















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 <u>seven</u> school districts were in the highest funding level of 90% NSLA or >.

	Total	239	100.00	100.00	
\$1488	90% or >	7	2.90	2.90	100.00
\$992	70%-89%	80	33.50	33.50	97.10
\$496	< 70%	152	63.60	63.60	63.60
NSLA Funding Levels	NSLA %	Number of Districts	Percent	Valid Percent	Cumulative Percent

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.	Benchmark	2011 NSLA %	Number of Districts	Mean %	Standard Deviation
Differences in	2011	< 70%	152	70.29	7.75
Meen	Literacy %	70%-89%	80	64.81	9.23
wean	Low-Income	90% or >	7	59.64	10.63
Percentages	Low-Income	Total	239	68.14	8.83
Proficient or >	2011	< 70%	152	75.10	8.10
FIGHCIENT OF >	Math %	70%-89%	80	68.71	9.07
on Benchmark	Low-income	90% or >	7	59.03	6.25
Exams Between		Total	239	72.49	9.18
Exams Detween	2011	< 70%	152	76.33	7.43
NSLA Funding	Literacy	70%-89%	80	68.04	9.33
Levels	% Population	90% or >	7	61.20	11.07
		Total	239	73.11	9.30
	2011	< 70%	152	80.12	7.68
Note: Differences in	Math %	70%-89%	80	71.73	9.17
Note: Differences in	Population	90% or >	7	61.36	8.67
mean percentages		Total	239	76.76	9.48
proficient or above on	Gap 2011	< 70%	152	6.05	2.57
state Benchmark tests	Literacy Low-	70%-89%	80	3.23	2.35
are shown according to	income & Pop.	90% or >	7	1.56	3.32
2011 NSLA funding		Total	239	4.97	2.90
levels.	Gap 2011 Math	< 70%	152	5.03	2.52
	Low-income &	70%-89%	80	3.02	2.24
	Population	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 <u>suggests</u> 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 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.

		2006 Lit Low Income	2006 Math Low Income	2006 Lit Pop.	2006 Math Pop.	2011 Literacy Low Income	2011 Math Low Income	2011 Lit. Pop.	2011 Math Pop.	Lit. *** Change 2006 to 2011	Math *** Change 2006 to 2011	NSLA 2006	NS 20
2006 Literacy Low Income	Correlation Significant												
2006 Math Low Income	Correlation Significant	.634** .000											
2006 Literacy Population	Correlation Significant	.912** .000	.806** .000										
2006 Math Population	Correlation Significant	.806** .000	.890** .000	.905** .000									
2011 Literacy Low Income	Correlation Significant	.699** .000	.640** .000	.759** .000	.738** .000								
2011 Math Low Income	Correlation Significant	.624** .000	.710** .000	.746** .000	.786** .000	.835** .000							
2011 Literacy Population	Correlation Significant	.773** .000	.691** .000	.836** .000	.811** .000	.950** .000	.836** .000						
2011 Math Population	Correlation Significant	.703** .000	.731** .000	.812** .000	.835** .000	.827** .000	.961** .000	.893** .000					
Literacy Change 2006 to 2011	Correlation Significant	330** .000	326** .000	389** .000	284** .000	.153* .018	001 .989	.113 .081	.007 .915				
Math Change 2006 to 2011	Correlation Significant	361** .000	459** .000	361** .000	484** .000	128* .049	.039 .547	118 .070	.014 .826	.549** .000			
NSLA 2006	Correlation Significant	512** .000	435** .000	569** .000	539** .000	353** .000	410** .000	516** .000	531** .000	.075 .252	.047 .476		
NSLA 2011	Correlation Significant	528** .000	404** .000	567** .000	522** .000	385** .000	432** .000	551** .000	557** .000	.052 .426	.014 .824	.920** .000	























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: <u>Group 1</u> (0 to 49%), <u>Group 2</u> (50% to 69%), and <u>Group 3</u> (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 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 (**70% 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 8. Changes in % Proficient or > from 2006 to2011 and Gaps Between District Population andLow Income

Statistics		(Popu	Ga lation min	I ps Jus Low In	come)			
	Literacy Low Income	Literacy Pop.	Math Low Income	Math Pop.	Literacy 2011	Literacy 2006	Math 2011	Math 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 Percentile	13.40	10.80	16.20	13.86	2.50	4.88	2.10	3.90
40 th Percentile	17.50	13.70	20.60	17.40	4.00	6.76	3.00	6.70
60 th Percentile	20.50	17.04	24.90	20.40	5.80	9.70	4.90	8.70
80th Percentile	24.40	20.42	28.90	25.20	7.60	12.30	6.40	11.32
								34



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 4th grade and 8th 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 <u>insignificant</u> comparison was between Group 1 (< 50% NSLA) and Group 2 (50% to 69% NSLA) in literacy.

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







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.

	2011 NSLA	
Benchmarks	Expenses/ ADM*	Mean
2011	< 261	71.45
Literacy	261-362	68.44
% Low Income	> 362	64.74
	Total	68.14
2011	< 261	76.26
Math	261-362	72.91
% Low Income	> 362	68.47
	Total	72.47
2011	< 261	78.13
Literacy	261-362	73.82
% Population	> 362	67.63
-	Total	73.11
2011	< 261	81.84
Math	261-362	77.58
% Population	> 362	71.12
	Total	76.76
Gap**	< 261	6.76
2011	261-362	5.38
Literacy	> 362	2.86
	Total	4.97
Gap**	< 261	5.59
2011	261-362	4.67
Math	> 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.

The comparisons of Groups 1 (**< \$473**) and Groups 2 **(\$473-\$579**) are 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	< 473	70.45
Literacy	473-579	69.14
% Low Income	> 579	65.13
	Total	68.14
2011	< 473	75.20
Math	473-579	74.08
% Low Income	> 579	68.49
	Total	72.47
2011	< 473	76.30
Literacy	473-579	75.30
% Population	> 579	68.17
	Total	73.11
2011	< 473	80.30
Math	473-579	79.07
% Population	> 579	71.38
	Total	76.76
Gap**	< 473	5.92
2011	473-579	6.13
Literacy	> 579	3.03
	Total	4.97
Gap**	< 473	5.09
2011	473-579	4.96
Math	> 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.

		Coaches	Teacher PD	High Quality Teachers	Before/After School	Pre K	Tutors	Aides
# of Districts		164	67	122	97	44	77	14
Districts with No Expenditures		75	172	117	142	195	162	9
Mean		\$186,743.08	\$43,376.13	\$139,623.80	\$38,033.09	\$152,636.19	\$38,151.16	\$100,349.3
Standard Deviation		\$337,658.00	\$62,970.54	\$162,243.81	\$71,377.17	\$472,508.42	\$47,492.09	\$206,936.7
Minimum	$\left \right \right $	\$156	\$182	\$115	\$65	\$381	\$61	\$60
Maximum	$\left(\right) \right)$	\$2,457,995	\$304,876	\$1,050,231	\$450,206	\$3,105,644	\$208,424	\$2,204,97
Percentiles	20	\$31,941.99	\$4,017.65	\$30,453.40	\$5,304.76	\$12,214.91	\$4,394.80	\$18,930.7
	40	\$60,842.62	\$12,405.51	\$61,305.59	\$11,099.53	\$34,983.73	\$15,389.13	\$37,479.8
	60	\$105,500.66	\$23,383.02	\$116,754.18	\$22,701.99	\$56,634.87	\$34,484.35	\$69,741.4
	80	\$214,356.69	\$76,898.83	\$219,386.12	\$38,429.10	\$96,896.11	\$60,620.20	\$129,509.8

Table 14. Frequencies and Descriptive Statistics of NSLA Program Expenditures

		Student Services	Curriculum Specialist	Parent Education	Summer School	Early Intervention	School Improvement	Other
# of Districts	111	175	92	67	75	39	103	159
Districts with No Expenditu	ires	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 Devia	tion	\$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	$\boldsymbol{\Pi}$	\$1,697,298	\$669,567	\$63,244	\$140,392	\$468,493	\$2,410,294	\$1,247,750
Percentiles	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 exp	enditu	ures indicates	s that none w	ere reported	d.			

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.

