Research Report

Efficiency of School Districts in Arkansas Based on Per Pupil Expenditures and Student Achievement

April 15, 2014

Prepared for

THE HOUSE INTERIM COMMITTEE ON EDUCATION AND THE SENATE INTERIM COMMITTEE ON EDUCATION

2013-14 Adequacy Study

BUREAU OF LEGISLATIVE RESEARCH
One Capitol Mall, 5TH Floor | Little Rock, Ark., 72201 | (501) 682-1937

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INTRODUCTION

Efficiency is one of the foundational concepts, or pillars, of school finance (Guthrie et al. 2007; Odden & Picus, 2008; Rolle & Houck 2004). The primary assumption underlying the concept of efficiency is that there is a linear relationship between inputs (e.g., expenditures) and outcomes (e.g., achievement). For example, studies of school or district efficiency have been based on the assumption that increased expenditures lead to improved student achievement (e.g., Guthrie et al., 2006; Stevens, 2007). Efficiency studies also have examined negative linear relationships such as the correspondence between increases in educational expenditures and reductions in high school dropouts (e.g., Seiler et al., 2013). Historically, efficiency research has investigated a wide variety of inputs and outcomes.

In examining the efficiency of per pupil expenditures as a predictor of achievement, it is important to statistically adjust (or control) for *extraneous* influences on this spending, such as % NSL (National School Lunch), % minority, and district property wealth (Howley et al., 2012; Houck et al., 2010; Silvernail et al., 2012). These statistical adjustments provide a more valid (or accurate) measure of efficiency in school districts that vary widely in demographics.

Failure to adjust for *extraneous* influences leads to skewed, or distorted, results regarding the relationship between expenditures and achievement (Houck et al., 2010). Examining the efficiency, after adjusting for significant demographic factors, is critical to ferreting out inefficient districts, identifying lighthouse districts to serve as a model for other districts, and measuring statewide expenditure efficiency.

Traditional analysis of efficiency in public education has relied on economic models from the private sector (Guthrie et al. 2007; Houck et al., 2010; Odden & Picus, 2008). An application of these production models have led education researchers to evaluate whether increases in expenditures either produce or fail to produce higher achievement (e.g., Hanushek, 2007; Odden & Picus, 2008). Related approaches have used return on investment or cost-benefit methods to determine more incremental effects of increasing expenditures (Houch et al., 2010).

More recently, researchers have begun to use measures of relative rather than normative efficiency to provide information about use of resources to attain educational outcomes (Rolle 2004; Rolle & Houck, 2004; Rolle & Jimenez-Castellanos, 2014; Stevens, 2007). For instance, researchers have compared schools or districts to statistically-derived efficiency “frontiers,” or empirical parameters of efficiency (e.g., Rolle, 2005; Worthington, 2001), whereas other investigators have examined the relative efficiency of districts within a particular state (Calzini, 2011; Douglas, 2008; Rolle & Jimenez-Castellanos, 2014). Comparing the relative efficiency of districts within a state has the advantage of assessing districts that share similar academic standards, funding formulae, rules and regulations, and educational policies.

These relative comparisons are made with statistical methods that classify districts on a scale that indicates levels of efficiency (Rolle & Houck, 2004; Rolle & Jimenez-Castellanos, 2014; Stevens, 2007). These efficiency classifications indicate which school districts need to make changes to operate more efficiently, and which districts can serve as a model for less efficient districts (Rolle, 2005).

PURPOSE OF THIS EFFICIENCY STUDY

The purpose of this study was to assess the efficiencies of Arkansas school districts by examining the linear relationship between per pupil expenditures and student achievement. Per pupil expenditures included spending from all sources of funding. Investigating the efficiency of per pupil expenditures is particularly critical during financial uncertainty and economic downturns (Guthrie et al., 2006; Houck et al., 2010; Howley et al., 2012; Odden & Picus, 2008; OECD, 2013). Per pupil expenditures were examined because they were among the robust predictors in prior efficiency studies (Bureau of Legislative Research, 2010, 2012; Houch et al., 2010; Stevens, 2007), and they include the full spectrum of expenditures in a school district.

Increasingly, efficiency of school districts also is being assessed in terms of performance outcomes, especially student achievement gains (Guthrie et al. 2007; Odden & Picus, 2008; Rolle & Houck 2004). The landmark study, *A Nation at Risk* (National Commission on Excellence in Education, 1983), established an enduring argument for performance-based accountability measured by state standardized achievement tests. Subsequently, the federal *No Child Left Behind Act* (2002) refined and expanded on student performance-based outcomes. Performance-based reform assumes that the role of the state is to set standards for educational inputs and outcomes, and to measure the equity, adequacy, and efficiency of inputs based on performance levels (Odden & Picus, 2008; Rutland, 2013).

STUDY METHODOLOGY

A primary statistical method of classifying school districts according to efficiency is known as quadriform analysis, and it is widely accepted because of its relative simplicity and clear application in practice (e.g., Houck et al., 2010; Stevens, 2007). In quadriform analysis, ordinary least squares (OLS) regression procedures (Freund & Wilson, 2006) are used to examine the linear relationship between inputs (e.g., per pupil expenditures) and outcomes (e.g., student achievement). The assumption underlying the concept of “efficiency” is that changes in expenditures correspond with changes in student performance (Guthrie et al. 2007; Houck et al., 2010; Odden & Picus, 2008).

The regression line that indicates the relationship between expenditures and achievement becomes the predicted (or expected) student performance for different levels of education expenditures based on the efficiency assumption of a linear relationship between these inputs and outcomes. So, for each school district there is a predicted (or expected) level of performance based on its specific level of expenditures. In quadriform analysis, these predicted levels of performance are subtracted from observed (or actual) performance levels for each school district. These differences between observed and predicted levels of student achievement are referred to as “residuals” in efficiency studies, and they are used to construct the efficiency classifications (Guthrie et al., 2007; Rolle, 2000; Stevens, 2007),

Research is clear that there are extraneous influences - many outside the control of school districts - on expenditures and achievement that need to be considered in any analysis of the relationship between these inputs and outcomes. Researchers refer to the statistical procedure of examining these additional influences, together with inputs and outcomes, as controlling (or adjusting) for extraneous factors. Adjusting for extraneous influences provides a more valid, or accurate, measure of the relationship between inputs and outcomes (Freund & Wilson, 2006).

For example, there is well-established evidence that high concentrations of poverty – measured by National School Lunch (NSL) rates - are associated with lower achievement (Bureau of Legislative Research, 2010, 2012; Coley & Baker, 2013; Houck et al., 2010; Ladd, 2011). Research clearly indicates that poverty places children at a disadvantage in achievement because of limited exposure to rich learning environments (Coley & Baker, 2013; Duncan & Murnane, 2011; Ladd, 2011; and Reardon, 2011). Furthermore, states provide additional funding to districts with high concentrations of poverty to try to offset the disadvantages of growing up in impoverished circumstances (Baker, Sciarra, & Farrie, 2010).

Additionally, efficiency studies have found that education expenditures and student performance are impacted, to varying degrees, by average teacher salaries, average daily membership (ADM), and property assessments (Bureau of Legislative Research, 2010, 2012; Houck et al., 2010; Rolle, 2000, 2005; Silvernail et al., 2012; Stevens, 2007). They also indicate that a myriad of education expenditures predict achievement, including instruction expenses, instruction support services, student support services, transportation, school and central office administration, and school maintenance and operations (Houck et al., 2010; Stevens, 2007).

MEASURE OF STUDENT ACHIEVEMENT

The student performance outcome analyzed in this study was based on Arkansas Comprehensive Testing, Assessment and Accountability Program (ACTAAP) testing, or what is commonly referred to as state Benchmark exams. Those 2013 ACTAAP data were provided by the Arkansas Research Center in Conway. The expenditure and demographic data came from the Arkansas Department of Education.

Specifically, the measure of student achievement used in this study was a district's average percentage of students who scored proficient or advanced on six state Benchmark tests. The average involved 3rd grade and 8th grade math and literacy, and geometry and 11th grade literacy. Two different factor analysis procedures were used to determine if those six tests were measuring one factor, or different factors. One procedure was principal components analysis with a varimax rotation, and the results of that procedure were confirmed with a maximum likelihood factor analysis with direct oblimin rotation.

Both types of factor analysis clearly indicated that all six tests measured the same factor with commensurate strength. Those factor analyses provided empirical support for averaging the six tests as a measure of one outcome (i.e., district average percentage proficient or advanced).

Measures of school dropout and of remediation also were considered for analyses. But, preliminary analyses indicated that those outcomes did not provide useful classifications.

SELECTION OF EFFICIENCY STUDY FACTORS BASED ON PRIOR STUDIES

In the past two efficiency studies, the BLR (Bureau of Legislative Research, 2010, 2012) also has analyzed the linear relationship between per pupil expenditures and student achievement. These previous studies and the current investigation have found a negative linear relationship between per pupil expenses and achievement, which indicated that increases in expenditures corresponded with declines in performance. Too often this negative relationship has been misinterpreted as indicating increasing funding led to (or caused) declines in achievement.

In actuality, the negative relationship between per pupil expenditures and student performance is a reflection of the fact that additional funding (e.g., NSL, Title 1) is provided to school districts with higher concentrations of poverty. In other words, per pupil expenditures are not negatively influencing student performance, but rather they are an indicator of the additional funding provided to address poverty-related issues (Baker et al., 2010; Ladd, 2011).

Based on prior research (e.g., Bureau of Legislative Research 2010, 2012; Houck et al., 2010; Stevens, 2007), per pupil expenditure was selected in this study as the primary predictor of student achievement. Other commonly investigated expenditures and demographics were shown in Appendix A (e.g., Houck et al., 2010; Stevens, 2007). The linear (or efficiency) relationships between the factors in Appendix A and achievement were analyzed separately with bivariate OLS regression procedures to determine their level of significance as predictors in this study (Freund & Wilson, 2006). Insignificant ($p < 0.05$) predictors were eliminated from further multivariate analyses, including 3 quarter ADM, teachers' degree, student services expenditures, and transportation expenses.

As an orientation to Appendix A, the standardized regression coefficient (β) shown in the table indicates the type (positive or negative) and strength of the relationship between predictors (inputs) and outcomes (achievement). These coefficients generally vary between 0 and 1, and larger coefficients indicate greater strength of prediction (or relationship). Positive coefficients indicate that both factors are changing in value in the same direction (increasing or decreasing together). Negative coefficients indicate that the values of the two factors are changing in opposite directions. A relationship typically is considered statistically significant when the probability (or alpha (α)) of that relationship is less than (<) 0.05.

For example, Appendix A shows that percentage of all expenditures allocated to instruction (β = .466) was a strong positive predictor of achievement, along with the percentage of teacher salary expenditures (β = .570). However, both of these factors could not be analyzed together in a multiple regression because tolerance tests and variance inflation factors (Freund & Wilson, 2006) verified that these were redundant factors. Those multi-collinearity tests also showed that instruction support (e.g., instructional facilitators, technology instructors) was a redundant measure of the same factor as instruction expenditures. Instruction expenditures included all forms of classroom teachers, materials and supplies used for instruction, tutors, and instructional technology.

Finally, all expenditures, except per pupil, were measured as a percentage of total expenditures in school districts, and they came from all sources of funding (federal, state, and local). These expenditures do not include capital expenses.

CURRENT EFFICIENCY STUDY

The various types of expenditures shown in Appendix A were analyzed by adjusting for the effects of % NSL and minority % using stepwise OLS multiple regression procedures (Freund & Wilson, 2006). Stepwise regression procedures selected predictors (expenditures) in descending order according to their statistical significance, and they excluded insignificant (p = 0.05) predictors.

Preliminary bivariate regression analyses, such as those shown in Appendix A, typically are accurate prognosticators of the results obtained with multiple regression procedures. Indeed, the multiple regression analyses conducted affirmed the bivariate results shown in Appendix A. The significant predictors selected with stepwise multiple regression procedures were per pupil expenditures, % NSL, and % minority. Stated in efficiency terms, the relationship between per pupil expenditures and student achievement was examined after adjusting for the effects of NSL rates and percentage of minority students. Those statistical findings were in accord with other efficiency studies (Guthrie et al. 2007; Houck et al., 2010; Ladd, 2011; Seller et al., 2013; Silvernail et al., 2012; Stevens, 2007).

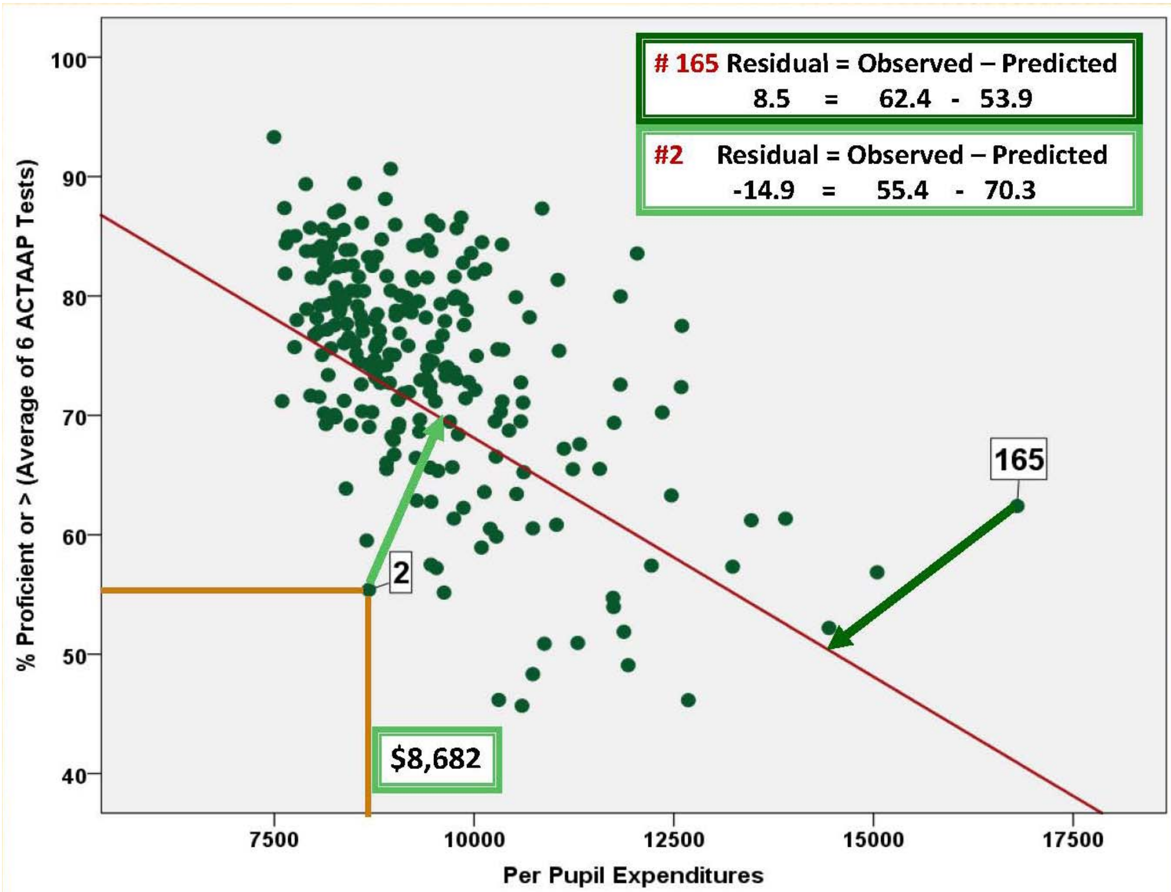
QUADRIFORM ANALYSIS METHODOLOGY

The first step in quadriform analysis was to examine the linear relationship between per pupil expenditures (input) and the measure of student achievement (outcome). The red line in the scatter plot shown in Chart 1 was derived from multivariate OLS regression, which indicated the linear (or efficiency) relationship between per pupil expenditures and student achievement. That linear relationship between expenditures and achievement was adjusted for % NSL and % minority with regression procedures. Adjusting expenditures for % NSL and % minority accounted for the diversity in those factors across school districts. Other study factors discussed in the section on Study Methods were not selected by stepwise multiple regression, using an alpha (α), or significance level, of 0.05.

Each green dot in Chart 1 represented the intersection of observed (actual) per pupil expenditure and observed student achievement for a particular Arkansas school district. The red regression line also represented the predicted achievement for districts based on their respective per pupil expenditure. For example, the gold lines (vertical and horizontal) indicated that District #2, based on per pupil expenditure of $8682.00 had a predicted percent proficient or above (>) of 70.3%, whereas its observed (or actual) percentage was 55.4%. Subtracting District #2's predicted percent from its observed percent gave a difference (or residual) of -14.9%. Similarly, based on a per pupil expenditure $16,799, District #165 had a predicted percent proficient or above of 53.9%, while its observed percentage was 62.4%, creating a residual of 8.5%. The green lines with arrows pointing to the red regression (or prediction) line indicated these residuals.

Residuals were calculated for all 239 school districts shown in Chart 1 by green dots. Residuals also were calculated for per pupil expenditures with exactly the same procedures. Efficiency classifications were based on a scatter plot of achievement residuals and per pupil expenditure residuals.

CHART 1. LINEAR RELATIONSHIP BETWEEN PER PUPIL EXPENSES & ACHIEVEMENT



RESULTS OF QUADRIFORM (OR EFFICIENCY) ANALYSIS OF STUDENT ACHIEVEMENT

In the second major step of the efficiency (quadriform) analysis, a scatter plot of adjusted (for % NSL and minority %) per pupil expenditure residuals and achievement residuals was created (Chart 2). The stepwise regression procedures indicated that other adjustments were not needed because of insignificance or redundancy of predictors, such as 3 quarter ADM (Freund & Wilson, 2006).

Each dot in Chart 2 designated the intersection of per pupil expenditure residual and the student achievement residual for a particular school district. A zero residual indicated that there was no difference between the observed and predicted expenditures or achievement. A zero residual on both factors would indicate perfect efficiency.

Therefore, zero (0) became the dividing line for per pupil expenses (vertical line) and achievement (horizontal line). These lines form the quadrants that separate districts into four levels of efficiency classification. For example, districts (blue dots) in the upper left quadrant were classified as highly efficient because their observed per pupil expenditures (E) were lower than predicted, and their achievement (P = % proficient or >) was higher than expected.

Districts in the upper right quadrant (green dots) were classified as efficient because they had higher than expected achievement, but also higher than expected expenditures. Inefficient districts in the lower left quadrant (orange dots) had lower than expected expenditures and achievement, whereas highly inefficient districts (red dots) had higher than expected expenditures, with lower than predicted achievement.

CHART 2. EFFICIENT ACHIEVEMENT CLASSIFICATION OF DISTRICTS

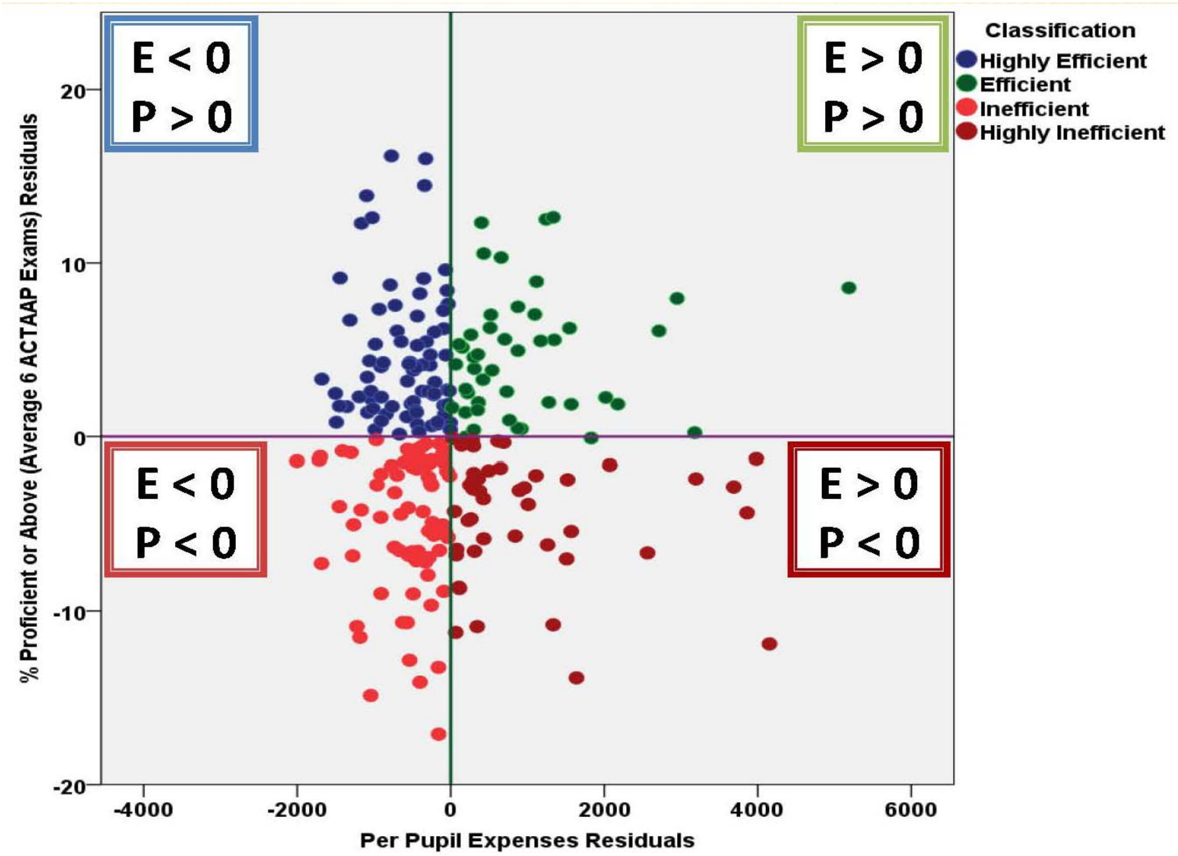


TABLE 1. ACHIEVEMENT EFFICIENCY CLASSIFICATIONS

Efficiency Classification	Number of Districts	Percent of Districts
Highly Inefficient	44	18.4%
Inefficient	73	30.5%
Efficient	45	18.5%
Highly Efficient	77	32.2%

TABLE 2. AVERAGE % PROFICIENT OR > ACCORDING TO CLASSIFICATION

Efficiency Classification	Number of Districts	Average % Proficient or >
Highly Inefficient	44	68.1%
Inefficient	73	69.6%
Efficient	45	79.4%
Highly Efficient	77	79.0%

Table 1 shows the number and percentage of districts in each classification. It indicated that 51% of the districts was classified as *efficient*, leaving about 49% classified as *inefficient.* Forty-four districts, or 18.4%, were classified as *highly inefficient*. Another 30.5% was classified as *inefficient*.

Table 2 shows the district average % proficient or above on 6 tests by efficiency classifications. All possible comparisons between classifications were statistically significant ($p < 0.05$), except between *highly efficient* and *efficient* districts, and between *highly inefficient* and *inefficient* districts. Those comparisons were based on Anova, or analyses of variance, and Tukey post hoc tests (Miller, 1998), Other efficiency classification comparisons, based on demographic factors, are shown in Appendix B. They were examined with the same statistical procedures. The only statistically significant ($p < 0.05$) differences between efficiency classifications were based on property assessments, which were divided by 3 quarter ADM. The significant differences were between *highly efficient* and *efficient* districts, *highly efficient* and *highly inefficient* districts, *efficient* and *inefficient* districts, and *inefficient and highly inefficient* districts. The noticeably large differences in 3 quarter ADM were not statistically significant because differences between districts within classifications were larger than between classifications.

Finally, some factors often discussed in the literature on student performance as important failed to be relevant to efficiency classifications of achievement in this study (e.g., Houck et al., 2010; Stevens, 2007). For example, the percentages of total expenditures devoted to school administration and to student services were unrelated to efficiency classifications (Appendix C). Average teacher salaries and percentage of teachers with advanced degrees also were not related to the efficiency classifications.

There were statistically significant ($p < 0.05$) differences in per pupil expenditures between *highly efficient* and *efficient* districts, *efficient* and *inefficient* districts, *inefficient* and *highly inefficient* districts, and *highly efficient* and *highly inefficient* districts.

DISCUSSION AND CONCLUSIONS

The purpose of this study was to identify school districts that were efficient in use of resources. Efficiency was measured and analyzed in terms of per pupil expenditures and student achievement. Analyses were performed with the widely used quadriform procedures, which entailed conducting OLS multiple regression analyses to adjust the linear relationship between expenditures and achievement according to % NSL and minority % (Guthrie et al., 2006; Howley et al., 2012; Houck et al., 2010; Silvernail et al., 2012; Stevens, 2007). Those adjustments accounted for significant demographic differences in concentrations of poverty between school districts in Arkansas. Adjusting for poverty-related factors was necessary because evidence indicated that those factors have potent impact on student academic performance (Coley & Baker, 2013; Ladd, 2011).

Confidence in this study's findings was bolstered by similar classification results reported in Georgia (Houck et al., 2010), Indiana (Rolle, 2000), Maine (Silvernail et al., 2013), and Texas (Stevens, 2007), using the same methodology and similar measures. The BLR conferred with Dr. Anthony Rolle, who has written extensively on methods of efficiency analyses, to make certain the same methodology and procedures were being used in Arkansas.

Furthermore, the predictors (% NSL, minority %, and per pupil expenditures) in this study accounted for 56% of the variance (difference) in achievement efficiency classifications (Table 1), which was a respectable amount of explained variance in education studies. The amount of explained variance and the agreement in classification percentages with prior studies supported the validity of the achievement classifications in this study. This validity suggested that the classifications derived in this study can be used to inform policy and practice. For example, 44 districts, or 18.4%, were classified as *highly inefficient*, suggesting that they might benefit from consulting with districts that had more favorable efficiency classifications. Likewise, efficient districts might be able to scale up to highly efficient by comparing policies and practices.

However, because of the study limitations to be discussed these classifications should not be the sole basis for policy and practice decisions. These classifications should confirm other professional observations and sources of information (i.e., they should be confirmative, not determinative). These efficiency classifications function in much the same way as diagnostic instruments in medicine or psychology. They provide an (not "the") indicator of which districts may need to make changes in efficiency. They do not function to prescribe exactly what needs to be changed or how changes should be made. These latter decisions have to be made based on other evidence and professional observations and judgments.

In making comparisons between districts for purposes of enhancing efficiency, it must be kept in mind that there are extraneous influences, such as poverty, on achievement that affect district expenditures and operations. School districts have limited, if any, control over most extraneous influences. Therefore, any comparison of efficiencies of districts must be tempered with knowledge of extraneous influences over which the administrators exercise no substantive control. Matching districts for efficiency comparisons must be done with careful deliberation by professionals who have enough knowledge and experience to make comparisons that reflect adjustments for extraneous factors.

This study also indicates that some common assumptions about extraneous influences on achievement may not be supported by evidence. For example, this study and other research do not support the arguments often made in policy literature concerning school size (Grauer & Ryan, 2012; Slate & Jones, 2005). A review of the literature on optimal district size, or student enrollment, reveals a high degree of seemingly irreconcilable complexities, and a lack of consensus among experts (Grauer & Ryan, 2012; Slate & Jones, 2005). Too many interrelated influences, such as poverty and geography, must be taken into account in examining school size (e.g., Andrews, Dumcombe, Yinger, 2002; Duncombe & Yinger, 2005; Rooney & Augenblick, 2009).

According to this study, ADM is unrelated to achievement (Appendix A), or to achievement efficiency classifications (Appendix B). There are noteworthy, but statistically insignificant, differences in ADM between efficiency classifications based on per pupil expenditures. For example, inefficient districts have considerably less 3 quarter ADM (1533) on average than other classifications of districts. However, this difference between classifications of districts fails to be statistically significant because of large differences between districts within classifications.

There were several statistically significant differences in property assessments between efficiency classifications. Property assessments shown in Appendix B were divided by 3 quarter ADM. The significant differences are between *highly efficient* and *efficient* districts, *highly efficient* and *highly inefficient* districts, *efficient* and *inefficient* districts, and *inefficient and highly inefficient* districts.

In conclusion, there are limitations to this study that need to be considered in its application to policy and practice decisions. For example, this is a cross-sectional study based on one year, and therefore, it does not consider value-added changes in student performance, or fluctuations in student performance from one year to another. Use of classifications with more than one outcome would have provided information about the range of applicability. More detailed information about districts would have permitted more discussion of characteristics associated with the classifications. Finer grained data might have provided more clues about why districts were placed in different classifications. For example, what factors lead some districts to allocate more of their expenditures to instruction than other districts?

Finally, caution should be exercised in making generalizations from this study. It investigated the efficiencies of districts in only one state, which makes generalizations to other states dubious. Secondly, it must be kept in mind that this was a study of expenditures, and not of the quality or quantity of interventions, strategies, or practices. It also should be clear that this cross-sectional efficiency study was not designed to examine causal relationships between expenditures and student performance. Causal relationships must be established longitudinally in experimental designs (Bailey, 2008; Rossi, Lipsey, & Freeman, 2004).

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APPENDIX A – SEPARATE BIVARIATE OLS REGRESSION ANALYSES OF ACHIEVEMENT

Predictor	Standardized Coefficient β	Significance Level α	Explained Variance r^2
NSL %	-.654	.000	.425
% non-White	-.655	.000	.427
Property Assessment*	-.161	.013	.022
3 Quarter ADM	.059	.361	.001
Instruction Cost**	.466	.000	.214
Teacher Salary**	.570	.000	.323
% Teachers w/ Masters	.023	.727	.000
Years Teaching	-.022	.737	.000
Student Services**	.046	.477	.002
Instruction Support**	-.512	.000	.259
School Administration**	.224	.000	.046
Central Administration**	-.275	.001	.072
Maintenance/Operation**	-.074	.254	.001
Transportation**	.017	.800	.000
Per Pupil Expenses	-.534	.000	.283

***Note:* ***Property assessment is divided by 3 quarter ADM.* ****Denotes that expenditure items are the percentage of the total district expenditures from all funding sources. All expenditures were based on all funding sources.*

APPENDIX B – DIFFERENCES IN AVERAGES OF EFFICIENCY CLASSIFICATIONS

Factors	Highly Efficient	Efficient	Inefficient	Highly Inefficient
% NSL	64.9%	61.7%	65.4%	66.7%
% Non-White	26.1%	23.3%	24.3%	26.9%
3 Quarter ADM	2246.5	1915.4	1533.0	2006.7
Property Assessment/ADM*	**$69,121.08**	**$113,283.94**	**$67,981.88**	**$99,012.62**

Note: *3 quarter ADM. Differences in averages were examined with Anova and Tukey post hoc tests. The colors indicate that the ***red numbers*** significantly ($p < 0.05$) differ. The significant differences are between *highly efficient* and *efficient*, *highly efficient* and *highly inefficient*, *efficient* and *inefficient,* and *inefficient and highly inefficient*. The noticeably large differences in 3 quarter ADM are not statistically significant because differences between districts within classifications are larger than between classifications.

APPENDIX C – OTHER DIFFERENCES IN AVERAGES OF EFFICIENCY CLASSIFICATION

Factors	Highly Efficient	Efficient	Inefficient	Highly Inefficient
Per Pupil Expenditures	**$8,843.83**	**$10,248.13**	**$8,879.68**	**$10,569.59**
School Administration*	4.9%	4.7%	4.8%	4.6%
Average Teacher Salary	$43,666.58	$43,825.44	$43,033.49	$43,172.86
% Teachers with Master's Degree	38.3%	38.1%	36.6%	38.1%
Student Services*	4.5%	4.6%	4.6%	4.6%

Note: **Indicates average % of total expenditures. Significant (p <50.05) differences are in* ***red numbers.*** *They are between highly efficient and efficient, between efficient and inefficient, between inefficient and highly inefficient, and between highly efficient and highly inefficient.*