored 100% could be added to this range with little to no loss of statistical credibility.

That would encompass 451 of the schools, with only 70 left as outliers on the low end.

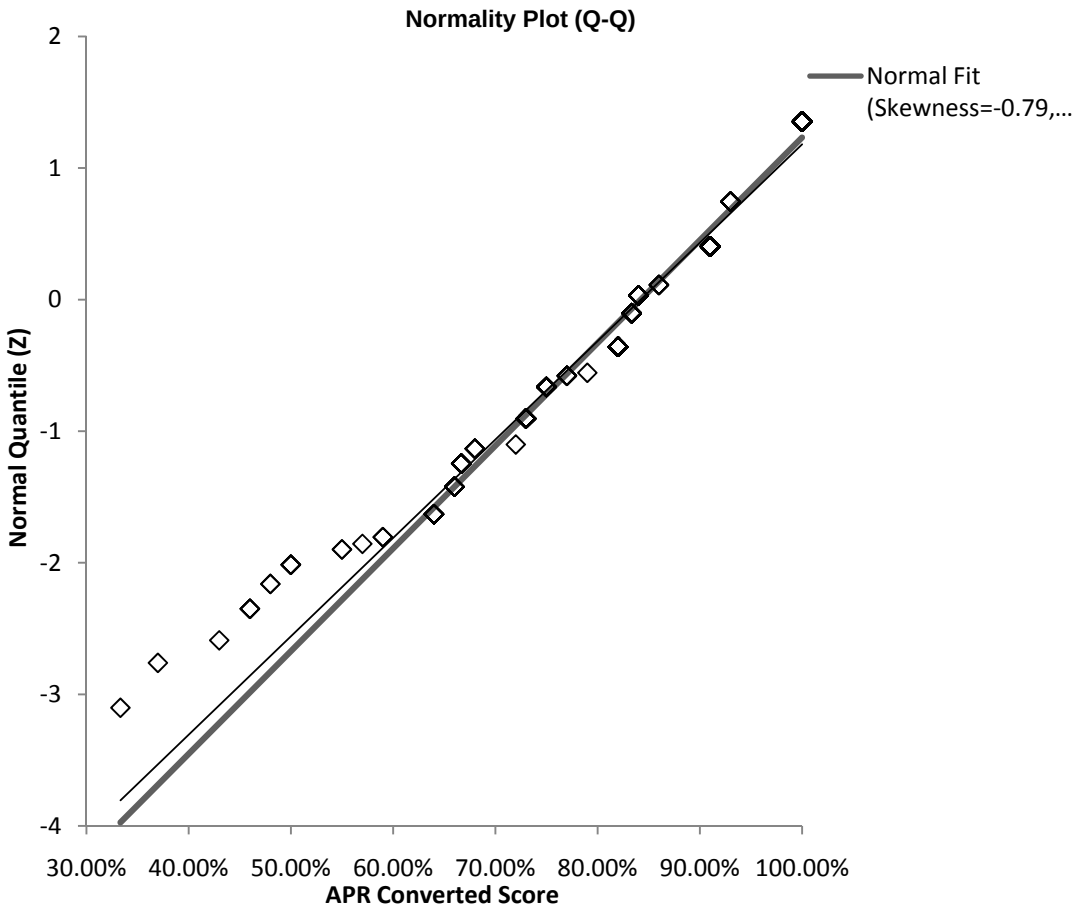

Figure 17
Normality of APR Converted Score

In any event, the distribution of the APR converted scores is nearly a perfect bell curve, with a skewness of -.79 and kurtosis of .65. As has been done throughout this study, it is interesting to follow up the

numbers with a graphic organizer. Note the nearly perfect fit of the line of normal fit in Figure 17.

Finally, it is important to note that, when ranked, and when viewed on a scatter plot, the regression line one uses to look for relationship becomes very obvious. We note that the strongest correlation of the entire study is the relation of the Rank of District Assessed Valuation compared to the Rank of Expenditure per ADA.

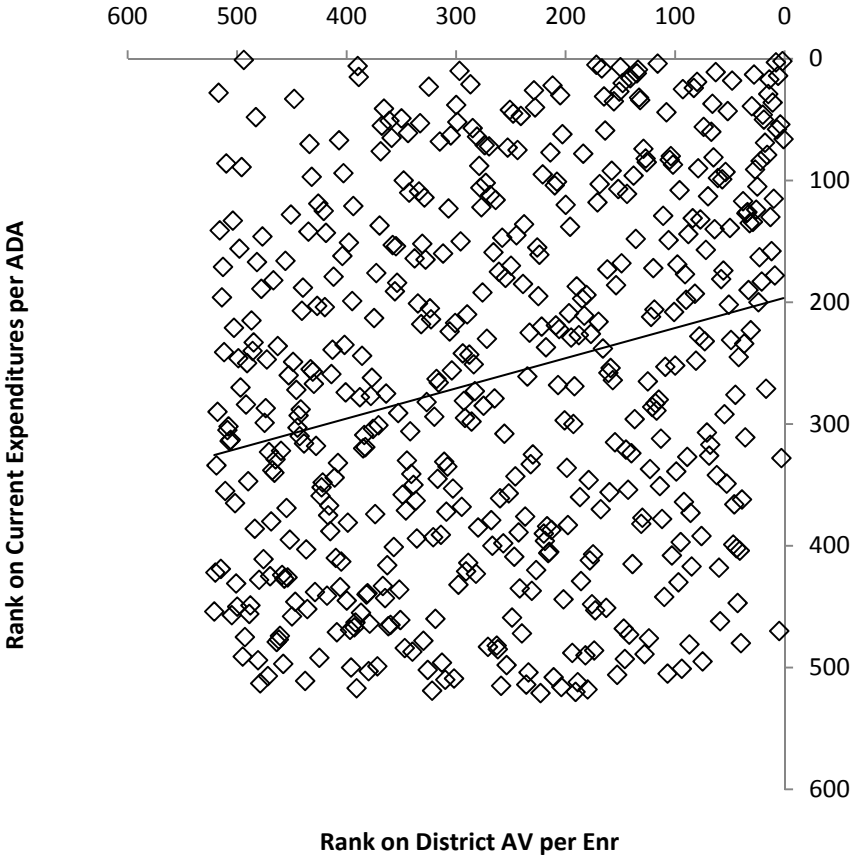

Figure 18
Assessed Valuation v. Expenditure

One would assume that this would be a perfect correlation, given the assumption that wealthier districts would spend more per ADA. This simply is not the case, since the correlation returned was .309, with a significance of .000. In other words, wealthier districts do spend more per student but not nearly to the level one would assume.

Recommendations

Does this then indicate that schools are adequately funded and thus performing adequately as well? Absolutely not; it appears as if most schools have found a way to be successful, at least as measured on the APR Scale, as developed by the Missouri Department of Elementary And Secondary Education. It is the author's opinion that this indicates further study is merited.

The questions that remain to be answered are

1. Why are successful schools successful?
    - It is obvious from this study that financing is not the primary success factor.
2. What, then, is the primary success factor?
    - The data in this review indicate that, by and large, schools in Missouri are successful.
3. Is this primary factor tied to funding issues?

- The district's wealth and expenditures, as measured in this study, do not appear to be thus married.

4. What, then, would be a fair and accurate method to establish the state adequacy target?
    - Conventional financial comparisons do not appear to be working as means to determine a state adequacy target, since the inputs are not correlated to the results.
5. What is an adequate level of financing that will bring every school district to a fairly established state adequacy target?
    - As noted earlier, there are a variety of ways to arrive at this final number, but they all have points of debate and, apparently, cannot be supported statistically.
6. If districts that can afford to spend more per pupil do not do so and they have student achievement at high levels, could this give us an indicator of "adequate"?

The larger question thus remains: "To what extent and how, shall the General Assembly of the State of Missouri fund public education to minimize inadequacies and inequities, while maximizing student, and thus district, achievement?"

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Vita

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