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Educational Funding and Student Outcomes: The Relationship as Evidenced by State-Level Data

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Introduction

This report shows the impact of various school funding measures on student outcomes measured by NAEP, ACT, and SAT scores, the four-year cohort graduation rate, and percent of the population ages 18-24 with at least a high school diploma. State-level data for the United States from 2005 through 2014 as available is utilized to establish the nature of the relationships between these measures via linear regression and correlation analyses. For key significant relationships, Kansas' status is discussed along with the status of peer states and the nation.

For definitions of the variables and methods used, see Appendix A. For information on the number of observations per variable and year, see Appendix B. For additional information on all comparisons, see Appendix C.

Implications of This Study

1. Educational spending is a strong predictor of student achievement.

- The amount of spending (total revenue per pupil, current spending per pupil, and spending on instruction per pupil; in actual dollars, adjusted for inflation, and adjusted for regional cost of living), is a significant predictor of almost all outcome measures, including all NAEP math and reading scores, college readiness tests and high school completion.

- Higher spending is a significant predictor of outcomes even when adjusted for the percent of low-income students tested (NAEP) or the percentage of students participating in the test (ACT and SAT).

2. The amount of spending is more important than the percent spent on "instruction."

- Actual dollar amounts spent have a much higher impact on outcomes than does spending on instruction as a percent of current spending or total revenue.
- Spending on instruction as a percent of total revenue has a lower impact across outcome measures than does spending on instruction as a percent of current spending; which excludes spending on building construction, equipment and debt service.

3. Kansas spends below the national average but has outcomes well above the national average.

- Kansas has better student outcomes than predicted based on the total revenue per pupil, current spending per pupil, and spending on instruction per pupil.
- Kansas outcomes are either at or above what would be predicted based on instruction as a percent of either current spending or total revenue.

Table 1: Outcomes by Funding Amounts

Nsig = Not Significant

		Total Revenue Per Pupil R ²	Total Revenue Per Pupil - Inflation R ²	Total Revenue Per Pupil - State COL R ²	Current Spending Per Pupil R ²	Current Spending Per Pupil - Inflation R ²	Current Spending Per Pupil - State COL R ²	Spending on Instruction Per Pupil R ²	Spending on Instruction Per Pupil - Inflation R ²	Spending on Instruction Per Pupil - State COL R ²
% at Basic or Above	All	0.16	0.14	0.20	0.15	0.14	0.18	0.17	0.15	0.21
	FRL Eligible	0.07	0.04	0.13	0.07	0.04	0.12	0.08	0.05	0.13
	FRL Ineligible	0.16	0.11	0.22	0.17	0.13	0.22	0.18	0.14	0.24
NAEP	% at Proficient or Above	0.24	0.22	0.23	0.23	0.21	0.21	0.24	0.22	0.24
	FRL Eligible	0.09	0.06	0.14	0.09	0.06	0.13	0.11	0.07	0.15
	FRL Ineligible	0.23	0.17	0.23	0.23	0.18	0.22	0.24	0.19	0.24
Average (Mean) Score	All	0.20	0.18	0.22	0.20	0.18	0.20	0.21	0.20	0.23
	FRL Eligible	0.07	0.05	0.13	0.07	0.05	0.12	0.09	0.06	0.14
	FRL Ineligible	0.21	0.16	0.23	0.22	0.17	0.22	0.23	0.18	0.24
ACT	Percent Meeting Benchmark	0.34	0.31	0.23	0.32	0.30	0.22	0.37	0.35	0.28
	Difference in Percent Benchmark	0.17	0.13	0.18	0.16	0.12	0.17	0.20	0.16	0.22
	Average (Mean) Score	0.28	0.28	0.18	0.26	0.26	0.17	0.30	0.31	0.23
	Difference in Average (Mean) Score	0.11	0.10	0.13	0.11	0.09	0.12	0.14	0.13	0.17
SAT	Average (Mean) Score	0.09	0.10	0.02	0.09	0.09	0.02	0.09	0.09	0.02
	Difference in Average (Mean) Score	0.09	0.10	0.08	0.09	0.10	0.08	0.12	0.13	0.12
Adjusted 4 Year Cohort Grad Rate		0.06	0.05	0.08	0.04	0.04	0.06	0.06	0.05	0.08
% 18-24 Year Olds with => H.S. Diploma		0.24	0.20	0.25	0.23	0.19	0.24	0.24	0.20	0.26

Results - Funding Amounts

The following are some key findings related to the amount of funding and its impact on student outcomes.

1. Educational spending is a strong predictor of student achievement.

The amount of spending (total revenue per pupil, current spending per pupil, and spending on instruction per pupil; in actual dollars, adjusted for inflation, and adjusted for regional cost of living), is a significant predictor of almost all outcome measures, including all NAEP math and reading scores, college readiness tests and high school completion.

Funding has an impact on student outcomes. For all major outcome measures used, the linear regressions calculated with the funding measure predicting those outcomes were significant. The R² values; which indicate the amount of variation in the dependent measure that can be accounted for by the independent measure, range from 0.01 to 0.37; meaning the funding measures can account for as much as 37 percent of the variation in outcome measures or as little as 1 percent; depending on the comparison.

Table 1 shows the R² values for the nine per pupil funding measures as predictors of key outcome variables. For definitions of the variables and methods used, see Appendix A. For information on the number of observations per variable and year, see Appendix B. For additional information on all comparisons, see Appendix C.

Higher spending is a significant predictor of outcomes even when adjusted for the percent of low income students tested (NAEP) or the percentage of students participating in the test (ACT and SAT).

The significant relationships between funding amounts and outcomes were consistent across all measures; including NAEP scores reported by eligibility for free and reduced-price lunch as a proxy measure for students at risk based on financial status. Though the amount of variation in outcomes predicted by the funding measures varies across these groups, the trend is consistent; higher funding is predictive of better outcomes. For details, see Table 1.

One caution often cited related to the use of ACT and SAT scores is that the percent participation within a state has been shown to impact the overall scores and/or benchmark achievements; with an increase in

percent participation predicting a decrease in the scores and benchmark attainments. In order to control for this, scores and benchmark percents were calculated for the ACT and SAT results by year and state that removed the influence of percent participation. As the table above shows, funding amounts were able to account for less of the ACT difference measures than for the original ACT measures, but the regressions were all still significant for these difference scores. The funding amounts were almost equal, and possibly even slightly more effective, at predicting the SAT difference scores than they were at predicting the original SAT scores.

Results - Funding Percents

2. Total spending is more important than the percent spent on "instruction."

Actual dollar amounts spent have a much higher impact on outcomes than does spending on instruction as a percent of current spending or total revenue.

Though spending on instruction as a percent of current spending is a significant predictor of almost all student outcomes, and spending on instruction as a percent of total revenue is a significant predictor for

Table 2: Outcomes by Funding Percents

Nsig = Not Significant

		Instruction as a Percent of Current Spending R ²	Instruction as a Percent of Total Revenue R ²	Total Revenue Per Pupil R ²	
NAEP	% at Basic or Above	All: 0.07 FRL Eligible: 0.04 FRL Ineligible: 0.04	0.02 Nsig 0.03	0.16 0.07 0.16	
	% at Proficient or Above	All: 0.07 FRL Eligible: 0.06 FRL Ineligible: 0.04	0.02 0.02 Nsig	0.24 0.09 0.23	
	Average (Mean) Score	All: 0.07 FRL Eligible: 0.06 FRL Ineligible: 0.04	0.02 0.03 0.02	0.20 0.07 0.21	
	ACT	Percent Meeting Benchmark	0.17	0.04	0.34
		Difference in Percent Benchmark	0.15	0.05	0.17
		Average (Mean) Score	0.18	0.05	0.28
Difference in Average (Mean) Score		0.17	0.06	0.11	
SAT	Average (Mean) Score	Nsig	Nsig	0.09	
	Difference in Average (Mean) Score	0.12	0.06	0.09	
Adjusted 4 Year Cohort Grad Rate		0.07	Nsig	0.06	
% 18-24 Year Olds with => H.S. Diploma		0.06	0.03	0.24	

approximately half of the student outcomes, they do not have nearly as large an impact as the measures of actual funding amounts. The R² values; which indicate the amount of variation in the dependent measure that can be accounted for by the independent measure, range from 0.02 to 0.20; meaning the funding measures can account for as much as 20 percent of the variation in outcome measures or as little as 2 percent; depending on the comparison.

Table 2 shows the R² values for the two percent instruction measures as predictors of key outcome variables. For definitions of the variables and methods used, see Appendix A. For information on the number of observations per variable and year, see Appendix B. For additional information on all comparisons, see Appendix C.

As the table shows, overall the R² values for these percent measures are much lower than those seen for the funding amounts in Table 1 (and demonstrated by the Total Revenue Per Pupil column in Table 2). This shows that, though these measures are still significant predictors of student outcomes in many cases, they are not as strong as the actual funding amounts.

Spending on instruction as a percent of total revenue has a lower impact across outcome measures than does spending on instruction as a percent of current spending; which excludes spending on building construction, equipment and debt service.

Spending on instruction as a percent of current spending is a significant predictor of all outcome measures with the exception of the NAEP science measures and SAT scores. Spending on instruction as a percent of total revenue is a significant predictor of ACT measures, SAT scores adjusted for participation, the percent of 18- to 24-year olds with at least a high school diploma, and most NAEP reading measures, but not of NAEP math measures, most NAEP science measures, SAT scores, or the four-year cohort graduation rate.

The results for the regression analysis of funding measures as predictors of student outcomes using spending on instruction as a percent of total revenue yielded mixed results that make it the least effective predictor of student outcomes included in the current study. Additional research and analysis would be needed in order to determine why in general this metric was a significant predictor for NAEP reading but not

for NAEP math scores and percents at basic and proficient, why it was a significant predictor for the percent of 18- to 24-year olds with at least a high school diploma but not for the four-year cohort graduation rate, and why it was a significant predictor for SAT scores adjusted for participation, but not for SAT raw scores.

These findings indicate overall spending on instruction as a percent of current spending is a more effective predictor than spending on instruction as a percent of total revenue. Likely this is due to the introduction of additional external factors that comes with using total revenue as the denominator rather than current spending; which is less varied from state to state.

Since the percent metrics are not as effective predictors of outcomes as the actual dollar metrics, it is recommended that total revenue per pupil, current spending per pupil, and spending on instruction per pupil be used instead whenever possible.

Results - Kansas Funding Amounts

3. Kansas spends below the national average but has outcomes well above the national average.

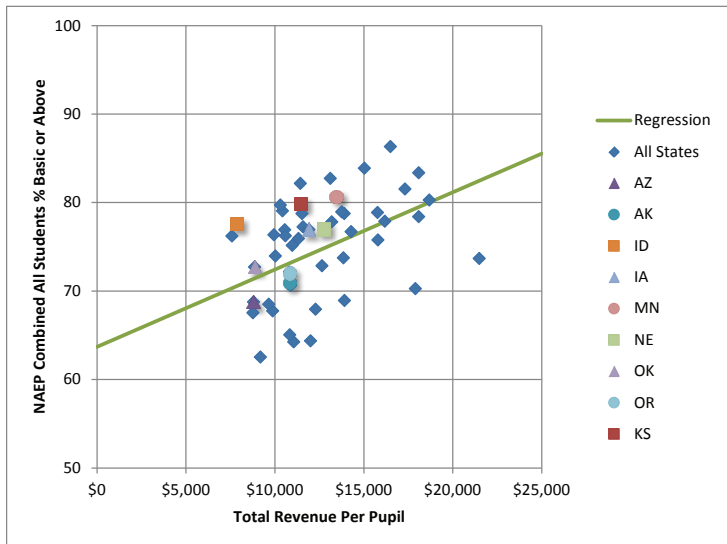
Kansas has better student outcomes than predicted based on the total revenue per pupil, current spending per pupil, and spending on instruction per pupil.

Rather than presenting detailed discussion of each regression analysis, examples are provided below that give an indication of the relationship between the variables as indicators of funding's impact on student outcomes.

Total Revenue Per Pupil and the Percent of All Students Performing at Basic or above on NAEP

Total revenue per pupil accounts for 16 percent of the variation in the percent of all students performing at basic or above on the NAEP assessment. The scatterplot in Figure 1 shows the relationship, and the actual values for each state for the most recent year available (2011).

Figure 1: Total Revenue and NAEP Basic Percents

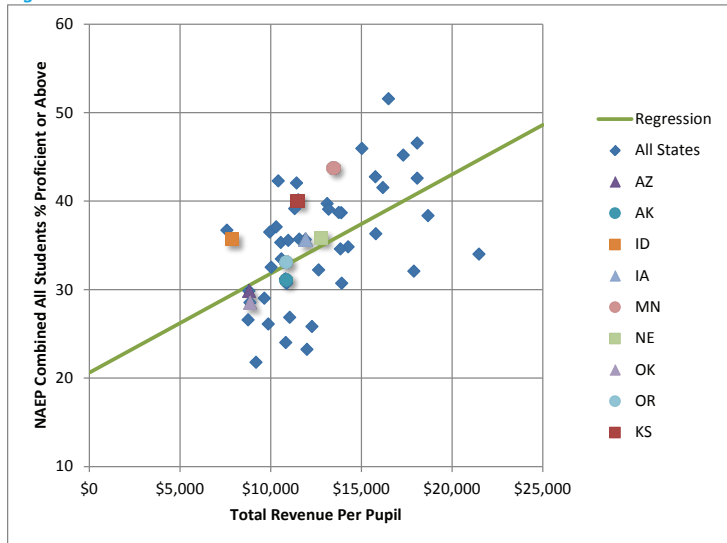


As Figure 1 illustrates, increases in total revenue per pupil predict increases in the percent of the all students group performing at basic or above on the NAEP exam across subjects and grades. Kansas is just below the median for total revenue per pupil, but is noticeably above the median for the percent of students at basic or above on the NAEP exam across subjects and grades. In addition, Kansas' data point is above the regression line; meaning Kansas students do better on the NAEP exam than predicted based on the total revenue per pupil. Of Kansas' peer states with similar total revenue per pupil, only Minnesota performed better on this NAEP measure, and only Idaho showed an outcome that was further above its predicted value.

Total Revenue Per Pupil and the Percent of All Students Performing at Proficient or above on NAEP

Total revenue per pupil accounts for 24 percent of the variation in the percent of all students performing at basic or above on the NAEP assessment. The scatterplot in Figure 2 shows the relationship, and the actual values for each state for the most recent year available (2011).

Figure 2: Total Revenue and NAEP Proficient Percents

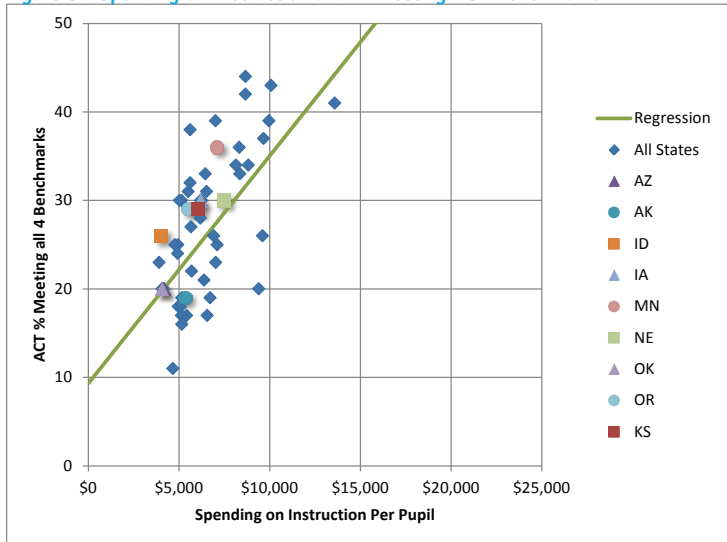


As Figure 2 illustrates, increases in total revenue per pupil predict increases in the percent of the all students group performing at proficient or above on the NAEP exam across subjects and grades. Kansas is just below the median for total revenue per pupil, but is noticeably above the median for the percent of students at proficient or above on the NAEP exam across subjects and grades. In addition, Kansas' data point is above the regression line; meaning Kansas students do better on the NAEP exam than predicted based on the total revenue per pupil. Of Kansas' peer states with similar total revenue per pupil, only Minnesota performed better on this NAEP measure, and only Minnesota showed an outcome that was further above its predicted value.

Spending on Instruction Per Pupil and Percent of Students Meeting All Four ACT Benchmarks

Spending on instruction per pupil accounts for 37 percent of the variation in the percent of students meeting all four benchmarks on the ACT exam. The scatterplot in Figure 3 shows the relationship, and the actual values for each state for the most recent year available (2012).

Figure 3: Spending on Instruction and % Meeting ACT Benchmarks



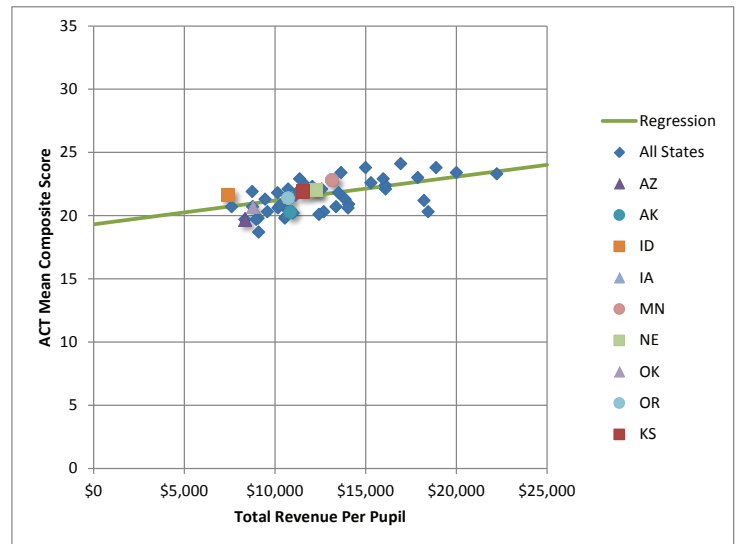
As Figure 3 illustrates, increases in spending on instruction per pupil predict increases in the percent of students meeting all 4 benchmarks on the ACT exam. Kansas is below the median for spending on instruction per pupil, but is slightly above the median for the percent of students meeting all four ACT benchmarks. In addition, Kansas' data point is above the regression line; meaning Kansas students do better on the ACT exam than predicted based on spending on instruction per pupil. Of Kansas' peer states with similar spending on instruction per pupil, Minnesota, Nebraska, and Iowa performed better on this ACT measure. Idaho, Oregon, and Minnesota showed outcomes that were further above their predicted values.

Total Revenue Per Pupil and ACT Mean Composite Score

Total revenue per pupil accounts for 28 percent of the variation in the average (mean) composite score on the ACT exam. The scatterplot in Figure 4 shows the relationship, and the actual values for each state for the most recent year available (2012).

As the chart illustrates, increases in total revenue predict increases in the average overall ACT scores. Kansas is below the median for spending on instruction per pupil, but is just above the median for the average ACT scores. In addition, Kansas' data point is above the regression line; meaning Kansas students do better on the ACT exam than predicted based on total revenue per pupil. Of Kansas' peer states with similar spending on instruction per pupil, Minnesota and Nebraska performed better on this ACT measure, and Idaho and Minnesota showed outcomes that were further above their predicted values.

Figure 4: Total Revenue Per Pupil and ACT Mean Composite Score

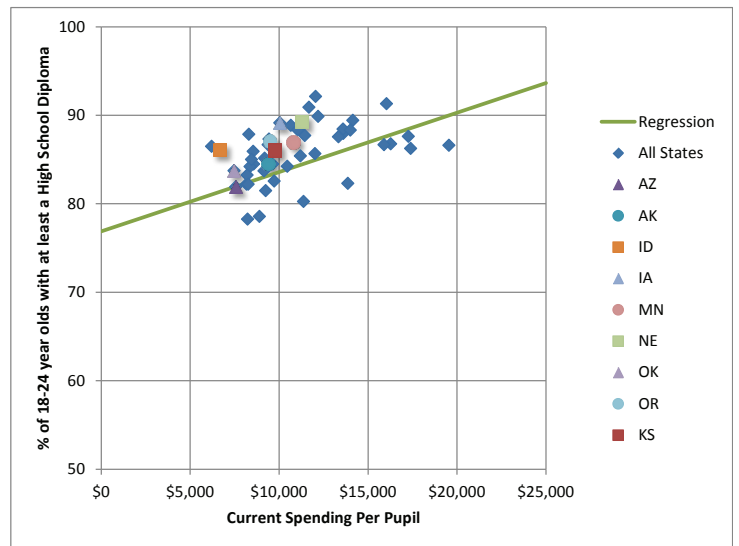


Current Spending Per Pupil and Percent of 18- to 24-Year Olds with at Least a High School Diploma

Current spending per pupil accounts for 23 percent of the variation in the percent of 18- to 24-year olds with at least a high school diploma. The scatterplot in Figure 5 shows the relationship, and the actual values for each state for the most recent year available (2012).

As the chart illustrates, increases in current spending per pupil predict increases in the percent of 18- to 24-year olds with at least a high school diploma. Kansas is well below the median for spending on instruction per pupil, but is only slightly below the median for the percent of 18- to 24-year olds with at least a high-school diploma. In addition, Kansas' data point is above the regression line; meaning Kansas has a higher percent of 18- to 24-year olds with at least a high-school diploma than predicted based on current spending per pupil. Of Kansas' peer states with similar current spending per pupil, Idaho, Oregon, Oklahoma, Minnesota, and Nebraska performed better on this 18-24 completion measure. Idaho, Oregon, Iowa, and Nebraska showed outcomes that were further above their predicted values.

Figure 5: Current Spending & 18-24 Year Olds w/ a High School Diploma



Total Revenue Per Pupil and 4 Year Adjusted Cohort Graduation Rate

Total revenue per pupil accounts for 6 percent of the variation in the four year adjusted cohort graduation rate. The scatterplot in Figure 6 shows the relationship, and the actual values for each state for the most recent year available (2012).

As Figure 6 illustrates, increases in total revenue per pupil predict increases in the four-year graduation rate. Kansas is below the median for total revenue per pupil, but is above the median for the cohort graduation rate. In addition, Kansas' data point is quite a bit above the regression line; meaning Kansas has a higher percent students graduating within four years of entering ninth grade than predicted based on total revenue per pupil. Of Kansas' peer states with similar current spending per pupil, Nebraska and Iowa performed better on this completion measure. Nebraska and Iowa also showed outcomes that were further above their predicted values.

Figure 6: Total Revenue and 4 Year Grad Rate

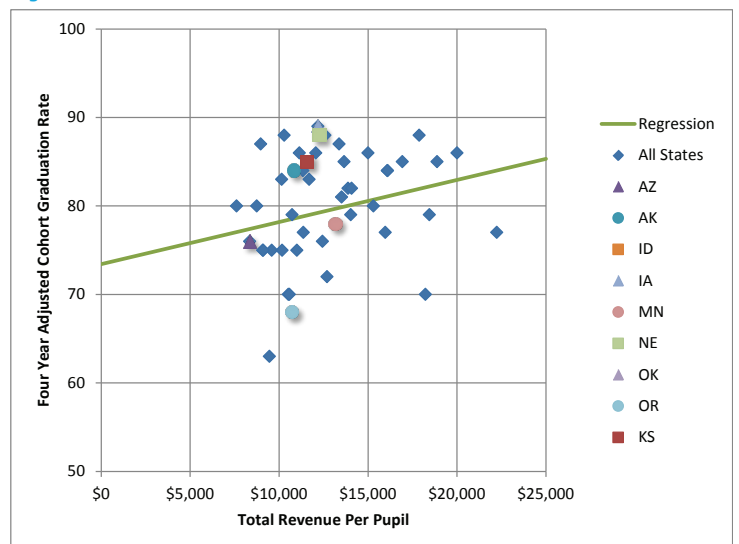
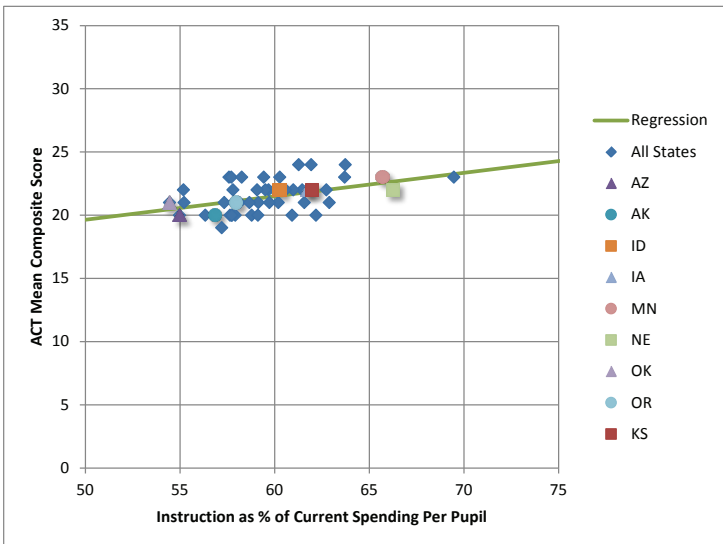


Figure 7: Instruction % Current and ACT Mean Composite Score



Overall

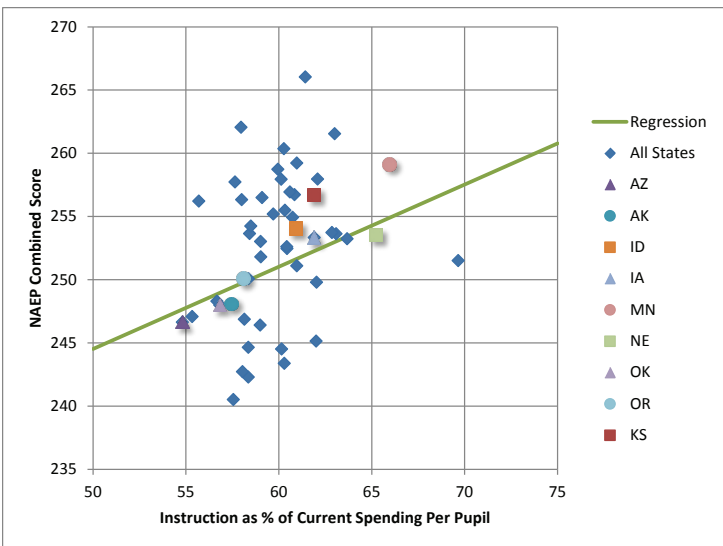
As these scatterplots show, Kansas consistently performs above what is predicted based on funding. This is consistent across outcome measures and across funding measures. This suggests that Kansas schools and districts are able to achieve better test scores and graduation rates because they are more efficient and effective than other states spending similar amounts.

Results - Kansas Funding Percents

Kansas outcomes are either at or above what would be predicted based on instruction as a percent of either current spending or total revenue.

Rather than presenting detailed discussion of each regression analysis, examples are provided below that give an indication of the relationship between the variables as indicators of funding’s impact on student outcomes.

Figure 8: Instruction % Current and NAEP Mean Combined Scores



Instruction as a Percent of Current Spending and ACT Mean Composite Scores

Instruction as a percent of current spending accounts for 18 percent of the variation in the mean ACT composite score. The scatterplot in Figure 7 shows the relationship, and the actual values for each state for the most recent year available (2012).

As Figure 7 illustrates, increases in instruction as a percent of current spending per pupil predict increases in the ACT mean composite score, although the impact of this funding percent measure is not as strong as that seen for other measures. Kansas is slightly above the median for instruction as a percent of current spending, and right at the median for ACT mean composite score. Kansas falls right on the regression line; meaning the ACT mean composite score is almost exactly where it would be predicted to be based on instruction as a percent of current spending. Of Kansas’ peer states with similar spending on instruction per pupil, Idaho, Oregon, Oklahoma, Minnesota, and Nebraska performed better on this 18-24 completion measure. Idaho, Oregon, Iowa, and Nebraska showed outcomes that were further above their predicted values.

Instruction as a Percent of Current Spending and NAEP Mean Combined Scores

Instruction as a percent of current spending accounts for 7 percent of the variation in the mean NAEP combined score. The scatterplot in Figure 8 shows the relationship, and the actual values for each state for the most recent year available (2011).

As Figure 8 illustrates, increases in instruction as a percent of current spending per pupil predict increases in the NAEP mean combined score. Kansas is above the median for both instruction as a percent of current spending and the average combined NAEP score. Kansas falls well above the regression line; meaning the NAEP combined mean

Figure 9: Instruction % Total and Adjusted SAT Mean Scores

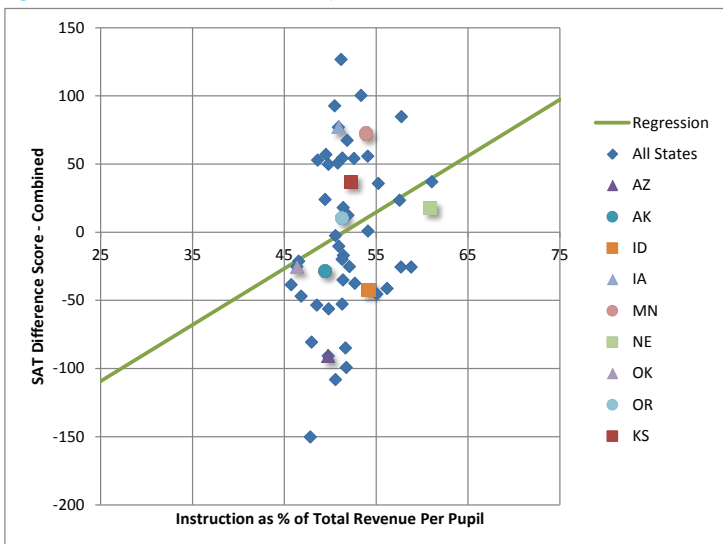
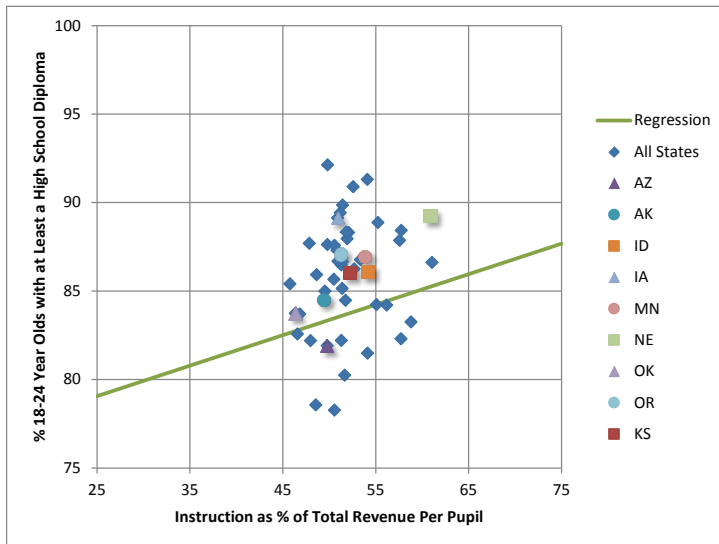


Figure 10: Instruction % Total and 18-24 Year Olds with HS Diploma



score is well above where it would be predicted to be based on instruction as a percent of current spending. Of Kansas' peer states with similar spending on instruction per pupil, only Minnesota performed better on this NAEP measure, and no state showed outcomes further above their predicted values.

Instruction as a Percent of Total Revenue and Adjusted SAT Mean Scores

Instruction as a percent of total revenue accounts for 6 percent of the variation in the average SAT score adjusted for percent of participation. The scatterplot in Figure 9 shows the relationship, and the actual values for each state for the most recent year available (2012).

As Figure 9 illustrates, the range of SAT difference scores is spread out quite a bit from the regression line; as increases in instruction as a percent of total revenue per pupil is not a strong predictor of increases in SAT scores adjusted for percent participation. Kansas is right at the median for instruction as a percent of total revenue, and quite a bit higher than the median for SAT mean combined score adjusted for percent participation. In addition, Kansas' data point is above the regression line; meaning the SAT mean combined score adjusted for inflation is higher than predicted based on instruction as a percent of total revenue. Of Kansas' peer states with similar percents per pupil, Iowa and Minnesota performed better on this SAT measure, and Iowa and Minnesota also showed outcomes that were further above their predicted values.

Instruction as a Percent of Total Revenue and Percent of 18- to 24-Year Olds with at Least a High School Diploma

Instruction as a percent of total revenue accounts for 3 percent of the variation in the percent of 18- to 24-year olds with at least

a high school diploma. The scatterplot in Figure 10 shows the relationship, and the actual values for each state for the most recent year available (2012).

As Figure 10 illustrates, the range of percents is spread out quite a bit from the regression line; as increases in instruction as a percent of total revenue per pupil is not a strong predictor of the percent of 18- to 24-year olds earning at least a high school diploma. Kansas is right at the median for instruction as a percent of total revenue, and just under the median for percent of 18- to 24-year olds with at least a high school diploma. In addition, Kansas' data point is above the regression line; meaning the percent of residents under 25 that are high school graduates is higher than predicted based on instruction as a percent of total revenue. Of Kansas' peer states with similar percents per pupil, Idaho, Minnesota, Oregon, Iowa, and Nebraska performed better on this graduation outcome measure. Minnesota, Oregon, Iowa, and Nebraska showed outcomes that were further above their predicted values.

Overall

As these scatterplots show, Kansas consistently performs at or above what is predicted based on the percent of funding going to instruction as defined federally. This is consistent across outcome measures and across funding measures. This suggests that Kansas schools and districts are able to achieve at least as predicted for test scores and graduation rates. However, as noted earlier, the measures based on the percent of current spending or total revenue on instruction are not nearly as effective as predictors of student outcomes as the measures based on funding amounts.

Conclusion

As noted in the introduction, this study was conducted to determine the relationship between educational funding and student outcomes. The results of the analyses point clearly to the conclusion that increased funding reliably predicts improved student outcomes. In addition, the amount spent is a much stronger predictor than is the percent spent on instruction.

Finally, the results of this study suggest that Kansas performs at above average efficiency and effectiveness; consistently producing student outcomes that are better than predicted based on the amount of money being spent.

Appendix A: Methodology, Data Sources, and Notes

The following are descriptions of the data elements and methods used in this study.

Total Revenue, Current Spending, and Spending on Instruction:

The U.S. Census Bureau's Public Education Finances data includes state-level figures for Total Revenue Per Pupil, Current Spending Per Pupil, and Spending on Instruction Per Pupil. These figures were utilized in the current study; both as reported and also as adjusted for inflation and reported in 2014 dollars as reported by the Bureau of Labor Statistics in their Consumer Price Index data. (www.census.gov/govs/school)

- **Total Revenue Per Pupil:** Additions to assets that do not incur an obligation that must be met at some future date, do not represent exchanges of fixed assets, and are available for expenditure by the LEAs [local education agency] in the state. Revenues include funds from local, intermediate, state, and federal sources. This differs from expenditures, which are defined as all amounts of money paid out by a school system. If revenues are funds available to spend, expenditures are funds that are actually spent.
- **Current Spending Per Pupil:** Current expenditures include instruction, instruction-related, support services, and other elementary/secondary current expenditures, but exclude expenditures on capital outlay, other programs, and interest on long-term debt.
- **Spending on Instruction Per Pupil:** Instruction includes the activities dealing directly with the interaction between teachers and students. Teaching may be provided for students in a school classroom, in another location such as a home or hospital, and in other learning situations such as those involving co-curricular activities. It may also be provided through some other approved medium, such as television, radio, computer, the Internet, multimedia, telephone, and correspondence, that is delivered inside or outside the classroom or in other teacher-student settings. Included here are the activities of aides or classroom assistants of any type (graders, teaching machines, etc.) who assist in the instructional process.

- **Inflation Adjustment (CPI2014):** In order to account for inflation over time, the annual Consumer Price Index provided by the Bureau of Labor Statistics was used to adjust dollar amounts to their 2014 equivalent across the three funding amount metrics. (www.bls.gov/data/inflation_calculator.htm)
- **State Cost of Living Adjustment (RPP):** In order to account for regional cost of living differences, the annual Regional Price Parity statistic provided by the Bureau of Economic Analysis was used to adjust dollar amounts that were equalized for all states across the three funding metrics. (www.bea.gov/newsreleases/regional/rpp/2014/pdf/rpp0414.pdf)

Spending on Instruction as a Percent of Current Spending and of Total Revenue:

The Census bureau also provides a metric of the percent of current spending going to expenses categorize as directly instruction-related as a proxy for the amount of resources being applied directly to the classroom versus administrative overhead and expenses not directly related to educating the student. KASB has also calculated a related variable in the past based on the spending on instruction as a percent of the total revenue per pupil in order to represent a ratio of instruction spending to all per-pupil spending. (www.census.gov/govs/school)

- **Spending on Instruction as a Percent of Current Spending:** Represents the percent of current spending (as defined above) allocated to instruction (as defined above).
- **Spending on Instruction as a Percent of Total Revenue:** Represents the percent of total revenue (as defined above) allocated to instruction (as defined above).

NAEP:

The National Assessment of Educational Progress, administered by NCES, is a commonly used measure of student outcomes by state. It is perhaps the only measure that provides state-level data that is reportedly representative of the entire

state population, and provides breakouts by demographic characteristics such as eligibility for free and reduced-price lunch. Along with the composite measures discussed in the report, data is available in Appendix C for individual grades (Fourth and Eighth) and individual subjects (reading, mathematics, and science). (<http://nces.ed.gov/nationsreportcard/naepdata/report.aspx>)

- **Average (Mean) Scores:** The average of the scores attained by all test-takers in the state (or subgroup).
- **Percent at Basic and Above:** The percent of all students tested by state performing at Basic, Proficient, or Advanced as defined by NCES.
- **Percent at Proficient and Above:** The percent of all students tested by state performing at Proficient or Advanced as defined by NCES.
- **FRL Eligible:** Students eligible for free or reduced-price lunch as defined by USDA; used as a proxy measure for at-risk students based on financial status.
- **FRL Ineligible:** Students not eligible for free or reduced-price lunch as defined by USDA; used as a proxy measure for student who are not at-risk based on financial status.

ACT:

The American College Test, or ACT, is an achievement test designed to measure what a student has learned in school. It is commonly used by colleges as an entrance exam along with other measures. ACT scores by state are available, but are highly impacted by the percent of graduating students taking the exam within each state. (www.act.org/newsroom/data/)

- **Percent Meeting Benchmark:** The ACT College Readiness Benchmarks are the minimum ACT college readiness assessment scores required for students to have a high probability of success in credit-bearing college courses. The percent is based on all students who took the exam by state.

- **Difference in Percent Meeting Benchmark:** Calculated by subtracting the predicted percent based on percent participation from the actual observed percent for each state (or subgroup). The predicted percents are determined by using the regression equation with percent participation as the independent (predictor) variable and the percent meeting benchmarks as the dependent (predicted) variable.
- **Average (Mean) Score:** The average of the scores attained by all test-takers in the state (or subgroup).
- **Difference Average (Mean) Score:** Calculated by subtracting the predicted score based on percent participation from the actual observed score for each state (or subgroup). The predicted scores are determined by using the regression equation with percent participation as the independent (predictor) variable and the score as the dependent (predicted) variable.

SAT:

The Scholastic Aptitude Test, or SAT, is an aptitude test designed to measure things such as reasoning and verbal abilities. It is commonly used by colleges as an entrance exam along with other measures. SAT scores by state are available, but are highly impacted by the percent of graduating students taking the exam within each state. (<http://nces.ed.gov/programs/digest>)

- **Average (Mean) Score:** The average of the scores attained by all test-takers in the state (or subgroup).
- **Difference Average (Mean) Score:** Calculated by subtracting the predicted score based on percent participation from the actual observed score for each state (or subgroup). The predicted scores are determined by using the regression equation with percent participation as the independent (predictor) variable and the score as the dependent (predicted) variable.

Adjusted Four-Year Cohort Graduation Rate:

Because of the changes in federal requirements over the past several years, it is nearly impossible to find a good source of continuous longitudinal data related to graduation. There are three main types of graduation rates that have been used in recent history for federal reporting by states; the National Center for Education Statistics formula (NCES); which was used through 2008, the No Child Left Behind formula (NCLB); which was used for 2009 only, and the four-year adjusted cohort formula (four year); which has been used since 2010. The current study utilizes the 2011 and 2012 four-year adjusted cohort graduation data as the most recent graduation data available. (<http://eddataexpress.ed.gov/index.cfm>)

Percent of 18- to 24-Year Olds with at Least a High School Diploma:

NCES's Digest of Educational Statistics includes information on the percent of persons 18 to 24 years old who have at least a high school diploma. This measure is used in the current study as a proxy graduation rate by state; with the understanding this measure is limited by the potential time lag between the funding and outcome data and also by the number of 18- to 24-year olds who move in and out of the state each year. (<http://nces.ed.gov/programs/digest/index.asp>)

Regression:

For this study, simple linear regressions were utilized. Simple linear regression fits a straight line through the set of points in such a way that makes the vertical distances between the points of the data set and the fitted line as small as possible. (http://en.wikipedia.org/wiki/Linear_regression)

- **R²:** R-squared is a statistical measure of how close the data are to the fitted regression line. It can be interpreted as the amount to which a change in independent variable can predict the corresponding change in the dependent variable.

- **R² Sig:** The statistical significance of the calculated regression. Indicates the likelihood that the observed relationship is due to chance. For this study, any regression with a significance of .05 or less is considered statistically significant; whereas any regression with a significance greater than .05 is considered non-significant.

Correlation:

For this study, Pearson correlations were utilized. The Pearson Correlation coefficient indicates the degree to which two or more attributes or measurements on the same group of elements show a tendency to vary together. (http://en.wikipedia.org/wiki/Correlation_and_dependence)

- **Corr:** The Pearson Correlation coefficient. Indicates magnitude and direction of relationship, but does not provide information on the specific nature of the relationship (linear, polynomial, logistic, etc.)
- **Corr Sig:** The statistical significance of the calculated correlation. Indicates the likelihood the observed relationship is due to chance. For this study, any correlation with a significance of .05 or less is considered statistically significant; whereas any correlation with a significance greater than .05 is considered non-significant.

Peer States:

Kansas' peer states were identified via the methodology described here: <http://kasbresearch.blogspot.com/2014/07/knowning-your-peers.html>

Appendix B : Sample Info

The following table shows the number of observations for each measure or variable used in the analyses for the current study.

Variable / Measure			2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
National Assessment of Educational Progress (NAEP) - includes All, FRL Eligible, FRL Ineligible	Percent at Basic or Above	Combined	51		51		51		51		51		
		4th Math	51		51		51		51		51		
		4th Reading	51		51		51		51		51		
		8th Math	51		51		51		51		51		
		8th Reading	51		51		51		51		51		
	Percent at Proficient or Above	Combined	51		51		51		51		51		51
		4th Math	51		51		51		51		51		51
		4th Reading	51		51		51		51		51		51
		8th Math	51		51		51		51		51		51
		8th Reading	51		51		51		51		51		51
	Average (Mean) Score	Combined	51		51		51		51		51		51
		4th Math	51		51		51		51		51		51
		4th Reading	51		51		51		51		51		51
		8th Math All	51		51		51		51		51		51
		8th Reading All	51		51		51		51		51		51
		4th Science All	45		47								
	8th Science All	45		47		51							
American College Test (ACT)	Percent Meeting Benchmark	All 4	51	51	51	51	51	51	51	51	51	51	
		English	51	51	51	51	51	51	51	51	51	51	
		Mathematics	51	51	51	51	51	51	51	51	51	51	
		Reading	51	51	51	51	51	51	51	51	51	51	
		Science	51	51	51	51	51	51	51	51	51	51	
	Difference in Percent Benchmark	All 4	51	51	51	51	51	51	51	51	51	51	
		English	51	51	51	51	51	51	51	51	51	51	
		Mathematics	51	51	51	51	51	51	51	51	51	51	
		Reading	51	51	51	51	51	51	51	51	51	51	
		Science	51	51	51	51	51	51	51	51	51	51	
	Average (Mean) Score	Composite	51	51	51	51	51	51	51	51	51	51	51
		English	51	51	51	51	51	51	51	51	51	51	51
		Math	51	51	51	51	51	51	51	51	51	51	51
		Reading	51	51	51	51	51	51	51	51	51	51	51
		Science	51	51	51	51	51	51	51	51	51	51	51
	Difference in Average (Mean) Score	Composite	51	51	51	51	51	51	51	51	51	51	51
English		51	51	51	51	51	51	51	51	51	51	51	
Math		51	51	51	51	51	51	51	51	51	51	51	
Reading		51	51	51	51	51	51	51	51	51	51	51	
Science		51	51	51	51	51	51	51	51	51	51	51	
Scholastic Aptitude Test (SAT)	Average (Mean) Score	Combined		51	51	51	51	51	50	51	51		
		Mathematics	51	51	51	51	51	51	50	51	51		
		Reading	51	51	51	51	51	51	50	51	51		
	Difference in Average (Mean) Score	Writing		51	51	51	51	51	50	51	51		
		Combined		51	51	51	51	51	51	51	51		
		Mathematics	51	51	51	51	51	51	51	51	51		
	Reading	51	51	51	51	51	51	51	51	51			
	Writing		51	51	51	51	51	51	51	51			
Adjusted 4 Year Cohort Graduation Rate									48	48			
Percent 18-24 Year Olds with => H.S. Diploma			51	51	51	51	51	51	51	51			
Total Revenue Per Pupil, CPI2014, RPP			51	51	51	51	51	51	51	51			
Current Spending Per Pupil, CPI2014, RPP			51	51	51	51	51	51	51	51			
Spending on Instruction, CPI2014, RPP			51	51	51	51	51	51	51	51			

