# The Relationship Between NSLA Funding and Expenditures, and Measures of Student Performance 

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## Brief Orientation to Study Methods

The gold standard research method is a double-blind experimental design, where the researcher and experimenter are both unaware of which is the intervention and control groups.

This design eliminates researcher and experimenter biases, and study participants are randomly assigned to intervention and control groups.

Double-blind experiments typically are not attainable in education research (strategically or politically).

Classical experimental designs also have random assignment to intervention and control groups, which has the desirable feature of randomly distributing any factors (e.g., poverty, individual characteristics), to the intervention and control groups, that might be alternative "causes" of an outcome.

While rarely attainable, random assignment has the advantage of ruling out alternative explanations for outcomes (e.g., student achievement).


Classical Experimental Design
A Demonstration of
Random Assignment




## Survey Research

The lack of opportunity to conduct experimental research does not mean that there are no other methodological approaches to studying the relationships between interventions (e.g., NSLA funding) and outcomes (e.g., achievement).

Survey research is commonly conducted to examine statistical relationships between interventions, other factors, and outcomes. Whole fields of study have arisen out of survey research (e.g., demography).

In survey research, statistical procedures are used to control for the effects of alternative "causes" of an outcome, instead of randomly distributing these "causes" as is done in the experimental designs.
While survey methods typically do not test for "causes," they can provide evidence to support or disconfirm conventional wisdom regarding the "effects" of intervention, such as NSLA funding.

For example, a negative correlation between NSLA funding and student achievement clearly indicates that the funding is not having the desired effects.

## Data Analyses

The following statistical analyses of NSLA \% and student achievement are based on the 239 school districts that existed in 2011. Districts that were consolidated in study years prior to 2011 were dropped from the analyses.

The 2011 \% NSLA funding levels and corresponding per pupil dollar amounts were: (1) 0 - 69\% (\$496); (2) 70\% - 89\% (\$992); and (3) 90\% or > (\$1,488).

NSLA \% and expenditure data, demographic and personnel information, and student characteristics came from ADE. ACTAAP data (Benchmark) came from NORMES at the $U$ of A - Fayetteville.

Each statistic used is uniquely suited to the study purpose, and assumptions of each statistic were tested. For example, homogeneity of variance was tested in analyses of variance (or Anova).

Table 1 shows the number of school districts that were in each of the NSLA funding levels for 2011. Most noteworthy is the fact that only seven school districts were in the highest funding level of $90 \%$ NSLA or $>$.

## Table 1. Frequencies of 2011 \% NSLA

| NSLA <br> Funding <br> Levels | NSLA \% | Number of <br> Districts | Percent | Valid <br> Percent | Cumulative <br> Percent |
| ---: | ---: | ---: | ---: | ---: | ---: |
| $\$ 496$ | $<70 \%$ | 152 | 63.60 | 63.60 | 63.60 |
| $\$ 992$ | $70 \%-89 \%$ | 80 | 33.50 | 33.50 | 97.10 |
| $\$ 1488$ | $90 \%$ or $>$ | 7 | 2.90 | 2.90 | 100.00 |

## Differences in Performance

Table 2 indicates the differences in mean (or average) percentages proficient or > on the state ACTAAP exams between the 2011 NSLA funding levels.

The differences in means are not subjected to statistical analyses because there are too few (7) districts in the highest NSLA funding level ( $90 \%$ or $>$ ).

However, visual comparisons of means reveal all measures of student performance in 2011 (\% proficient or above) decline as 2011 NSLA funding levels increase.

This inverse relationship between performance and NSLA funding levels holds true for math and literacy, and for low income students and the district populations (or all students).

In contrast, the gap between low income student and the district population (or all students) actually becomes less as the NSLA level increases.

## Table 2. <br> Differences in Mean Percentages Proficient or > on Benchmark Exams Between NSLA Funding Levels

Note: Differences in mean percentages proficient or above on state Benchmark tests are shown according to 2011 NSLA funding levels.

| Benchmark | $\begin{gathered} 2011 \\ \text { NSLA \% } \end{gathered}$ | Number of Districts | Mean \% | Standard Deviation |
| :---: | :---: | :---: | :---: | :---: |
| \|2011 <br> Literacy \% Low-Income | < 70\% | 152 | 70.29 | 7.75 |
|  | 70\%-89\% | 80 | 64.81 | 9.23 |
|  | 90\% or > | 7 | 59.64 | 10.63 |
|  | Total | 239 | 68.14 | 8.83 |
| \|2011 <br> Math \% <br> Low-income | < 70\% | 152 | 75.10 | 8.10 |
|  | 70\%-89\% | 80 | 68.71 | 9.07 |
|  | 90\% or > | 7 | 59.03 | 6.25 |
|  | Total | 239 | 72.49 | 9.18 |
| 2011 <br> Literacy \% Population | < 70\% | 152 | 76.33 | 7.43 |
|  | 70\%-89\% | 80 | 68.04 | 9.33 |
|  | 90\% or > | 7 | 61.20 | 11.07 |
|  | Total | 239 | 73.11 | 9.30 |
| 2011 <br> Math \% <br> Population | < 70\% | 152 | 80.12 | 7.68 |
|  | 70\%-89\% | 80 | 71.73 | 9.17 |
|  | 90\% or > | 7 | 61.36 | 8.67 |
|  | Total | 239 | 76.76 | 9.48 |
| Gap 2011 <br> Literacy Lowincome \& Pop. | < 70\% | 152 | 6.05 | 2.57 |
|  | 70\%-89\% | 80 | 3.23 | 2.35 |
|  | 90\% or > | 7 | 1.56 | 3.32 |
|  | Total | 239 | 4.97 | 2.90 |
| Gap 2011 Math Low-income \& Population | < 70\% | 152 | 5.03 | 2.52 |
|  | 70\%-89\% | 80 | 3.02 | 2.24 |
|  | 90\% or > | 7 | 2.33 | 2.65 |
|  | Total | 239 | 4.27 | 2.63 |

## Narrowing the Gap in Achievement

This narrowing of the gap as NSLA funding is increased suggests the possibility that this funding may be contributing to equalizing achievement. However, any causal linkage must established in experimental studies. It is possible that factors outside the study play a role in the narrowing gap.

A decrease in the achievement gap in districts with higher concentrations of poverty may also be the result of increasing proportions of students being compared in both groups. For example, in a 95\% NSLA district, the students in the low income group are nearly the same students as those in the total district population group.
The correlations between NSLA percentages (2006 \& 2011) and measures of student performance shown in Table 3 (shaded in light blue) are negative and moderate in terms of size (the red print indicates that they are statistically significant at $\mathrm{p}<0.05$ ).

Moderate negative correlations indicate that decreases in performance are associated with increases in NSLA percentages, a finding that does not support the intent of higher NSLA funding leading to achievement gains.

Table 3. Correlations Between Student Performance and NSLA \% for 2006 and 2011

|  |  | $\begin{aligned} & 2006 \text { Lit } \\ & \text { Low } \\ & \text { Income } \end{aligned}$ | 2006 Math Low Income | $\begin{gathered} 2006 \text { Lit } \\ \text { Pop. } \end{gathered}$ | $\begin{gathered} 2006 \text { Math } \\ \text { Pop. } \end{gathered}$ | 2011 Literacy Low Income | 2011 Math Low Income | $\begin{gathered} 2011 \\ \text { Lit. Pop. } \end{gathered}$ | $\begin{array}{\|c\|} \hline 2011 \\ \text { Math Pop. } \\ \hline \end{array}$ | $\begin{array}{\|c\|} \hline \text { Lit }{ }^{* * t} \\ \text { Change } \\ 2006 \text { to } 2011 \end{array}$ | $\begin{array}{\|c\|} \hline \text { Math *** } \\ \text { Change } \\ 2006 \text { to } 2011 \end{array}$ | NSLA 2006 | $\begin{aligned} & \text { NSLA } \\ & 2011 \\ & \hline \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2006 Literacy <br> Low Income | Correlation Significant |  |  |  |  |  |  |  |  |  |  |  |  |
| 2006 Math Low Income | Correlation <br> Significant | $\begin{gathered} .634^{* *} \\ .000 \end{gathered}$ |  |  |  |  |  |  |  |  |  |  |  |
| 2006 Literacy <br> Population | Correlation Significant | $\begin{gathered} \hline .912^{* k} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .806^{* *} \\ & .000 \\ & \hline \end{aligned}$ |  |  |  |  |  |  |  |  |  |  |
| 2006 Math <br> Population | Correlation Significant | $\begin{gathered} \hline .866^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .890^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} .905^{* *} \\ .000 \\ \hline \end{gathered}$ |  |  |  |  |  |  |  |  |  |
| 2011 Literacy <br> Low Income | Correlation Significant | $\begin{gathered} \hline .699 * * \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & \hline .640^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} .759 * * \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .738^{* *} \\ & .000 \\ & \hline \end{aligned}$ |  |  |  |  |  |  |  |  |
| 2011 Math <br> Low Income | Correlation Significant | $\begin{gathered} \hline .624^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .710^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{aligned} & .746 * * \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} .786^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .835^{* *} \\ & .000 \\ & \hline \end{aligned}$ |  |  |  |  |  |  |  |
| 2011 Literacy <br> Population | Correlation Significant | $\begin{gathered} \hline .773^{* *} \\ .000 \end{gathered}$ | $\begin{aligned} & \hline .691^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} \hline .836^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .811^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{aligned} & .950^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{aligned} & .836^{* *} \\ & .000 \\ & \hline \end{aligned}$ |  |  |  |  |  |  |
| 2011 Math <br> Population | Correlation Significant | $\begin{gathered} \hline .703^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .731^{* *} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline .812^{* k} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline .835^{* k} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} \hline .827^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .961^{* k} \\ & .000 \\ & \hline \end{aligned}$ | $\begin{gathered} .893^{\star *} \\ .000 \\ \hline \end{gathered}$ |  |  |  |  |  |
| Literacy Change 2006 to 2011 | Correlation <br> Significant | $\begin{gathered} \hline-.330^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.326^{* k} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.389 * * \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.284^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{aligned} & .153^{*} \\ & .018 \\ & \hline \end{aligned}$ | $\begin{array}{r} \hline .001 \\ .989 \\ \hline \end{array}$ | $\begin{aligned} & .113 \\ & .081 \\ & \hline \end{aligned}$ | $\begin{array}{r} .007 \\ .915 \\ \hline \end{array}$ |  |  |  |  |
| Math Change 2006 to 2011 | Correlation Significant | $\begin{gathered} \hline .361^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.459^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} \hline .361^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.484^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} \hline-.128^{*} \\ .049 \end{gathered}$ | $\begin{aligned} & .039 \\ & .547 \end{aligned}$ | $\begin{aligned} & \hline-.118 \\ & .070 \end{aligned}$ | $\begin{aligned} & .014 \\ & .826 \end{aligned}$ | $\begin{aligned} & .549^{\star \star} \\ & .000 \end{aligned}$ |  |  |  |
| NSLA 2006 | Correlation Significant | $\begin{gathered} \hline .512^{\star *} \\ .000 \end{gathered}$ | $\begin{gathered} -.435^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} \hline .569 * * \\ .000 \end{gathered}$ | $\begin{gathered} -.539 * * \\ \hline .000 \end{gathered}$ | $\begin{gathered} -.353^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} -.410^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} \hline .516^{* *} \\ .000 \end{gathered}$ | $\begin{gathered} -.531^{\star *} \\ .000 \end{gathered}$ | $\begin{aligned} & .075 \\ & .252 \end{aligned}$ | $\begin{aligned} & .047 \\ & .476 \end{aligned}$ |  |  |
| NSLA 2011 | Correlation Significant | $\begin{gathered} \hline .528^{\star *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.404^{\star *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} \hline .567^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.522^{* \pi} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} -.385^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} \hline-.432^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} \hline .551^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{gathered} \hline-.557^{* *} \\ .000 \\ \hline \end{gathered}$ | $\begin{array}{r} .052 \\ .426 \\ \hline \end{array}$ | $\begin{aligned} & .014 \\ & .824 \\ & \hline \end{aligned}$ | $\begin{aligned} & .920^{* *} \\ & .000 \\ & \hline \end{aligned}$ |  |

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## Test of Linear Relationships

The lack of significant correlations between NSLA percentages and cohort changes in low-income students' performance between 2006 and 2011 does not offer empirical support for the intended effects of bolstering these students' academic achievement.
To examine any change in the nature of the relationship between NSLA funding percentages and student performance between 2006 and 2011, OLS regression procedures were used.

The regression formula in the charts draws a line through data points (239 green dots) that represent the intersection of NSLA percentages and student performance.

The line drawn by regression represents the predicted levels of student performance based on the assumption that there is a linear relationship between NSLA percentages and student achievement.

The assumption underlying the policy to provide categorical funding according NSLA \% is that additional funding leads to increased achievement (i.e., there is a linear relationship between funding and performance).



Chart C. Illustration of Equivalent Performance \& NSLA \%


## Charts Based on Regression Analyses

The linear relationship between NSLA percentages and student performance in 2011 is shown in Chart 1.

The slope (or slant) of the regression line indicates the negative relationship between NSLA percentage and student performance.

Although Chart 1 is based on literacy performance among district populations of students, the same pattern of relationship is exhibited for math and for low income students.

The vertical blue (70\% NSLA) and light red (90\% NSLA) lines indicate the current NSLA funding levels, and they provide a reference for visualizing how many districts are performing at each NSLA level.

Chart 2 shows the data points representing the intersection of NSLA \% of the same 239 districts and their population literacy performance in 2006. A test of the slopes of the regression lines in Charts 1 \& 2 reveals no statistical difference, indicating no change in the relationship between NSLA funding percentages and student performance.

## Chart 1. Linear Relationship Between NSLA \% and \% Proficient or > in Literacy (District Population)




Chart 3. Linear Relationship Between 2011 NSLA \% and \% Proficient or > in Literacy (Low Income)


Chart 4. Linear Relationship Between 2006 \& 2011 NSLA \% and \% Proficient or > (Low Income)


Chart 5. Linear Relationship Between 2006 \& 2011 NSLA \% and \% Proficient or > (District Population)


## Chart D. Linear Relationship Between 2011 NSLA \% and Low Income Literacy in Standard Deviations



## Differences in Performance

Differences in mean \% proficient or > in literacy and math among low income students are shown for 2006 and 2011 in Table 4.

Because there were only 5 districts with a NSLA rate of $90 \%$ or > in 2006, 3 new comparison groups were formed: Group 1 (0 to 49\%), Group 2 ( $50 \%$ to $69 \%$ ), and Group 3 ( $70 \%$ or >). The first cutoff occurs at $1 / 3$ of the districts, whereas $70 \%$ represents the cutoff for doubling per pupil funding.

The only comparison in Table 4 that was statistically insignificant ( $p<0.05$ ) was the difference between Group 1 ( $0-49 \%$ NSLA) and Group 2 (50\%-69\% NSLA) in 2006 literacy.

Using the same groups, Table 5 shows all of these comparisons in the district populations (or all students) are statistically significant.

The differences in Tables 4 and 5 indicate that the average \% proficient or > declines as NSLA funding levels are increased. This pattern of results is observed for low income students as well as for district populations.

## Table 4. \% Proficient or > for District Low Income in 2006 \& 2011



Note: The only comparison in the table that was not statistically significant ( $\mathrm{p}<0.05$ ) was between Group 1 (\%NSLA 0 to 49) and Group 2 (\%NSLA 50 to 69 ) in 2006 literacy. *NSLA and performance are matched in terms of year.


Table 5. \% Proficient or > for District Populations in 2006 \& 2011

Note: All of the comparisons in Table 5 are statistically significant ( $p<0.05$ ). *NSLA and performance are matched in terms of year.

## Changes in Performance from 2006 to 2011

Table 6 shows that none the comparisons of mean changes in performance from 2006 to 2011 in the same 2006 NSLA groups (or cohorts) are statistically significant.

In other words, there are no noteworthy differences in cohort changes in performance within NSLA funding levels among low income students from 2006 to 2011.

In contrast, Table 7 shows that there are statistically significant differences between Group 1 (NSLA < 50\%) and Group 3 (NSLA 70\% or >) for both literacy and math among the district populations (or all students).

Furthermore, the mean percentage change in performance shows that there were greater changes in the NSLA \% level where funding is appreciably increased ( $\mathbf{7 0 \%}$ or > NSLA).

Table 8 shows a summary of the percentage change in student performance between 2006 and 2011, and the gaps in performance between low income students and the population in 2006 and 2011.

## Table 6. Change in \% Proficient or > Between

 2006 \& 2011 Low Income

Note: None of the comparisons of changes in \% proficient or > between 2006 and 2011 are statistically significant ( $p<0.05$ ) for low income students. Groups are based on 2006 NSLA for cohort analyses.

## Table 7. Change in \% Proficient or > Between

 2006 \& 2011 District Populations

Note: There are statistically significant differences between Group 1 (NSLA < 50\%) and Group 3 (NSLA 70\% or >) for both literacy and math.
There are greater changes in the NSLA group where funding is appreciably increased (70\% or > NSLA). Groups are based on 2006 NSLA \% for cohort analyses.

Table 8. Changes in \% Proficient or > from 2006 to 2011 and Gaps Between District Population and Low Income

| Statistics | Change from <br> 2006 to 2011 |  |  |  | Gaps <br> (Population minus Low Income) |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Literacy <br> Low <br> Income | Literacy <br> Pop. | Math <br> Low <br> Income | Math <br> Pop. | Literacy <br> 2011 | Literacy <br> 2006 | Math <br> 2011 | Math <br> 2006 |
| Mean | 19.12 | 15.87 | 22.76 | 19.30 | 4.97 | 8.25 | 4.27 | 7.75 |
| Median | 19.00 | 15.80 | 22.90 | 18.60 | 4.80 | 7.90 | 4.30 | 7.65 |
| Standard Deviation | 6.33 | 6.01 | 7.45 | 8.77 | 2.90 | 4.49 | 2.63 | 4.39 |
| Minimum | 4.40 | 2.40 | -3.20 | -2.60 | -2.60 | -2.50 | -1.90 | -3.70 |
| Maximum | 59.40 | 58.50 | 48.20 | 53.10 | 13.60 | 20.30 | 14.00 | 20.20 |
| 20th $^{\text {th }}$ Percentile | 13.40 | 10.80 | 16.20 | 13.86 | 2.50 | 4.88 | 2.10 | 3.90 |
| $40^{\text {th }}$ Percentile | 17.50 | 13.70 | 20.60 | 17.40 | 4.00 | 6.76 | 3.00 | 6.70 |
| 60 $^{\text {th }}$ Percentile | 20.50 | 17.04 | 24.90 | 20.40 | 5.80 | 9.70 | 4.90 | 8.70 |
| 80 $^{\text {th }}$ Percentile | 24.40 | 20.42 | 28.90 | 25.20 | 7.60 | 12.30 | 6.40 | 11.32 |

## Grade-Level Differences in Performance

To examine whether these differences and changes in student performance hold true for grade-level performance in different years, data used from the recent efficiency study were analyzed for $4^{\text {th }}$ grade and $8^{\text {th }}$ grade in 2007 and 2010.

The results of these grade-level comparisons mirrored the findings of districtlevel achievement just discussed. In both 4th and 8th grades, performance declined as NSLA funding levels increased.

When changes in \% proficient or > from 2007 to 2010 were examined, the statistically significant differences indicate greater change in districts with higher NSLA funding levels only in 4th grade.

In 4th grade the only statistically insignificant comparison was between Group 1 ( $<\mathbf{5 0 \%}$ NSLA) and Group 2 (50\% to 69\% NSLA) in literacy.

None of the differences in 8th grade were statistically significant.

Table 9. \% Proficient or > for 4th \& 8th Grade District Populations


Note: All of the comparisons in Table 9 are statistically significant ( $p<0.05$ ). Groups are based on 2007 NSLA \%.

Table 10. Change in \% Proficient or $>$ in $4^{\text {th }}$ and $8^{\text {th }}$ Grade Math \& Literacy Between 2007 \& 2010 (District Population)


Note: All $4^{\text {th }}$ grade comparisons are significant except between Group 1 ( $0-49 \%$ NSLA) and Group 2 ( $50 \%-69 \%$ NSLA), whereas no $8^{\text {th }}$ grade comparisons are statistically significant ( $p<0.05$ ). Groups are based on 2007 NSLA \% for cohort analyses.

## Per ADM Expenditure Performance Differences

Table 11 shows the differences in district mean percentages proficient or > according to per ADM 2011 NSLA expenditures. Per ADM expenditure levels were determined by dividing the 239 schools districts into three equal groups.

The per ADM expenditures analyses reveal a pattern of results identical to the findings observed with funding levels.

The percentages of low income students and the district population who are proficient or > declines as NSLA expenditures are increased.

Even the gap comparisons are the same, with the gap between low income students and the population becoming less as expenditures increase.
These findings suggest the possibility that NSLA expenditures may contribute to narrowing the gap between low income students and the general population. However, factors outside this study may also play a major role.

A cautionary note is issued that some of this narrowing may be due to the overrepresentation of low income students, who tend to have lower academic achievement, in the population of districts with high NSLA rates.

Table 11. Comparison of Mean \% Proficient or > According to Per ADM Total 2011 NSLA Expenditures

Note: Differences in mean \% proficient or > or mean gap differences are shown in the table according to total 2011 NSLA expenditure groups/ADM.
*The three NSLA groups are equally divided into $1 / 3$ of the 239 school districts.
**Gaps are between district populations and low income students. All differences between means are statistically significant ( $p<0.05$ ) except the comparison of Group 1 (<261) and Group 2 (261-362) for low income literacy. Non-significant differences in means are highlighted in light blue.

| Benchmarks | 2011 NSLA Expenses/ ADM* | Mean |
| :---: | :---: | :---: |
| 2011 <br> Literacy <br> \% Low Income | < 261 | 71.45 |
|  | 261-362 | 68.44 |
|  | > 362 | 64.74 |
|  | Total | 68.14 |
| $\begin{array}{\|l} \hline 2011 \\ \text { Math } \\ \text { \% Low Income } \end{array}$ | < 261 | 76.26 |
|  | 261-362 | 72.91 |
|  | > 362 | 68.47 |
|  | Total | 72.47 |
| $2011$ <br> Literacy \% Population | < 261 | 78.13 |
|  | 261-362 | 73.82 |
|  | > 362 | 67.63 |
|  | Total | 73.11 |
| 2011 <br> Math \% Population | < 261 | 81.84 |
|  | 261-362 | 77.58 |
|  | > 362 | 71.12 |
|  | Total | 76.76 |
| $\begin{array}{\|l} \hline \text { Gap** } \\ 2011 \\ \text { Literacy } \end{array}$ | < 261 | 6.76 |
|  | 261-362 | 5.38 |
|  | > 362 | 2.86 |
|  | Total | 4.97 |
| $\begin{array}{\|l\|} \hline \text { Gap** } \\ 2011 \\ \text { Math } \end{array}$ | < 261 | 5.59 |
|  | 261-362 | 4.67 |
|  | > 362 | 2.62 |
|  | Total | 4.27 |

## Differences Per Low Income Count

Table 12 shows the differences in district mean percentages proficient or > according to per low income student count 2011 NSLA expenditures.

The original intent of NSLA funding was primarily to increase the performance of low income students.

The findings in Table 12 for 2011 are similar to those discussed in Table 11, with a few exceptions.
 insignificant for low income literacy and math. The math comparison for the same 2 groups for district populations is also statistically insignificant.

Finally, Groups 1 and 2 are not significant in the gap comparisons between low income students and the district population of students in 2011. The cells shaded in light blue indicate insignificant differences.

Table 12. Comparison of Mean \% Proficient or > Per Low Income Student 2011 NSLA Expenditures

Note: Differences in mean \% proficient or > or mean gap differences are shown in the table according to total 2011 NSLA expenditure groups/low income student count.
*The three NSLA groups are equally divided into $1 / 3$ of the 239 school districts.
**Gaps are between district populations and low income students. All differences between means are statistically significant ( $p<0.05$ ) except the comparisons of Groups 1 (<473) and Groups 2 (473-579) for low income literacy and math, district population math, and the gaps for literacy and math. Non-significant differences in means are highlighted in light blue.

| Benchmarks | NSLA Expenses/ Low Income Count* | Mean |
| :---: | :---: | :---: |
| 2011 <br> Literacy <br> \% Low Income | < 473 | 70.45 |
|  | 473-579 | 69.14 |
|  | $>579$ | 65.13 |
|  | Total | 68.14 |
| $\begin{aligned} & \hline 2011 \\ & \text { Math } \\ & \text { \% Low Income } \end{aligned}$ | < 473 | 75.20 |
|  | 473-579 | 74.08 |
|  | > 579 | 68.49 |
|  | Total | 72.47 |
| $2011$ <br> Literacy \% Population | < 473 | 76.30 |
|  | 473-579 | 75.30 |
|  | $>579$ | 68.17 |
|  | Total | 73.11 |
| 2011 <br> Math \% Population | < 473 | 80.30 |
|  | 473-579 | 79.07 |
|  | $>579$ | 71.38 |
|  | Total | 76.76 |
| $\begin{array}{\|l\|} \hline \text { Gap** } \\ 2011 \\ \text { Literacy } \end{array}$ | < 473 | 5.92 |
|  | 473-579 | 6.13 |
|  | $>579$ | 3.03 |
|  | Total | 4.97 |
| $\begin{aligned} & \hline \text { Gap** } \\ & 2011 \\ & \text { Math } \end{aligned}$ | < 473 | 5.09 |
|  | 473-579 | 4.96 |
|  | $>579$ | 2.89 |
|  | Total | 4.27 |

## Differences Per Low Income Count

The spreadsheet for 2011 NSLA expenditures for programs or interventions indicated vast differences in how districts spent NSLA funds.

The descriptive statistics in Tables 13 and 14 capture some of the diversity in spending.

For example, a particularly salient observation is that many districts had no expenditures for several programs (these are shaded in light gold).

The vast differences in minimum and maximum amounts spent on programs, as well as the standard (or average) deviation (or differences) between districts, also indicate the large inconsistencies in spending NSLA funds across districts.

Correlations (Pearson or Spearman) indicate no relationship between these NSLA program expenditures and student performance.

## Table 13. Frequencies and Descriptive Statistics of NSLA Program Expenditures

|  | Coaches | Teacher PD | High Quality Teachers | Before/After School | Pre K | Tutors | Aides |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \# of Districts | 164 | 67 | 122 | 97 | 44 | 77 | 148 |
| Districts with <br> No Expenditures | 75 | 172 | 117 | 142 | 195 | 162 | 91 |
| Mean | \$186,743.08 | \$43,376.13 | \$139,623.80 | \$38,033.09 | \$152,636.19 | \$38,151.16 | \$100,349.39 |
| Standard Deviation | \$337,658.00 | \$62,970.54 | \$162,243.81 | \$71,377.17 | \$472,508.42 | \$47,492.09 | \$206,936.76 |
| Minimum | \$156 | \$182 | \$115 | \$65 | \$381 | \$61 | \$605 |
| Maximum | \$2,457,995 | \$304,876 | \$1,050,231 | \$450,206 | \$3,105,644 | \$208,424 | \$2,204,973 |
| Percentiles 20 | \$31,941.99 | \$4,017.65 | \$30,453.40 | \$5,304.76 | \$12,214.91 | \$4,394.80 | \$18,930.76 |
| 40 | \$60,842.62 | \$12,405.51 | \$61,305.59 | \$11,099.53 | \$34,983.73 | \$15,389.13 | \$37,479.85 |
| 60 | \$105,500.66 | \$23,383.02 | \$116,754.18 | \$22,701.99 | \$56,634.87 | \$34,484.35 | \$69,741.49 |
| 80 | \$214,356.69 | \$76,898.83 | \$219,386.12 | \$38,429.10 | \$96,896.11 | \$60,620.20 | \$129,509.86 |

Note: No expenditures indicates that none were reported.

Table 14. Frequencies and Descriptive Statistics of NSLA Program Expenditures

|  | Student <br> Services | Curriculum Specialist | Parent <br> Education | Summer School | Early Intervention | School Improvement | Other |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \# of Districts | 175 | 92 | 67 | 75 | 39 | 103 | 159 |
| Districts with <br> No Expenditures | 64 | 147 | 172 | 164 | 200 | 136 | 80 |
| Mean | \$90,991.16 | \$84,538.71 | \$13,197.28 | \$27,417.31 | \$61,538.91 | \$156,307.55 | \$149,823.67 |
| Standard Deviation | \$178,311.20 | \$81,117.98 | \$15,235.65 | \$32,028.26 | \$88,430.93 | \$299,097.13 | \$196,500.03 |
| Minimum | \$137 | \$1,217 | \$20 | \$511 | \$70 | \$36 | \$507 |
| Maximum | \$1,697,298 | \$669,567 | \$63,244 | \$140,392 | \$468,493 | \$2,410,294 | \$1,247,750 |
| Percentiles $\quad 20$ | \$25,328.97 | \$42,721.85 | \$1,277.52 | \$3,893.31 | \$9,862.82 | \$14,131.43 | \$33,495.64 |
| 40 | \$36,340.01 | \$59,381.13 | \$4,377.87 | \$8,444.35 | \$33,163.48 | \$36,169.27 | \$70,429.28 |
| 60 | \$56,894.39 | \$81,195.77 | \$12,112.32 | \$21,014.12 | \$50,433.69 | \$85,285.71 | \$110,663.81 |
| 80 | \$103,303.21 | \$105,940.82 | \$23,112.82 | \$54,029.35 | \$65,029.27 | \$210,255.03 | \$206,835.85 |

Note: No expenditures indicates that none were reported.

## Discussion and Conclusions

In statistical comparisons of means, correlations, and regression analyses a negative (or inverse) relationship was found between NSLA funding levels and expenditures and student performance measures.
The negative relationships indicate that lower student achievement is associated with higher NSLA funding and expenditure levels.

A formal test of the negative linear relationships observed for 2006 and 2011 in the regression analyses indicated that there was no significant difference.

This lack of appreciable change in the linear relationship suggests that overall NSLA percentages have relatively limited impact on student achievement.

However, a comparison of performance averages shows that the performance gap between low income students and the district populations decreases as NSLA funding and expenditure levels increase.

Analyses also showed greater achievement gains between 2006 and 2011 for districts that have higher NSLA funding levels ( $70 \%$ or $>$ ) than for districts that are below $50 \%$ NSLA.

## Discussion and Conclusions

These comparison analyses suggest that NSLA funding may contribute to better academic performance among students that were initially targeted for additional funding.
According to the original Adequacy Report (Odden \& Picus, 2003), the purpose of NSLA funds is to raise achievement for low-income students through the provision of enhanced interventions such as tutoring and student support services.
The significantly higher achievement gains noted for targeted districts (i.e., $70 \%$ or > NSLA) is a noteworthy finding that should not be summarily dismissed because of the inability to test "cause" and "effect" relationship in this study.

Rigorous significance levels $(p<0.05)$ were required in a study with population data, and multivariate analyses suggest that the findings are not specious.

In the course of this study, BLR researchers made preliminary observations that NSLA funds appear to be spread across many different functions, including matrix (or foundation funded) items.

## Discussion and Conclusions

Discussions with ADE officials indicate that these preliminary observations have validity. It is possible that NSLA funding may be spread so thinly across many different functions (activities, interventions) that any potential benefits are completely diluted.

Preliminary observations regarding how NSLA funds are used suggest that a more detailed investigation is needed that not only examines the distribution of state NSLA funding, but also include the broader context of all funding (local, state, and federal).

Without this larger financial context, a complete examination and understanding of the impact of state NSLA funding is not attainable.

A more complete analysis of funding would provide a more comprehensive assessment of the benefits of additional funding for high-priority students.

For further information contact:

Dr. Brent Benda
Bureau of Legislative Research bendab@blr.arkansas.gov (501) 537-9146



[^0]:    Note: * indicates correlations are significant at $p<0.05$; **indicates correlations are significant at $p<0.01$. ***Cohort change between 2006 and 2011 for low-income students. Cells shaded in light blue show correlations between NSLA percentages and performance outcomes.

