Effects of Instructional Expenditures on Educational Outcomes in Mississippi Public Schools

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EFFECTS OF INSTRUCTIONAL EXPENDITURES ON EDUCATIONAL
OUTCOMES IN MISSISSIPPI PUBLIC SCHOOLS

by
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Abstract

This thesis examines the relationship between school funding and student success in public schools in Mississippi. Data for 200 public high schools were obtained upon request from the Mississippi Department of Education, including information about school budgets, average composite ACT scores, graduation rates, and other factors. Regression analysis was conducted with the data to determine which factors might influence the success of students, with an initial emphasis on school funding. The findings indicate that allocation of school funding may have a relationship with student success as measured by ACT scores and graduation rates, but that the relationship becomes more difficult to identify as more variables are added. Additionally, the findings indicate that schools with a high proportion of students living below the poverty line struggle with student success, indicating that family resources may be more influential than any factors within the education system itself. It is recommended that the state implement a more flexible funding system whereby schools are able to receive and utilize funding based on their specific needs, as opposed to the current formula for school funding which uses a base student cost.
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**Introduction**

There are few topics that have been as consistently and passionately discussed throughout history as public education. From what schools should be teaching students, to how they should accomplish it, to what role, if any, standardized tests should play in determining whether students have been adequately prepared for further studies, there is no shortage of spirited debate surrounding the education of youth. This is unsurprising, considering the importance of education, the doors that a high-quality education can open for students, and the current perceived failures of the public education system in the United States. In 2013, while addressing a philanthropy roundtable, future United States Secretary of Education Betsy DeVos said, “…traditional public schools are not succeeding. In fact, let’s be clear, in many cases, they are failing” ([Interview with Betsy DeVos](https://www.edelmans.com/2013/02/betsy-devos-on-public-ed/), 2022). While politics and differing opinions about the way to correct the issues with public education differ, the consensus seems to be that the country’s current setup needs improvement, and the numbers back up this sentiment.

In the past, the United States has led in student achievement and held its own as a world leader in public education ([Amadeo, 2022](https://www.amadeo.com/economy/education/)). Recently, though, the country’s progress in education has become stagnant at best. Test scores in mathematics and science have dropped or stayed the same over the years, while other countries continue to raise the bar and are now setting the standard for what it looks like to be on the cutting edge of education ([Amadeo, 2022](https://www.amadeo.com/economy/education/)). In the most recent scores on the Program for International Student Assessment (PISA), the United States ranked 11th out of 79 countries in science, and 30th in mathematics, with scores slightly above the average
score for all countries (Amadeo, 2022). While these scores are not necessarily bad, they are also not an improvement over the scores released in 2003 or 2006. Meanwhile, other countries are steadily improving their performance and have pushed the United States out of the upper echelon of test scores in recent years.

Understandably, many are frustrated with the lack of progress that the United States’ public education has been experiencing. After all, education is a key investment in human capital for any society. Many fear that if the United States continues to fall behind in education it will begin falling behind in the global economy as well, potentially losing jobs to more qualified candidates from better-educated countries. There are many opinions about which factors of the country’s education system should be changed to achieve better outcomes for students and remain competitive. One such factor that comes up frequently is that of school funding. Funding for public schools has long been a subject of debate, with some arguing that funding all schools fairly and equally is the key to creating the change that is needed in the public education system. A great deal of research has looked at the effects of school funding on student outcomes, with varied results.

Additional factors that influence the outcomes of students have been explored, with state departments of education keeping track of everything from the average experience of teachers to the number of advanced courses offered to students. Some factors outside of the classroom have even been identified as having a significant impact on the education of students. Specifically, a great deal of research has been done to determine the relationship between poverty and educational outcomes. This research has tended to find that factors outside of the classroom have a strong influence on learning.
and education, perhaps more than any factors in the classroom or the education system in general.

This thesis seeks to apply existing research methods to the public school system in Mississippi, a notoriously underfunded and underperforming system that regularly ranks among the worst in the country. In applying regression analysis to the state’s public high schools, insight might be gained as to what factors most strongly influence education in the state and what solutions might enable the state to improve its ability to educate its students.
Literature Review

When considering the ubiquitous impacts of education both on students and on society, the emotional nature of the issues surrounding equitable education, and the many differing opinions about the public education system in the United States, it is not particularly surprising that there has been a similarly wide range of academic research regarding the factors that matter most when it comes to maximizing student success. Much of this research focuses on identifying factors that better or worsen the quality of student outcomes; the purpose of this thesis is to apply methods used in previous research to public schools in Mississippi.

Defining Student Success

A key preliminary task in beginning to look at factors influencing student success is to actually define student success. Public school is compulsory in Mississippi for students age 6 – 17 (MS Compulsory School Attendance Law, 2013), but this does not mean that students’ reasons for attending school or their hopes for what they will get out of their education are uniform. Some students, for example, may be required to take a college entrance exam despite having no interest in attending college (Perna & Thomas, 2007). Their results on the test are likely not a great indicator of how successful they will be in the future. Similarly, there are some students who enter the workforce or the military directly after high school (Kleykamp, 2006). This could bring down a school’s 2- and 4-year college enrollment rates, but that does not mean that these students are not successful, or that their school has not prepared them for the future that they desire for themselves. Situations like these present a challenge for those wishing to study student
outcomes, since it becomes difficult to identify one metric by which to compare students in a meaningful way. On some occasions, educational research takes a holistic view of the benefits and drawbacks of public education, often using qualitative methods to identify positive psychological and sociological effects. On the other hand, many studies have made use of quantitative methods using data including standardized test scores, graduation rates, and 4-year or 2-year college enrollment rates to deem students successful or unsuccessful. Both qualitative and quantitative methods can yield useful and interesting results about student success in public schools.

Qualitative research tends to focus more on the overall wellbeing of students or a more holistic view of what it means for a student to be successful. Qualitative methods may allow researchers to gain a broader understanding of students’ motivations and views on their education and what it means for their future as an individual. For example, one study conducted interviews with first-generation college students to better understand their perspectives on college readiness and found that a wide variety of factors, such as learning time management skills, study skills, self-advocacy skills, and goal-setting skills frequently came up as being factors that influence a student’s college readiness (Byrd & Macdonald, 2005). Additionally, a study utilizing interviews with introductory course professors at universities and high school educators found that educators overwhelmingly support the evaluation of a school’s ability to teach “key cognitive strategies” that may enable students to take in material more efficiently rather than utilizing test scores, courses taken, or GPAs to measure student success (Conley, 2007). These studies provide examples of how quantitative methods may place too little emphasis on or even fail to identify factors that may strongly influence a student’s educational success. There are
challenges associated with these methods, however, with the main one being that this type of research may be seen as subjective and does not typically receive as much attention as research utilizing quantitative data. For example, a review of Mississippi’s report card system used to assign schools a grade on an A to F scale reveals that the factors included in the calculation of this grade are all quantitative—reading, math, and science proficiency measured by performance on state tests; college readiness measured by performance on the ACT; and graduation rate (Mississippi Department of Education, 2020). Thus, though qualitative data and methods may be able to provide a more holistic view of what it means for a student to be successful and allow researchers to gain insight as to what factors outside of test scores and graduation rates may be useful in determining student success, policymakers and researchers continue to stick largely with quantitative data and methods when researching public education.

Many studies have made use of quantitative methods in their analysis of student success. One of the major sources of data in studies of this nature is standardized test scores such as those from the SAT, the ACT, or mandated state tests. Standardized test scores have their own set of controversies to contend with; opponents have frequently asserted that they put minority and low-income students at a disadvantage (Camara & Schmidt, 1999; Dixon-Roman, 2013; Goldfarb, 2014). Even if these issues did not exist, some students do not care about their performance on tests like the ACT or SAT because they have no desire to attend college. For this same reason, percent enrollment in a four-year college does not take into consideration that some students desire to immediately enter the workforce following graduation, or that many students do not attend four-year college immediately for a variety of reasons (Mann, 1924). Overall, there are many
arguments against using standardized tests as an indicator of student success or a
predictor of how well a student is likely to perform academically in college.

Despite this, there have been many studies that have used standardized test scores,
graduation rates, or percentage of students enrolled in college upon graduation as a proxy
for student success, examining how these factors change in response to changes in
funding, curriculum, extracurricular engagement, or any number of other explanatory
factors. This is because of the fact that, in theory, standardized tests and graduation rates
provide a level playing field for all students; therefore, scores on these tests and
graduation rates should provide reliable information about a student’s level of success in
their high school environment. This does not always turn out to be true in practice, but
continues to be the dominant method by which policymakers and departments of
education judge their schools. Methods used for determining relationships between
student success and other variables frequently involve using regression analysis to
determine the relationships between variables and the extent to which these relationships
can be explained by the explanatory variables. Ultimately, it is difficult to define what it
means for a student to be successful, but some measures can serve as a fair proxy for
student success when conducting research pertaining to public education.

**Educational Outcomes in Mississippi**

Analysis of student success in schools in Mississippi paints a fairly bleak picture
of the state’s public education system. For years, headlines and data have placed
Mississippi last or close to last in the country when it comes to education. In 2013, the
state placed 50th in Education Week’s *Quality Counts* report (*Mississippi Ranks 35th*,
2021). The report takes into account a wide variety of factors that may influence a state’s
educational outcomes and includes school funding and allocation of funds, measures of equity among students, achievement on standardized tests, graduation rates, and opportunities to take advanced classes (EdWeek Research, 2021).

Recently, the state has made some improvements regarding educational outcomes for its students. In 2021, the same report ranked Mississippi 35th in the country with a grade only a few points below the national average (Mississippi Ranks 35th, 2021). The report highlights Mississippi’s improvements in equality of education and performance on the National Assessment of Educational Progress (NAEP), an assessment which is frequently referred to as the “Nation’s Report Card”. Mississippi had the second-best improvement behind Illinois in closing the achievement gap, being one of only four states to do so. In addition, the state had the most improvement on NAEP scores (Mississippi Ranks 35th, 2021). While this progress is certainly encouraging, it still places Mississippi in the bottom half of the rankings for states and behind the national average. There is still work that can be done to improve the state’s educational outcomes and ensure that its students are receiving the best education possible.

Public School Funding

An understanding of how schools are funded is central to the task of determining how school funding influences education. Public schools in the United States are funded using a combination of federal, state, and local funds. On average, local government and state government funding make up about 90% of school funding, with federal making a smaller contribution of about 10% (Hanson, 2021). These numbers can vary from state to state, and some states may have different rules governing the use of public education funds.
Federal funding for schools is almost entirely provided by income tax. Typically, federal funds are more targeted than state and local funds; this is because federal funding is reserved for the purpose of attempting to equalize disparities and help out states whose funding is particularly low. This explains why Mississippi, a state which has the highest poverty rate in the nation at 19% (U.S. Census Bureau, 2021), receives a significantly larger proportion of its school funding from federal funds; about 17% of school funding in the state comes from the federal level, compared to 10% on average (Hanson, 2021). Federal funding includes funding that is specifically targeted towards low-income students whether through a schoolwide program (for schools whose percentage of students eligible for free and reduced price lunch is above 40%) or through a targeted program designed to aid low-income students who attend schools with a less than 40% of students eligible for free and reduced price lunch. There are currently 728 elementary, middle, and high schools of the 1,063 schools in Mississippi receiving schoolwide Title I funding (Title I, Part A, 2021).

Nationally, state and local funding tends to make up a much larger portion of the overall budgets for education than federal funding. Local funds for public schools contribute about 43% of school funding and generally come from property taxes (Hanson, 2021). This can present difficulties for communities with lower property values (usually areas with high poverty levels), as it is more difficult to raise sufficient local funds for public schools through a property tax. State funding, which is raised through sales taxes, income taxes, or lotteries, is designed to help solve this problem. It makes up on average approximately 47% of funding for public schools.
In Mississippi, public schools are funded using a formula known as the Mississippi Adequate Education Program (MAEP). The program starts with a base formula that calculates a basic amount required to educate a student in Mississippi; this amount includes funding for teacher salaries, instructional materials, and basic operating costs for the school. To determine this base amount, the state first identifies successful schools, defined as a school which the state assigns a grade of C or better (Hall, 2018). From these schools, the state looks at a variety of factors like teacher to student ratios, administrator to staff ratios, maintenance and operations spending per square foot of building space, and librarian to student or counselor to student ratios and uses these measures to determine whether the school is efficient (Hall, 2018). Upon identifying efficient schools, the state looks at their costs for each of the components of MAEP in order to determine how much money it takes for a district to offer “adequate educational opportunity”. Schools receive an additional 5% of the per-student cost for each student that is considered to be low-income (Hall, 2018). Add-ons to MAEP also exist to fund transportation, special education, vocational education, alternative education, and gifted education (Hall, 2018).

There are several rules that Mississippi has implemented in addition to MAEP. Specifically impactful when it comes to school funding in Mississippi is a set of two rules known as the 27 Percent Rule and the 28-Mill Rule (Parents’ Campaign, 2021). Under the 28-Mill Rule, districts are required to contribute raise property tax of at least $28 of every $1,000 of property value. This rule is designed to ensure that districts are providing funding at a base level; however, districts are not limited to putting $28 of every $1,000 in property value towards education. This opens up the possibility that wealthier districts
are able to raise more tax dollars for education while still receiving funding from the state. The state also implemented the 27% rule, which caps the amount of funding that a district must provide from local taxes to fund its schools at 27% of the base student cost determined by MAEP; however, this means that wealthier districts which could provide a higher percentage of their budget from local taxes are still receiving money from the state, leading some to question the equitability of this rule and how it advantages wealthier school districts (Royals, 2021).

Unfortunately, MAEP is rarely fully funded at the level that the program determines. Since it began in 1997, the formula has only been fully funded four times; in other years, the base student cost actually provided for by the state has been less than the amount recommended by the formula in MAEP (Royals, 2021). This has led to many calling for a reevaluation of the state’s funding method for education.

In addition to a knowledge of how schools are funded, it is important to have an understanding of how those funds are allocated as well. States tend to break down their education budgets into more specific categories. In Mississippi, the major budget categories are instructional, food services, transportation, student support, other programs, administration, and plant operations (including maintenance). The focus of this thesis is on how instructional expenditures impact student success, so it is important to have an understanding of what aspects of school funding go into this budget category. In Mississippi, instructional expenditures are defined as expenditures that go towards “salaries for teachers in elementary, middle, high, and alternative schools; classroom assistants for elementary and special education programs; employee benefits; textbooks
and other supplies” (Mississippi State Legislature, 2021). This budget category should be representative of any expenditures that directly impact student instruction.

School funding can be complex, and specifically in Mississippi the formulas used to determine how schools should be funded, coupled with the fact that schools rarely actually receive the amount of funding recommended by the formula and the additional rules designed to decrease disparities in public education, cause gray areas in how funding is distributed and allocated among schools and programs.

**Impacts of School Funding on Student Performance**

School funding is one of the most frequently debated issues in education research and policymaking. There are those who believe that many problems found in public schools could be solved if schools only received more funding. In contrast, some have gone so far as to claim that funding has a negligible impact on quality of education after a certain baseline funding level is reached.

One of the most influential early studies regarding school funding occurred in 1966 with the Coleman Report. This report was conducted at the request of Congress when the Civil Rights Act of 1964 was passed and was designed to determine whether minority students had equal access to educational opportunities. While the report did indeed find that minority students are disadvantaged and tend to perform at a lower level, there were also other interesting findings pertaining to school funding. The authors of the report wrote that “schools bring little influence to bear on a child’s achievement that is independent of his background and general social context” (Coleman, 1966). The implications of this were that not only does a student’s background matter when it comes to educational opportunity, but also that no amount of funding from schools was found to
change this. Since the Coleman Report, many studies have found similar results. One study particularly highlights the impact of per pupil expenditures (a common metric used in determining whether a school is sufficiently funded) in Tennessee on college readiness, using ACT scores to represent college readiness. The study found no statistically significant impact of per pupil expenditure on college readiness (Bibb, 2012).

Despite the fact that there is a large body of research which finds that funding does not strongly impact educational outcomes for students, there are still those who continue to advocate for more school funding, and there is research that backs up claims that increasing school funding does in fact improve educational success rates for students. For example, one California study found that changing the amount of educational expenditures does have a statistically significant impact on results on standardized tests (Sebold & Dato, 1981). Additionally, there are several studies which found that an increase in funding could be tied to an increase in student success, or, similarly, that a lack of school funding is tied to a less successful student population (Sweetland, 2015; Lee, 2012; Hanushek, 1997).

Another factor to consider when looking at the impacts of funding on performance is the allocation of funding. In other words, once the amount of funding has been decided upon, which functions and programs it goes towards. One of the more notable ideas in the allocation of school funding is known as the 65 Percent Rule. This rule does not say anything about the amount of funding that a school receives, but rather asserts that it is the allocation of funding that matters. The rule proposes that a school district should devote 65% of its funding to instructional expenditures, leaving the other 35% to cover administrative costs, building maintenance, and other expenses. The
literature is divided on support of the use of the 65 Percent Rule. For example, a St. Louis area case study finds that, while increasing educational funding does not impact student outcomes past a certain point, the 65 Percent Rule seems to provide a good guideline for how much of their school funding districts should be putting directly towards student instruction. The findings also suggest that factors outside of the classroom such as environmental factors and family background are much more important in determining a student’s success (Antle, 2019). Others, however, have argued against the use of such strict rules for allocating funding, citing a need for different districts to have the freedom to allocate their funding in a way that makes the most sense for them (Leachman, 2006; Standard and Poor’s, 2005). Clearly, there are many debates regarding the efficacy of policies that increase school funding as well as how schools should be allocating their school funding. Certainly, funding matters to some extent; the question that divides policymakers and researchers is to what extent it does.

**Other Factors Influencing Educational Outcomes**

While funding is certainly an integral part of many conversations about the public education system, studies have identified several other factors that could influence student outcomes, with some coming to the conclusion that funding has a negligible impact on student outcomes. Factors outside of the school environment have been found to strongly influence student performance and success as well, with some research suggesting that these factors might have an even stronger impact on students than any internal factors within the public education system.

One of the factors that comes up most frequently as a determinant of student success is the socioeconomic status of the family. Over and over again, studies have
found that students who come from low-income families struggle in public schools (Jensen, 2013; Effects of Poverty on Education, 2013). One study looks at the performance of students who have jobs to help support their families compared to students who do not work. The study finds that there is a statistically significant negative relationship between the number of hours worked per week and the grade point averages of high school students (Singh, Chang, & Dika, 2007). The study also touches on the implication that the students who work long hours in high school are frequently students who come from lower-income families. The findings of this study support the assertion that student success can be negatively impacted by poverty in the family.

Additionally, low income has been identified as a driver of several other factors frequently used in measuring student success. For example, one study identifies five drivers of the graduation rate: economic factors, demographic factors, the “ninth grade factor”, the attendance factor and student engagement, and the course failure factor (Ritter, 2015). This study found that “students who live in poverty are at high risk of dropping out of high school” (Ritter, 2015), and that these students then continue in a cycle of poverty. It also found that falling behind early on in school reduces the chances of graduating (hence the importance of the ninth grade year), that engagement in school increases the chances of graduating, and that these factors are in turn heavily influenced by race, gender, and socioeconomic status.

There are many studies that bring up factors such as gender, race, ethnicity, and home life when discussing student performance. In 2020, Soares found a relationship between student success and several different factors by looking at the ACT and SAT scores of students. The results show that students below the 90th percentile of the income
distribution are disadvantaged on such tests, as are Hispanics, African Americans, and women (Ovaska, 2015; Soares, 2020). These disparities do not begin in high school, either. Research has been conducted that finds that, as early as kindergarten, students’ success (in this case measured by reading proficiency) is heavily impacted by factors outside of the classroom, including their family’s income and other factors related to the students’ lives at home (Aikens & Barbarin, 2008).

It is easy to see why such a large amount of research looking at factors that most contribute to student success exists. Every factor that has been identified as influencing educational outcomes is in turn related to many other factors both inside and outside the classroom, making educational success not only a complicated issue but also one with no simple solution. Some continue to point to a lack of sufficient school funding as a detriment to student success, while others assert that the effects of funding are negligible, and that there are many more important factors at play, with the most frequently cited being the student’s family income and home life. The question that policymakers are faced with is which factors matter the most when it comes to educating the students in the United States, and what policies provide the most equitable and efficient access to high quality education. With these debates about the efficacy of Mississippi’s current school funding program and proposed alternatives in mind, it is possible to move forward with analysis of the impacts of funding on public schools in the state.
Methodology

This thesis makes use of a wide variety of data about public schools in Mississippi, including information about expenditures, total enrollment, demographics, teachers, and administration available on the Mississippi Department of Education’s website. Additionally, ACT composite and section scores and breakdowns of expenditures into three categories – instructional expenditures, administrative expenditures, and other expenditures – were requested and obtained from the Mississippi Department of Education. For some schools or districts, there was a large amount of missing data present in the data set; if after searching for the missing information the data were still not found, the data for that school were dropped from the data set. Additionally, the data set included information on all public schools in Mississippi, including elementary, middle, high, and alternative schools. Since the focus of this thesis is on ACT scores and graduation rates, all elementary, middle, and alternative schools were dropped from the data set. Despite these changes, in all, data were able to be obtained for 200 public high schools serving 131,928 students in 134 school districts from all over the state. Summary statistics for several key variables are presented in Table 1.

With an exceptionally large number of combinations of dependent and explanatory variables possible, a set of consistent dependent variables needed to be selected in order to ensure coherent comparisons when looking at different explanatory variables. Despite the issues associated with attempting to consider student success synonymous with a single variable or a combination of variables, there are compelling reasons for using this type of data for judgments of success, as this paper does. First, the
ACT is administered to all students in Mississippi public high schools during the spring of their junior year (ACT State Testing, 2021). This convenient fact ensures that, for the vast majority of public schools in the state, it is possible to obtain detailed information about a school’s test scores, including averages for composite scores as well as for each individual section. Additionally, ACT scores and graduation rates are used frequently in research using similar methods to this one because they provide a number by which schools can be easily compared. This results in regression analysis that is simple to implement and to interpret. Finally, and perhaps most importantly given the purpose of this thesis, data such as ACT scores and graduation rates are, as discussed in the literature review, one of the variables that the state keeps track of and that some studies place a great deal of emphasis on. Since these are the data that policymakers and educators are focused on, it makes sense for this thesis to focus on that information as well. For these reasons, two variables, composite ACT scores and high school graduation rate, will be used as indicators of student success.

This thesis’s primary method of analysis is ordinary least squares regression analysis using the regression software Gretl. After selecting dependent variables, several combinations of explanatory variables were included in regressions in order to determine which variables most strongly impact student performance. The variables tested included the proportion of experienced teachers at a school, per pupil expenditures, proportion of the total budget allocated to instruction, proportion of the total budget allocated to general administrative expenses, and the average number of years of experience of the teachers at a school. Additionally, indicators were added for schools that have been identified by the state as high-poverty schools or low-poverty schools. The indicator is 1 for schools that
meet the criteria for high or low poverty, and 0 for all other schools. For example, a school that received a 0 for both the high poverty and low poverty indicators is neither a high-poverty school or a low-poverty school. The state’s criterion for a school to be considered “high-poverty” is that 40 percent or more of the school’s students eligible for free and reduced-price lunch. For a school to be considered “low-poverty”, fewer than 10 percent of the students must be eligible for free and reduced-price lunch.

<table>
<thead>
<tr>
<th>Table 1 - Summary Statistics for Key Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation Rate</td>
<td>85.34</td>
<td>86.49</td>
<td>6.75</td>
<td>59.53</td>
<td>97.10</td>
</tr>
<tr>
<td>Average ACT Composite Score</td>
<td>17.14</td>
<td>17.10</td>
<td>1.79</td>
<td>13.70</td>
<td>21.60</td>
</tr>
<tr>
<td>High Poverty Indicator*</td>
<td>0.55</td>
<td>1.00</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Low Poverty Indicator**</td>
<td>0.43</td>
<td>0.00</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Per Pupil Expenditure</td>
<td>11072</td>
<td>10480</td>
<td>3321</td>
<td>6961</td>
<td>45247</td>
</tr>
<tr>
<td>Proportion Experienced Teachers</td>
<td>76.50</td>
<td>78.60</td>
<td>12.27</td>
<td>28.99</td>
<td>100.00</td>
</tr>
<tr>
<td>Average Years Experience</td>
<td>11.84</td>
<td>11.98</td>
<td>1.98</td>
<td>6.65</td>
<td>17.28</td>
</tr>
<tr>
<td>Instructional Expenditures Proportion</td>
<td>.6726</td>
<td>.6790</td>
<td>.0450</td>
<td>.5405</td>
<td>.7438</td>
</tr>
<tr>
<td>General Administrative Expenses Proportion</td>
<td>.0537</td>
<td>.0497</td>
<td>.0205</td>
<td>.0229</td>
<td>.1304</td>
</tr>
</tbody>
</table>

* 1 if high poverty, 0 otherwise
** 1 if low poverty, 0 otherwise

Notes: Data are from the Mississippi Department of Education. The data are observed at the school level. Results are based on author’s calculations.
Results

The results of the regression analysis provide a great deal of insight as to how the different variables tested might influence student outcomes. A variety of regressions were run using high school graduation rates as the dependent variable and measurement of student success. The results of these regressions are included in Table 2 below.

<table>
<thead>
<tr>
<th>Dependent Variable: Graduation Rate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>90.20*** (1.65)</td>
<td>74.43*** (3.07)</td>
<td>78.18*** (3.06)</td>
<td>55.35*** (7.00)</td>
<td>88.68*** (1.34)</td>
<td>90.61*** (2.23)</td>
</tr>
<tr>
<td>Per Pupil Expenditure</td>
<td>-0.00*** (0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion Experienced Teachers</td>
<td></td>
<td>14.18*** (3.94)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Years Experience</td>
<td></td>
<td></td>
<td>0.64** (0.25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction expenditures proportion</td>
<td></td>
<td></td>
<td></td>
<td>44.57*** (10.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen admin expenses proportion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62.32*** (23.31)</td>
<td></td>
</tr>
<tr>
<td>Other expenses proportion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-33.67** (13.95)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.047</td>
<td>0.063</td>
<td>0.038</td>
<td>0.088</td>
<td>0.036</td>
<td>0.030</td>
</tr>
</tbody>
</table>

Notes: Data are from the Mississippi Department of Education. The data are observed at the school level. Regression results are based on author’s calculations.

Looking at these results, it appears that the variables included have a statistically significant impact on the graduation rate for public schools in the state. In fact, each variable has a statistically significant effect in one way or another on the graduation rate,
with the notable exception of per pupil expenditure, which has a statistically significant effect of 0 on graduation rate. This is a fascinating result, considering that per pupil expenditures are a number that the state has kept track of for years and MAEP funding is based on a per-pupil base cost.

These simple regressions appear to be able to provide a great deal of information concerning the nature of the relationship between various factors; however, they do not tell the whole story. Table 3 shows why these regressions cannot be relied on by policymakers to use in making definitive statements, as the results from Table 2 might indicate that they could. As more variables are added to the regression analysis, the results of their joint influence become more complicated to interpret. Far fewer variables produce statistically significant results as more variables are added into the mix. Instructional expenditures do continue to show promise in models (2) and (3) of Table 3 as a possible factor that policymakers should pay attention to, as they have a relationship with graduation rate even once other variables are included. One factor that does not change is that per pupil expenditure still is shown to have no effect on graduation rates.

Interestingly, once the low poverty and high poverty indicators are added to the regressions in model (4) of Table 3, the other variables are no longer statistically significant, and poverty levels are the only variables that remain statistically significant. This called for more exploration into the effects of poverty on student outcomes.

Additional regressions were run to determine the effects of low and high poverty on their own. The results from these regressions are presented in Table 4. It has already been determined that high and low poverty levels have a statistically significant impact on graduation rate when multiple other variables are included in the regression. The
results in Table 4 indicate that high and low poverty levels also have a strong relationship with graduation rate when no other variables are included in the regression. Namely, both high and low poverty levels tend to be associated with a school’s graduation rate.

<table>
<thead>
<tr>
<th>Table 3 – Multiple Variable Impacts on Graduation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: Graduation Rate</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Proportion Experienced Teachers</td>
</tr>
<tr>
<td>Avg. Years Experience</td>
</tr>
<tr>
<td>Instruction expenditures proportion</td>
</tr>
<tr>
<td>Per pupil expenditure</td>
</tr>
<tr>
<td>Low poverty</td>
</tr>
<tr>
<td>High poverty</td>
</tr>
<tr>
<td>R-Squared</td>
</tr>
</tbody>
</table>

Notes: Data are from the Mississippi Department of Education. The data are observed at the school level. Regression results are based on author’s calculations.

Similar regressions were run using composite ACT scores for the dependent variable rather than graduation rates. Overall, the trends identified when using ACT scores as the dependent variable are very similar to the trends identified when using graduation rates as the dependent variable. Per pupil expenditures still have no impact on test scores, despite being one measure that the state makes sure to keep track of for every school. Instructional expenditures do seem to improve student outcomes until high and
low poverty status are added into the regression analysis, at which point those two variables become the main predictors of student success. When considering the emphasis that is placed on numbers like per pupil expenditures, instructional expenditures, and the extensive list of other data that Mississippi keeps track of, it is interesting to consider that few of the variables outside of poverty status of schools have a consistently strong predictive power of graduation rates or test scores. The question now becomes why schools are evaluated using numbers that appear to have no impact on student success, and what alternatives should be considered.

### Table 4 – Effects of Poverty Level on Graduation Rates

<table>
<thead>
<tr>
<th>Dependent Variable: Graduation Rate</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>82.15*** (0.71)</td>
<td>89.28*** (0.78)</td>
</tr>
<tr>
<td>Low poverty*</td>
<td>7.24*** (1.07)</td>
<td></td>
</tr>
<tr>
<td>High poverty**</td>
<td></td>
<td>-7.32*** (1.06)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.249</td>
<td>0.256</td>
</tr>
</tbody>
</table>

*1 if low poverty (<10% of students living below the poverty line), 0 otherwise
**1 if high poverty (>40% of students living below the poverty line), 0 otherwise

Notes: Data are from the Mississippi Department of Education. Observations are at the school level. Regression results are based on author’s calculations.
Policy Implications

Considering the results of the regression analysis performed, as well as Mississippi’s significantly lower than average performance compared to other states when it comes to education and adequately preparing students for higher education or the workforce, there appears to be a great deal of room for improvement in the amount and allocation of Mississippi public school funding. There are no easy answers when it comes to determining one or even a few factors that outweigh the others and most strongly influence student education, but two factors that have been shown to have a relationship with student success are poverty and instructional expenditures. The results uncovered in this thesis provide some insight as to things that could be changed to potentially improve the state’s public education outcomes through aiding schools that have a high proportion of students facing poverty and ensuring that schools are putting a significant portion of their budgets towards the education of students.

Mississippi’s Department of Education could look into altering the funding plan by shifting away from a one-size-fits-all program like MAEP and towards a program like those used in other states. Connecticut, for example, uses ten different formulas to allocate its state funds to public schools (How Connecticut Funds Education, 2022). Different formulas are used for different types of schools, so that a charter school is funded differently from a magnet school, a school with a special emphasis or program, or a traditional public school. There are some clear advantages to using a system like this. Most obviously, the fact that there are multiple formulas to use means that schools which have different needs are able to get customized amounts and types of funding to meet
those needs. Additionally, a program like this would allow for the state to nix complicated rules such as the 27 Percent Rule or the 28-Mill Rule, which are currently in place to ensure equitability but are not necessarily succeeding in that goal. A whole formula more specific to a school’s needs would likely be a better alternative to these rules.

This is not to say that the Connecticut model is without its drawbacks, though. Only two of the formulas in their setup account for specific student needs out of the ten formulas used. While this is an issue in Connecticut, Mississippi would need to create its own formulas specific to its own schools in order for this plan to work. Thus, this issue appears to be specific to Connecticut’s setup. Another issue with this plan would be the amount of time and resources it would take for the Mississippi Department of Education to create these formulas. It would be an intensive and potentially politically divisive project to explicitly provide different schools with different levels of funding. Despite that, the benefits of a program like this could make it worth the hard work and resources that would go into making it possible for schools in Mississippi.

Another option that the state could consider in altering funding to improve student success is to target some funding towards implementing access to tutoring for students who are in high-poverty areas. The research shows that lack of access to resources outside of the classroom may be one reason why there is a negative relationship between poverty and student success. One way to combat this problem would be to provide ACT, SAT, and subject area tutoring to students in high-poverty schools at no charge or at a subsidized rate. This would allow students access a great resource that they could use to perform better in the classroom. It would require pulling funding from another area or
increasing the budget for education, though. Considering that MAEP as it stands has not been fully funded, this could present a significant roadblock to implementing something like this. Either tutoring would not be provided to every student who could benefit from it, property taxes would have to be raised, or funding for another aspect of education would need to be cut. None of these options seem likely to appeal to many members of the state legislature, making it likely that a plan like this would not be feasible to implement in Mississippi.

A final potential recommendation based on the relationships uncovered through the analysis in this thesis is to continue to use MAEP, but to implement the 65 Percent Rule formally through legislature. While this rule has been used as a guideline in the past, it is not currently state law in any state that 65 percent of funding has to go towards instructional expenditures. The advantage of this is that some studies do show that putting 65 percent of a school budget towards instruction maximizes student success, so there is some evidence that this could be a viable option as a method for increasing student success. On the other hand, there are several issues with this. First, no state has actually signed the 65 percent rule into law as a component of their school funding plan, so there is no precedent by which to determine whether making the rule a law would cause any improvement. The rule is used more as a guideline in the literature than as an actual policy that should be implemented. Second, though there have been case studies which have found that student success is maximized when following the 65 Percent Rule, the evidence supporting its use is fairly inconsistent. Finally, different schools have different needs, and while the 65 Percent Rule may indeed be a good way to allocate school
funding, placing such specific restrictions or requirements on schools may hurt them in the long run.

Of the options presented here as a solution to Mississippi’s school funding issues, the one that would allow for the most adaptive and personalized allocation of state education funds is the adoption of a program similar to Connecticut’s funding setup. While the program has its flaws, namely a current failure to take into consideration the needs of students who may need more support than the formulas allow for, an adapted version of this funding plan could work in Mississippi with great success, eliminating the need for rules like the 27 Percent Rule and the 28-Mill Rule while simultaneously creating a more equitable setup for school funding in the state. Mississippi could make this program work by developing different formulas for different categories of schools. The benefit of adopting this program later is that the issues with Connecticut’s current model can be addressed as Mississippi creates its own formulas to be used. For example, schools identified by the state as having a significant high-poverty population (which, as this thesis shows, are frequently the same schools that struggle with student success) could receive funding based on a formula that provides for a great deal of funding for hiring more experienced teachers, spending on instructional expenditures, or creating afterschool programs from which students in those high-need areas might benefit. On the other hand, a school that is already high-achieving could be funded using a different formula that may allocate fewer funds to factors that may benefit higher-need students but are not needed by as many students in schools which do not have a high number of impoverished students. Additionally, schools with different grade levels assigned by the state could receive more targeted funds through the use of a more specific formula, and
different types of schools (for example, charter schools or specialty schools such as the Mississippi School for Math and Science of the Mississippi School for the Arts) could receive different types and amounts of funding as well. This setup for school funding could allow the state much-needed flexibility in determining how to allocate funds for education.
Conclusion

Not surprisingly, the analysis in this thesis reveals that many of the trends found in case studies conducted elsewhere apply to Mississippi as well. The factors that most strongly influence education may be difficult to define, considering the sheer number of factors that state departments of education tend to keep track of and the way that many of those factors are interrelated. A few key results stick out, though. It appears that there is a relationship between instructional spending and student success based on the analysis of the data. This changes as more and more variables are added to the analysis, so more analysis could be useful. One thing that this analysis makes clear, though, is that factors outside of the classroom, specifically poverty levels, seem to have the most consistent impact on educational outcomes.

This thesis determines whether a relationship exists between the factors that have been examined. It does not, however, provide insight as to whether or not the factors used in the regression analysis cause the relationships observed, let alone the extent to which one variable affects another. Research could be conducted to determine the causal relationships between variables such as a school’s status as high poverty on a school’s graduation rate. This research would allow policymakers to gain a more comprehensive understanding of the way that school funding can impact the quality of education that students are receiving in Mississippi and allow for more definitive statements about the impacts of these variables on student success to be made.

Providing youth with a high-quality education is crucial to society, and school funding, both the amount of funding and the allocation of the funds, can influence student
outcomes. Because of this, and considering the results of the regression analysis, it seems that Mississippi should reevaluate the current funding situation and potentially look into implementing new programs or strategies for funding schools in the state. One system that seems to have a great deal of potential is the one used in Connecticut, which uses different formulas for different types of schools in order to ensure that the specific needs of a school are met. Providing schools with the flexibility to address their specific needs through the use of a more individualized funding formula would allow the state to target its funds towards programs and students that need them the most, and this could ultimately improve the quality of education that students in Mississippi receive, opening up doors for them as they graduate and move on to their future endeavors.
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