

The Relationship between Per Pupil Expenditures and Student Achievement in Tennessee

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Abstract

This study examined the relationship between high school student achievement, per pupil expenditure, school district enrollment, selected student demographics (economically disadvantaged, racial and ethnic groupings [African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White], limited English proficiency, and students with disabilities) and school district geographical location (West, Middle, East) in Tennessee. Two of the achievement tests given to Tennessee high school students are the ACT and TCAP writing assessments. These two measurements are found annually on the Tennessee Department of Education Report Card and are used in this study. There are 136 school systems in the state of Tennessee, with only 119 of those systems operating at least one high school. The 119 systems that operate at least one high school were examined in this study. Findings indicate that the average ACT score in Tennessee in 2008 was 20.7, and the average Writing Assessment average was 4.1. The average per pupil expenditure was \$8,345. This research revealed that per pupil expenditure did not have a significant relationship to ACT scores or to the TCAP Writing Assessment scores. An implication is that giving schools more money does not necessarily raise student achievement, but rather how the money is spent can raise student achievement. Keywords: Student Achievement, Education, Expenditure, Tennessee,

1. Introduction

Accomplishing the student achievement goals set forth in recent state and federal reforms will require that the revenues appropriated for education be spent more effectively [1]. The Tennessee Education Improvement Act (EIA) of 1992 and the Federal No Child Left Behind (NCLB) Act of 2002 are examples [2] of such reforms. Tennessee's EIA includes graduation requirements that are test-focused [2]. The Federal government's NCLB called for educational accountability with testing as the central theme [3]. The NCLB legislation also specifically requires a reduction in the achievement gap between subgroups of students who have traditionally performed well and those who have not performed well [4]. Although there has been a steady increase in education dollars per pupil over the past 100 years) the increases [1] average about 3.5% annually after adjusting for inflation. While revenues per pupil have increased consistently over time, there have not been corresponding increases in student achievement. Even though more students have been served and basic levels of achievement have raised, increases in student achievement have not increased relative to the increases in per-pupil revenues.

Socioeconomic challenges, such as the percentage of students eligible for free or reduced-priced meals or the adult unemployment rate, present the most persistent threats to high levels of student achievement [5]. For instance, eight of the thirteen states facing the worst rural socioeconomic challenges are located in the Southeast and Mid-South Delta, including [5] Mississippi, Louisiana, South Carolina, Alabama, Tennessee, Arkansas, North Carolina, and Georgia. The other regions of the United States represented in the top thirteen are Central Appalachia, which includes Kentucky and West Virginia, and the Southwest, which includes New Mexico, Oklahoma, and Arizona [5].

States with high concentrations of socioeconomic challenges are important to note because the performance of the economically disadvantaged subgroup [6] was the second most frequent reason for schools in Delaware, Pennsylvania, New Jersey, and the District of Columbia to not make adequate yearly progress due solely to one subgroup.

Tennessee is a state with a high concentration of socioeconomic challenges with a total public school average daily membership (enrollment) of 929,543 students [7]. Of the 929,543 students, 494,612 or 54.5% were considered economically disadvantaged. The major race or ethnic origin of the 929,543 students in Tennessee public schools during the 2007-08 school year were composed of the following: 235,526 (24.6%) were African American; 14,904 (1.6%) were Asian/Pacific Islander; 46,260 (4.8%) were Hispanic; 1,981 (.2%) were Native American/Alaskan; and 659,617 (68.8%) were White. Students with limited English proficiency totaled 30,680 of Tennessee students (3.2%), while 136,365 (14.7%) were identified as students with disabilities. The statewide average for per-pupil expenditures for the children in Tennessee public schools in 2008 was \$8,345 [7].

This study is an investigation of the relationship between high school student achievement, per pupil expenditure, school district enrollment, selected student demographics (economically disadvantaged, racial and ethnic groupings {African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White}, limited English proficiency, and students with disabilities), and geographic location (West, Middle, East) in the state of Tennessee. The following research questions guided the study:

1. Is there a relationship between high school student achievement as measured by the ACT and the TCAP Writing Assessment, per pupil expenditure, and school district enrollment in Tennessee?
2. Is there a relationship between high school student achievement (ACT and TCAP writing assessment scores), per pupil expenditures, school district enrollment, and selected student demographics (Economically Disadvantaged, Racial and Ethnic Groupings (African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White) Limited English Proficient, Students with Disabilities) in Tennessee?
3. Is there a relationship between high school student achievement (ACT and TCAP writing assessment scores), per pupil expenditures, school district enrollment, and selected student demographics (economically disadvantaged, racial and ethnic Groupings (African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, White) limited English proficiency, and students with disabilities) and school district location in Tennessee high schools?

The data analysis provides insight into the relationships and the discussion and conclusion supports the position that is not how much money is allocated to public education but how the money is spent in support of attaining educational goals in individual schools.

2. Review of Literature

Most Americans believe that students perform better in well-funded schools, and that public education should provide a level playing field for all children [8]. However, nearly half of funding for public schools is provided through local taxes in our country, resulting in great differences in funding between wealthy and impoverished American communities. Efforts to decrease these disparities through funding methods have surfaced at both federal and state levels, although these efforts have provoked controversy and have been resisted by powerful and wealthy persons [8]. Roughly \$440 billion was collected for public elementary and secondary education for the school year 2002-03. Funding by source for the 2002-03 school year included state sources funding 49%, local sources funding 43%, and federal sources funding 8%. Total revenues [9] were \$440 billion [9].

Expenditures per pupil varied widely prior to the establishment of the BEP for Tennessee public school systems [10]. Revenues still varied, however, as a result of a number of factors. Revenue for county and city school systems comes from state, county, and federal sources. A major difference is that cities in Tennessee that operate school systems regularly add considerable revenue to the school system above those obtained from these three sources. Additionally, city revenue and federal revenue essentially bear no connection to the levels of state and county revenue. The BEP establishes some relationship between state and county funding levels, although it does not result in full equity [10]. Policymakers should consider whether government-spending increases have led to improved student achievement [11]. This determination may better clarify whether future increases in education spending would yield substantial improvements for students.

Some studies of the effect of per-pupil expenditures on academic achievement find [12] either no relationship or a relationship that is weak or inconsistent while other studies conclude that increasing per-pupil expenditures had [13] a significance positive impact on student achievement. Despite the lack of consistent findings, leading researchers in the area acknowledge that any effect of per-pupil expenditures on academic achievement depends on how the money is spent, not on how much money is spent. The issue is getting productive uses from [12] current and added spending. The existing evidence basically indicates that the typical school system does not use resources well if promoting student achievement is their purpose [11].

Some research suggests that more money is needed [14] to hire bright and experienced professionals who produce higher levels of achievement and better-motivated students. In addition, those teachers who are academically more proficient, more experienced, better educated, and who work with smaller classes, are often associated with students who demonstrate significantly higher achievement. Also, the academic outcomes at all levels were influenced positively by the presence of expert teachers and to a somewhat lesser degree by attendance. Furthermore, the variable having the greatest impact on student performance at the elementary and middle school level was per pupil expenditure while attendance had the greatest impact at the high school level.

Accomplishing the student achievement goals of state and federal reforms will require [1] using the education dollar more effectively. While revenues per pupil increased consistently over time, there [1] has not been a matching increase in student achievement, even though more students are being served in schools and performance at basic levels has risen. Although more services have been provided to students with special needs, perhaps ensuring that overall achievement did not drop, the consistent rise in spending per pupil was not accompanied by a comparable rise in student performance, at least over the past 30-40 years. The result means that current education goals are not likely to be met without determining how better to use school resources [1].

3. Methods

This study is an investigation of the relationship between high school student achievement, per pupil expenditure, school district enrollment, selected student demographics (economically disadvantaged, racial and ethnic groupings {African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White}, limited English proficiency, and students with disabilities), and geographic location (West, Middle, East) in the state of Tennessee. The study used a quantitative research design. The objective of quantitative research is to determine the relationship between an independent variable and one or more dependent variables in a population. The quantitative research design used is descriptive and correlational and is used to establish associations between variables.

The population and sample in this study included the 119 school systems in Tennessee that operate at least one high school. Attending those schools (Tennessee Department of Education 2008) were 929,543 students and included in that population were 274,054 high school students. The entire population of high school students was used in the study [7]. Data for the study was collected from the Tennessee Department of Education's annual state report card on schools. The 2008 Report Card was released to the public on November 10, 2008. This annual comprehensive report card on pre-K through 12 education includes state and district-level information on student achievement, per pupil expenditures, school district enrollment, student demographics (economically disadvantaged, racial and ethnic groupings {African American, Asian/Pacific Islander, Hispanic, Native American /Alaskan, and White}, limited English proficiency, and students with disabilities).

4. Data Analysis and Results

In analyzing the data collected, correlational research methods were used to describe the relationship between variables. The researcher is interested in correlating high school student achievement (ACT scores and TCAP writing assessment scores), per pupil expenditures, district enrollment, selected student demographics (economically disadvantaged, racial and ethnic groupings (African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White), limited English proficiency, and students with disabilities), and school district geographical location (West, Middle, East) in Tennessee. Descriptive statistics were used to describe the population in this study and correlational analyses indicated the degree to which these variables relate to one another. The statistical software package, Statistical Package for the Social Sciences (SPSS), Version 17, was used for creating and saving data, and for analyzing data. Hierarchical multiple regression was the statistical procedure used to analyze the data.

Research Question 1

Is there a relationship between high school student achievement as measured by the ACT and the TCAP Writing Assessment, per pupil expenditure, and school district enrollment in Tennessee?

As indicated in Table 1, only 1% of the variance in ACT scores is explained by the combination of district enrollment and per pupil expenditures. District enrollment and per pupil expenditure did not have a significant unique influence on ACT scores.

Table 1

Hierarchical Multiple Regression of District Enrollment and Per Pupil Expenditure on ACT Scores (N = 119)

Variable	B	SEB	B	t
$(R^2 = .000)$				
District Enrollment	-1.38E-06	0	-0.02	-0.17
$(R^2 = .010)$				
District Enrollment	-3.91E-06	0	-0.05	-0.47
Per Pupil Expenditure	0.00E+00	0	0.10	1.09

Student achievement as measured by the TCAP Writing Assessment is detailed in Table 2. As Table 2 indicates, when district enrollment is the only variable in the model, 5.6% of the variance in TCAP writing scores is explained by district enrollment. When per pupil expenditure is added to the model, 7.3% of the variance in TCAP writing scores is explained by the combination of district enrollment and per pupil expenditures. In the presence of the other variable in the model (per pupil expenditure), school district enrollment had a significant positive relationship on TCAP writing assessment scores.

Table 2

Hierarchical Multiple Regression of District Enrollment and Per Pupil Expenditure on TCAP Writing Assessment Scores) N=119)

Variable	B	SEB	B	t
$(R^2 = .056)$				
District Enrollment	3.23E-06	0	0.237	2.64**
$(R^2 = .073)$				
District Enrollment	2.72E-06	0	0.199	2.12*
Per Pupil Expenditure	2.88E-05	0	0.134	1.44

** $p < .01$, * $p < .05$.

Research Question 2

Is there a relationship between high school student achievement (ACT and TCAP writing assessment scores), per pupil expenditures, school district enrollment, and selected student demographics (Economically Disadvantaged, Racial and Ethnic Groupings {African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and White} Limited English Proficient, Students with Disabilities) in Tennessee?

To answer the second research question, the researcher performed a hierarchical multiple regression analysis with these additional variables to determine their relationship to ACT scores. Table 3 details the various models as selected student demographics are added. Model 1 accounts for only district enrollment, with $R^2 = .000$, indicating that no relationship exists between school district enrollment and ACT scores. Various ethnic groups, including African American, Asian American, Hispanic, and Native American, are added in Model 2. With the selected racial groupings added in the model, $R^2 = .473$, indicating 47.3% of the variance in ACT scores explained by the addition of the selected racial groupings. Model 3 features the addition of the percentage of economically disadvantaged students. When the variable of economically disadvantaged is added to the model, $R^2 = .543$, meaning that 54.3% of the variance in ACT scores is explained by the combination of district enrollment, selected racial groupings, and percentage of economically disadvantaged. Notably, when the variable of economically disadvantaged was added, an additional 7% of the variance in ACT score was explained. The variable for Limited English Proficiency was added in Model 4, with $R^2 = .545$, resulting in a change in R^2 of only .002. Model 5 accounts for the addition of the percentage of Special Education students.

With the addition of this variable, there was no change in R^2 . Model 6 details the addition of per pupil expenditure, indicating $R^2 = .555$. In other words, the combination of all variables in Table 9 accounts for 55.5% of the variance in ACT score. Table 9 also reveals that in the presence of other variables, the variables of district enrollment, African American percentage, and economically disadvantaged had significant negative influences on ACT scores. In the presence of other variables, the percent of Asian American students had a significant positive relationship to ACT scores. When all variables were added to the model, including district enrollment, percentage of African American students, percentage of Asian American students, percentage of Hispanic students, percentage of Native American students, percentage of economically disadvantaged students, percentage of limited English proficiency students, percentage of special education students, and per pupil expenditure, the group of variables accounted for 55.5% of the variance in ACT average.

Table 3
Hierarchical Multiple Regression of District Enrollment and Per Pupil Expenditure on ACT Scores (N = 119)

Variable	B	SEB	B	t
$(R^2 = .000)$				
District Enrollment	-1.38E-06	0	-0.02	-0.17
$(R^2 = .473)$				
District Enrollment	-2.20E-05	0	-0.254	-2.774**
African American %	-0.027	0.006	-0.37	-4.694**
Asian American %	1.003	0.123	0.707	8.151**
Hispanic %	0.02	0.03	0.049	0.652
Native American %	0.025	0.518	0.003	0.048
$(R^2 = .543)$				
District Enrollment	-2.02E-05	0	-0.234	-2.718**
African American %	-0.016	0.006	-0.223	-2.726**
Asian American %	0.661	0.142	0.466	4.664**
Hispanic %	0.023	0.028	0.058	0.821
Native American %	-0.007	0.484	-0.001	-0.014
Economically Disadvantaged %	-0.034	0.008	-0.359	-4.134**
$(R^2 = .545)$				
District Enrollment	-2.13E-05	0	-0.246	-2.796**
African American %	-0.016	0.006	-0.223	-2.711**
Asian American %	0.648	0.143	0.457	4.526**
Hispanic %	-0.029	0.081	-0.074	-0.362
			0.006	0.091

(Table 3 Continues)

(Table 3 Continued)

Variable	B	SEB	B	t
District Enrollment	-2.13E-05	0	-0.246	-2.764**
African American %	-0.016	0.006	-0.223	-2.699**
Asian American %	0.648	0.144	0.457	4.495**
Hispanic %	-0.029	0.082	-0.074	-0.36
Native American %	.046	.498	.006	.092
Economically Disadvantaged %	-0.034	0.008	-0.367	-4.129**
Limited English Proficient %	0.081	0.118	0.146	0.688
Special Education %	0	0.026	-0.001	-0.014

 $(R^2 = .555)$

District Enrollment	-2.04E-05	0	-0.236	-2.661**
African American %	-0.018	0.006	-0.244	-2.935**
Asian American %	0.552	0.156	0.389	3.534**
Hispanic %	0.003	0.084	0.007	0.035
Native American %	0.105	0.496	0.014	0.211
Economically Disadvantaged %	-0.037	0.009	-0.4	-4.404**
Limited English Proficient %	0.039	0.12	0.071	0.326
Special Education %	-0.009	0.026	-0.023	-0.332
Per Pupil Expenditure	0	0	0.124	1.55

** $p < .01$, * $p < .05$.*Research Question 3*

Is there a relationship between high school student achievement (ACT and TCAP writing assessment scores), per pupil expenditures, school district enrollment, and selected student demographics (economically disadvantaged, racial and ethnic Groupings {African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, White} limited English proficiency, and students with disabilities) and school district location in Tennessee high schools? To answer this question, Table 4 describes the influence of school district geographical location on ACT scores. When geographical location is added to the regression model, $R^2 = .560$, indicating that the set of variables including school district geographical location accounts for 56% of the variance in ACT scores, indicating a change of 1.5% of the variance in ACT scores when school district geographical location is added.

Table 4

Multiple Regression Analysis of the Influence of District Location on ACT Scores (N=119)

Variable	B	SEB	B	t	
District Enrollment	-1.81E-05	0	-0.209	-2.315	*
African American %	-0.023	0.008	-0.312	-2.75	**
Asian American %	0.562	0.156	0.396	3.593	**
Hispanic %	0.01	0.083	0.026	0.125	
Native American %	0.211	0.496	0.028	0.425	
Economically Disadvantaged %	-0.038	0.009	-0.404	-4.384	**
Limited English Proficient %	0.039	0.12	0.07	0.325	
Special Education %	-0.002	0.027	-0.005	-0.069	
West vs. Middle	-0.402	0.248	-0.161	-1.624	
West vs. East	-0.16	0.268	-0.065	-0.597	
Per Pupil Expenditure	0	0	0.124	1.45	

** $p < .01$, * $p < .05$.

4. Discussion and Conclusions

The main purpose of this study was to examine the relationship between Tennessee school systems per pupil expenditures and high school student achievement based on ACT scores and the TCAP writing assessment. There were districts in Tennessee who had above average per pupil expenditures but did not reach above average levels in high school student achievement.

When analyzing the data to answer the first question in this study, the researcher found that per pupil expenditures and district enrollment did not have a significant, unique relationship to high school student achievement as reflected by ACT scores. Secondly, the researcher found that per pupil expenditures did not have a significant relationship to TCAP writing assessment scores, however school district enrollment did have a significant positive relationship to TCAP writing assessment scores. When looking at the second question in this research, district traits were examined to determine their relationship to high school student achievement in Tennessee. This researcher identified a major student demographic, economically disadvantaged, that had a direct relationship to high school student achievement. Overwhelmingly, the indicator of economically disadvantaged appeared to have the greatest impact on student achievement levels. When considering the findings of the second research question, policy makers should look at how dollars are spent to address the needs of those systems with a large percentage of students who are economically disadvantaged.

Next, the racial/ethnic subgroup of Asian/Pacific Islander had a positive relationship to student achievement. Those school systems in Tennessee with a higher population of Asian/Pacific Islander had higher levels of student achievement as reflected on Act scores and TCAP writing assessment.

Finally, the following relationships were found not significant with regard to one or both of the indicators of high school student achievement in Tennessee during the 2007-08 school year: African American percentage and TCAP writing; Hispanic and Native American percentage and ACT scores; Hispanic and Native American percentage and TCAP writing; white percentage and TCAP writing; ethnic minority percentage and TCAP writing; limited English proficiency percentage and ACT and limited English proficiency and TCAP writing; special education percentage and ACT and special education percentage and TCAP writing. This study focused on the possible relationship among high school student achievement (ACT and TCAP writing assessment scores), per pupil expenditures, school district enrollment, selected student demographics (economically disadvantaged, racial and ethnic groupings {African American, Asian/Pacific Islander, Hispanic, Native American/Alaskan, and white}, limited English proficiency, and students with disabilities) in Tennessee.

The No Child Left Behind Act of 2002 required school systems to look at the achievement levels of racial and ethnic groups of students for the first time. In the current educational environment, schools and school systems that do not meet student achievement benchmarks face consequences that can greatly affect resource allocation. With a clearer understanding of how the variables in this study affect student achievement, policy makers can make more informed decisions when it comes to resource allocation. A significant finding in this study was the impact of socioeconomic level on student achievement. Students from low socioeconomic families are truly at a disadvantage academically. As a result, one suggestion that emerged from this study was that school systems should spend resources on staff development designed to help staff understand problems that economically disadvantaged students bring to school. School systems should also look at allocating resources appropriately so that the achievement needs of economically disadvantaged kids are addressed.

For our country to continue to be the land of opportunity and for Tennessee to be a state where economic growth thrives, expenditures in public education must be adequate. With adequate expenditures, the challenge for educational policymakers is then to maximize the use of these expenditures to achieve the highest possible level of student performance. When all students are achieving at high levels, they will then have more opportunities for their future and the quality of life for all of society will improve.

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