

***IMPACTS OF PUBLIC EDUCATION
ACCOUNTABILITY INDICATORS ON TEST
SCORES AND POLICY IMPLICATIONS***

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ABSTRACT

Based on a sample of 64 parishes (counties) in the state of Louisiana during academic year 2000-2001 and applying the weighted least squares method, we find that a higher (IOWA) test score is associated with higher attendance indexes, better summer school programs, more certified teachers, higher teacher salaries, less spending per student, and lower poverty rates. The dropout index, the pupil-teacher ratio, and the percent of female students are insignificant. Therefore, teacher certification needs to be continued and strengthened, and teacher salaries need to be raised to the national level to retain or attract quality teachers.

INTRODUCTION

To improve the public education system and to create a productive workforce, the Louisiana legislature created the School and District Accountability Commission in 1997 to design and monitor the state's Public Education Accountability System. Among other things, the Commission published the district performance score (DPS) to analyze the strengths and weaknesses of public schools and districts. In the last several years, statistics indicate some progress and some concerns. The overall DPS increased from 69.4 in 1999 to 80.8 in 2001. In 2000-2001, 85% of teachers were fully certified, and the remaining had non-standard certification. Teachers possessing masters or doctoral degrees account for 37.5% of all teachers. The dropout rate decreased to 8.6% from 9.4%. The graduation rate rose to 92%, which was 1.2% higher over three years. The 2001 ACT score for Louisiana remained at 19.6, which was below the national average of 21.0. Fifteen percent of schools did not achieve required growth or declined, and they were placed under the categories of corrective actions I or II.

Because of the importance of academic performance in determining whether a student may be eligible for the state TOPS (Tuition Opportunity Program for Students) scholarship, it is time to examine possible relationships between test scores and these indicators in order to provide public policy makers insight in reviewing the strengths and weaknesses of public education. The paper has several unique aspects. First, the sample comes from all the parishes so that its outcomes can be applied to local school districts. Second, the paper considers several policy and socioeconomic variables such as percent of teachers certified, summer school programs, teacher salaries, spending per student, gender, and poverty rates. The sign and significance of each of these variables may have important policy implications. We may find some

answers as to how to allocate limited resources to competing needs to meet one of our goals of achieving a higher test score. The study applies the weighted least squares method so that standard errors are more efficient and unbiased and that hypothesis tests would be valid.

LITERATURE SURVEY

There are several recent studies on possible factors impacting test scores and other related subjects. Dynarski (1985) was among the first to investigate the determinants of SAT scores across states. According to his findings, a higher participation rate increased test scores. Other factors include higher teacher compensation, higher participation by private school students, more participation by population from central cities, a smaller proportion of black population, and a higher proportion of students living with both parents.

Sander and Krautmann (1991) examined three determinants for educational outcomes including ACT scores for the state of Illinois. They found, among other things, that higher ACT scores led to more job opportunities at the county level and that spending per student did not affect ACT scores. Instead, ACT scores were influenced by family background such as parent income and education, and the parent's marital status. Sander (1993) later did a second study to measure educational outcomes for the state of Illinois. He showed that higher teachers' salary led to higher ACT scores and that an increase in the student-teacher ratio caused the percent of college-bound students to decline. There is a need to examine the impact of TOPS on ACT scores since its inception in 1998.

Graham and Husted (1993) used the 1991 SAT scores across states as the dependent variable and found that state participation rates, parents' educational level, sex, race, and income are important determinants of SAT scores. Husted and Kenny (2000) examined the impacts of state regulation and subsidies on SAT scores. Their findings based on state SAT scores during 1987 - 1992 supported the hypotheses that some state regulations increase workloads and make school operations less efficient and that state programs to mitigate inequality in the education budget make voters less concerned about school quality.

Card and Payne (1998) studied the impact of state spending equalization on SAT scores and found that it reduced the disparity of test outcomes across districts and different background groups. Based on the experiment of the Tennessee STAR program, Krueger and Whitmore (2001) analyzed whether past experience of small classes would affect test outcomes and whether they would take an ACT or a SAT exam. They found that those children who had small class experiences scored better and had a higher probability to take an ACT or a SAT exam. Furthermore, the small class experience narrowed the test difference of the white-black group by 54 percent.

THE MODEL

Extending previous studies and based on educational and economic theories, test scores for a parish school district can be expressed as

$$\text{TEST} = f(\text{ATTEND}, \text{DROP}, \text{SSI}, \text{CERT}, \text{SAL}, \text{EXP}, \text{PUT}, \text{FEM}, \text{POV})$$

(1)

$$+ \quad + \quad + \quad + \quad + \quad ? \quad - \quad ? \quad -$$

where

TEST = test scores;
ATTEND = the attendance index;
DROPOUT = the dropout index (the higher the index, the more students stay in school);
SSI = summer school index;
CERT = percent of school teachers certified;
SAL = average teacher salary;
EXP = spending per student;
PUT = pupil-teacher ratio;
FEM = percent of female students; and
POV = the poverty rate.

We expect that higher test scores are associated with a higher attendance index, higher dropout index, better summer school index, more percent of certified teachers, higher teacher salaries, lower pupil-teacher ratio, and lower poverty rate. SSI refers to the remedial work in summer for those students who did not receive a passing grade during the regular school year. Thus, the summer school arrangement is expected to improve students' academic background and test scores. The certification of teachers is a core program of the state's accountability system so that teachers are qualified to teach in their disciplines or catch up with new knowledge or skills. Higher teacher salaries would lead to more satisfaction and devotion to classroom teaching. Therefore, we expect that higher teacher salaries would cause test scores to rise.

More spending per student may or may not raise students' test scores, depending upon whether the budget is used efficiently and effectively. If more resources are spent on non-academic items, there will be less effect on students' academic achievement.

We also test whether male or female students may score better. The 2001 *Digest of Education Statistics* shows that the American College Test (ACT) composite scores for male and female students in 2001 were 21.1 and 20.9, respectively. It seems that the difference may be too small to make any inference. High poverty rates may reflect more welfare recipients, single parents, or low-income families. We expect that poor families may have less resources to provide students needed support to improve academic performance and that such poverty negatively impacts test scores.

EMPIRICAL RESULTS

The sample consists of 64 parishes in the state of Louisiana during academic year 2000-2001. The poverty rate was taken from the Bureau of the Census, U.S. Department of Commerce. Other data came from the Department of Elementary and Secondary Education of Louisiana. In many previous studies, the ACT or SAT score was employed in evaluating students' academic performance to compare with other states. However, the available data for school districts refers to K-8. Therefore, the IOWA test score is used because students are required to take it in the 3rd, 5th, 6th, and 7th grades. The IOWA test is standardized nationally, and its test scores for Louisiana can be compared with other states and the national average. To avoid very small

regression coefficients, teacher salary, and spending per student are expressed in thousands of dollars.

Table 1 compiles basic statistics for the IOWA test index and explanatory variables. Some of the variables show large variations due to different social and economic conditions in the parishes. As shown, the IOWA index ranges from a high of 35.8 to a low of 9.7 with an average of 23.3. Percent of teachers certified varies from 44.2% to 98.6%. Teacher salaries varied from \$24,634 to \$36,028. Spending per student varied by as much as \$2,796 among parishes. Poverty rates show more disparity ranging from a low of 9.7% to a high of 40.5%.

Table 1
Statistics of the Variables: N = 64

	NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
The weighted least squares method is employed to estimate regression parameters. The multiplicative heteroske	TEST	64	23.32	5.41	29.24	9.70	35.80
	ATTEND	64	4.92	0.60	0.36	2.80	5.90
	DROP	64	7.04	1.95	3.80	0.00	9.80
	SSI	64	107.32	21.93	480.74	64.00	174.50
	CERT	64	86.61	11.43	130.56	44.20	98.60
	SAL	64	31.24	2.58	6.64	24.63	36.03
	EXP	64	6.05	0.59	0.34	4.96	7.76
	PUT	64	13.46	1.00	1.01	10.71	15.71
	FEM	64	48.72	0.81	0.66	45.60	51.00
	POV	64	21.96	6.26	39.14	9.70	40.50

dasticity model is applied to obtain unbiased standard errors for hypothesis tests. The results are reported in Table 2. As shown, the attendance index, the summer school index, percent of teachers certified, teacher salaries, spending per student, and the poverty rate are significant at the 1% or 2.5% level, whereas the dropout index, the pupil-teacher ratio, and percent of female students are insignificant at the 10% level. It is interesting to note that statistically spending per student has a negative impact on students' test scores. It may suggest that test scores are influenced not by the amount of spending but by how the budget is utilized effectively and efficiently to provide quality education. Based on the estimated coefficient, the IOWA test index is expected to rise by 2.014 if the attendance index increases by 1.0. If teacher salaries increase by \$1,000, the IOWA test index should increase by 0.360.

Table 2
Weighted Least Squares Regression: The dependent variable is the IOWA Test Index

Variable	Coefficient	T-Ratio
ATTEND	2.014	3.497
DROP	0.225	1.140
SSI	0.070	5.382
CERT	0.206	10.910
SAL	0.360	2.326
EXP	-2.531	-3.825
PUT	-0.488	-1.244
FEM	0.297	0.671
POV	-0.403	-6.395
CONSTANT	-9.383	-0.458
Adj. R2	0.596	
Log-likelihood	-154.178	

If the ordinary least squares method is employed, the results are poor or different in some aspects. The OLS estimates are unbiased. Because the standard error is biased, the t-test is invalid. In the OLS regression, only the attendance index, percent of teachers certified, and the poverty rate are significant at the 10%, 1% and 1% levels, respectively, and other explanatory variables are insignificant at the 10% level. Therefore, the choice of an appropriate econometric technique in empirical work may change statistical outcomes and conclusions.

In comparison, our study has similar findings as reported by Sander and Krautmann (1991) that income or poverty affects test scores and that higher spending per student did not improve test scores and by Sander (1993) that higher teacher salaries led to higher test scores. We also provide empirical evidence on whether other policy and socioeconomic variables would affect test scores.

SUMMARY AND CONCLUSIONS

In this study, we have examined the determinants of test scores for the state of Louisiana based on the state's 64 parishes for the academic year 2000-2001. We find that a higher test score is associated with a higher attendance index, better summer school programs, a higher percentage of teachers certified, higher teacher

salaries, lower spending per student, and a lower poverty rate. There are several policy implications. First, if there is more budget available for local schools, the first priority to be considered may be a pay raise for instructional teachers. When teachers receive higher pay, arguably, they are more satisfied and would provide better education for students. Second, the importance of having certified teachers, qualified to teach in their fields, cannot be understated. Clausen (Anderson, 2000) indicated that the “single most important factor in improving education is assuring that we have a qualified teacher in every classroom.” State and local governments should continue to improve and monitor this program in the expectation that public school teachers are qualified to teach and possess the ability to learn the latest developments in their fields. Third, the government needs to provide more support for the summer school program to render remedial education to those in need and to serve other useful functions as well.

There may be areas for future research. If the data is available, time series analysis at the state level may be considered in order to find potential changes in regression parameters. Some of other socioeconomic variables may be considered. A relatively high percent of welfare recipients in a parish may affect the environment for some of the students to pursue a better education. The number of single parents may be another variable to be considered due to its potential negative impact on student academic performance.

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