

ALABAMA PUBLIC SCHOOL EXPENDITURES
AS CORRELATES OF STUDENT
ACADEMIC ACHIEVEMENT

by
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A DISSERTATION

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the degree of Doctor of Education in the Area of
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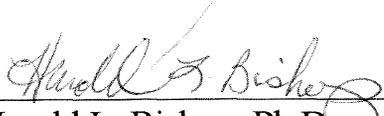
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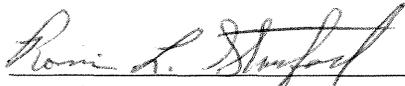
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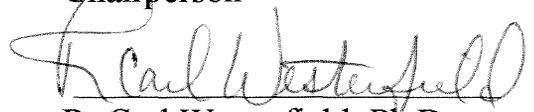

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Introduction

Over the past several decades, public schools in America have been the subjects of a number of efforts to upgrade student educational performance. Passow (1990) cited as an example the post-Sputnik era reform efforts such as The National Defense Education Act of 1958, which provided funds for upgrading the teaching of science, mathematics, and foreign languages. The year 1983 is generally regarded as the beginning of the current cycle of education reform. Several reports were issued that year and over the next several years which called for more rigorous academic standards for students as well as higher standards for teachers. A number of state legislatures have answered this call by enacting mandates for education reform aimed at improving student academic performance.

Finn (1991) discussed several indicators of poor academic achievement. Only 1 in 20 high school seniors, for example, could read well enough to understand and use information found in technical materials and college-level texts. About 13 % of all 17-year-olds in the United States were functionally illiterate. Remedial mathematics courses in colleges had increased to the point that they constituted 25 % of all mathematics courses taught in those institutions. When young American adults (ages 18 to 24) were presented with a blank map of the United States, fewer than half were able to find New York and only one in four properly labeled Massachusetts.

The average pupil, emerging from a typical school, often possesses skills and knowledge which are inadequate for the successful entry into the skilled labor force or transition into higher education. Innerst (1990) reported that Albert Shanker, American Federation of Teachers president, estimated that 95 % of the students who go on to college in the United States would not even be admitted to colleges in other parts of the world.

Henson (1986) noted that, in recent years, a number of national task forces issued reports which chronicled the difficult problems facing public education, with particular emphasis on the decline in student performance on standardized achievement tests. The National Commission on Excellence in Education (1983) for example, reporting on the status of American schools, concluded the following: "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war" (p. 5).

The various efforts to bring about improvement in student achievement have provoked extensive debate and discussion concerning how to accomplish this objective. Perhaps one of the most debated issues in this area over the past several years has been the role that educational spending plays, or should play, in efforts to improve academic performance. This debate usually centers around the link, if any, that exists between school expenditures and student academic achievement.

In Alabama, the debate on this issue has become very intense, especially following a circuit court ruling that the method of funding public education is both inadequate and inequitable (Alabama Coalition for Equity v. Hunt, 1990) . As education reform efforts are proposed which seek to increase school funding, or to eliminate funding inequities among school districts, there is widespread disagreement as to the actual degree of influence

that a higher level of school funding (with the resultant increased expenditures) has on student achievement.

Dean (1994) reported that State Superintendent of Education Wayne Teague linked low student achievement levels with inadequate funding. According to Teague, "For every dollar that the average state spends on its elementary and high schools, we spend 68 cents" (p. 7). He asserted that "until all of our schools have adequate and equitable resources and facilities, increased achievement will be difficult" (p. 7).

Kazal-Thresher (1993) discussed the contradictory results reported by different studies of this issue in recent years. Some studies found a significant relationship between funding and student achievement, while others found funding differences only accounted for a small part of the variance in student achievement.

Statement of the Problem

Data from a number of studies over the past 20 years reveal that student academic performance, as measured by several different indicators, is so low as to put students "at risk" to fully develop and serve their own interests as well as the progress of society itself. Students' scores on many standardized achievement tests have shown consistent declines in recent years. A substantial percentage of students demonstrate major deficits in reading skills, with approximately one in eight 17-year-olds being functionally illiterate. So many students emerge from high school with deficient math skills that 25 % of all college math courses are remedial math.

In Alabama, students have consistently scored below the national average on standardized achievement tests. During the past 2 or 3 years, various programs have been proposed by state governmental agencies or interest groups which seek to upgrade student academic performance. Several

of these proposals have linked the problem of poor student achievement with the low level of school funding which exists in many Alabama school districts, especially after a recent court decision which declared that school funding in the state is both inadequate and inequitable (Alabama Coalition for Equity v. Hunt, 1990) . The State Superintendent of Education, as well as other proponents of funding reform, has stated that, until adequate funding is provided for schools, the problem of low student achievement will remain.

Purpose of the Study

The purpose for conducting this study was to examine the relationship between public school expenditures and student academic achievement. In addition, the study investigated whether the relationship between expenditures and achievement is related to the socioeconomic conditions in a school district. The population sample was 4th, 7th, and 10th grade students in public school districts in Alabama.

Data were gathered from two sources. Spending data came from the official budgets which categorize each school system's expenditures. Achievement data came from scores on the Stanford Achievement Test.

Definition of Terms

The following terms are operationally defined:

1. Academic achievement--A measure of the level of student academic performance as indicated by the mean complete battery normal curve equivalent score on the Stanford Achievement Test.
2. Expenditures Per Student--The average amount of money a school district spends for each student in the district. This amount is calculated by dividing expenditures by the average daily attendance (ADA) for the district.
3. Funding--The process by which financial resources are provided for use by public school districts.
4. General Administration and Central Support Services Expenditures--Monies budgeted by a school district to pay the costs of the superintendent and central office administrative staff, the central office support personnel, and other systemwide administrative costs.
5. Instructional Expenditures--Monies budgeted by a school district to be used at the local school level to pay the costs of direct classroom instruction.
6. Instructional Support Expenditures--Monies budgeted by a school district to be used at the local school level to pay the costs of local school administration, counselors, media specialists, and other instructional support services.
7. School District Clusters--Homogeneous groupings of school districts based on the socioeconomic conditions of the community served by the school district, as outlined in the State Department of Education's Annual Status Report (1994). Conditions used to group the districts are per capita income, percentage of students eligible for free or reduced-price lunches, and the yield per mill per student of district tax.

Research Questions

This study was guided by the following research questions:

1. Is there a significant relationship between school district instructional expenditures and students' academic achievement?
2. Is there a significant relationship between school district instructional support expenditures and students' academic achievement?
3. Is there a significant relationship between school district general administration and central support services expenditures and students' academic achievement?
4. Do the relationships between expenditures and students' academic achievement differ, based on school district clusters?

Significance of the Study

The significance of the study was that it examined the relationship between two factors which are central to the subject of education reform, expenditures and student achievement. Although the literature abounds with studies of academic achievement and with data concerning public school expenditures, surprisingly few studies exist that examine the relationship between these two. A primary goal of efforts to reform public education has been a higher level of student academic performance. The role that expenditures play in reaching this goal (including the adequacy and equity of funding) has come to be the subject of much debate among both governmental policy makers and educators. With a number of states now proposing or already implementing education reform programs (many of which involve funding reform), this study should help inform both educators and policy makers by adding to the current body of knowledge in this area.

In addition, this study took into account the socioeconomic conditions which may have a bearing on the relationship between expenditures and

achievement. Because socioeconomic conditions vary so widely from district to district, an analysis which controls for this factor should prove to be more useful for real-world applications.

Limitations

This study was confined to public school districts in Alabama, and was limited to achievement data from 4th, 7th, and 10th grade students. Therefore, generalizations about the relationship among the factors in this study may be limited.

In addition, it should be understood that this study was not meant to be an investigation of all possible factors involved in student academic achievement.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The literature of public education abounds with writings on student achievement and, in recent years, a good deal has been written about public school funding and spending. Relatively little attention, however, has been given to an investigation of the relationship between school expenditures and student achievement.

The literature on the relationship between spending and achievement, for the purposes of this review, has been divided into 4 sections: 1) a review of studies, reports, treatises, etc. which investigate and/or discuss this relationship and its educational, sociological, and economic implications; 2) a review of judicial rulings in school finance cases from other states that define the relationship between school funding and student outcomes from a legal perspective; 3) a review of the current Alabama school finance court case; and 4) a review of recent federal legislation impacting school funding.

Educational, Sociological, and Economic Perspectives

A landmark study known as Equality of Educational Opportunity, or, more commonly, the "Coleman Report" (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, and York, 1966) was the first major research conducted on the relationship between school expenditures and student academic achievement.

This report was compiled in response to the directives incorporated in the Civil Rights Act of 1964. Specifically, the Act required an investigation into the extent of inequality in the nation's schools. Even though the Coleman Report (1966) was not the first study of its kind, it was much larger and more influential than previous studies. Instead of addressing questions of inequality by looking at differences among schools by race or by region of the country, it examined the relationship between inputs and outputs of schools. The report presented the results of a study of cross-sectional survey data covering 3000 schools. It captured widespread attention because of its conclusions. It found that students' families and, to a lesser extent, their peers, are the primary determinants of variations in student performance. According to the report, differences in school funding account for only a small fraction of the variance in student achievement. This conclusion has, for years, served as primary evidence by those who assert that additional funding is not the solution to problems of low student achievement. The findings of the report were controversial and led to a large research effort to compile additional evidence about input-output relationships in schools.

Jencks, Smith, Acland, Bane, Cohen, Gintis, Heyns, and Michelson (1972) concluded that student performance, as measured by standardized test scores, depends primarily on the characteristics of the students themselves. Other factors, such as school expenditures, policies, and teacher characteristics play decidedly subordinate roles in student performance, the study concluded. In light of the egalitarian belief that the educational system could be used to equalize student performance and, by extension, equalize the distribution of future income, it is not surprising that the Coleman (1966) and Jencks studies have come under considerable scrutiny. After all, these studies

cast doubt upon the capacity of schools to make a significant difference in student outcomes.

Mosteller and Moynihan (1972), in reexamining the Coleman Report (1966), noted that the report's findings showed that low levels of educational achievement among black children came primarily from generalized social conditions, and not from variations in school facilities. These findings, and the implication that schools could have only a very marginal impact on such conditions, were unsettling both to the advocates of social change and to the analysts of social conditions, according to Mosteller and Moynihan. The report's findings showed schools not to be the potent agents of social change which many in the educational establishment and the "civil-rights community" had assumed them to be.

According to Silberman (1967),

The Coleman Report suggests forcibly that the public schools do not--and as now constituted cannot--fulfill what has always been considered to be one of their main purposes and justifications: to ensure equality of opportunity or, in Horace Mann's phrase, to be "the balance wheel of the social machinery." (p. 181)

Smith (1972) reappraised several of the findings of the Coleman Report (1966) and found an error in the calculation of the amount of variation in student achievement attributable to family background. The effect of the mistake was to produce an underestimate in the importance of family factors. He found that the percentage of variation in achievement which is attributed to differences in individual home background is actually much larger (3 to 4 times as large) than that reported by Coleman et al. This finding certainly lent no comfort to those who claimed that the Coleman Report had given too much credit for achievement variations to home background factors and not

enough to school factors. Smith concluded that, since the data showed students tended to leave school with the same advantages they had over other students when they entered, this suggested that the principal function of the schools is to serve as an allocation and selection agency rather than as an equalizing agency.

Armor (1972), after reanalyzing the data from the Coleman Report (1966), concluded that "the final results of the correlation and regression analysis give no support for rejecting Coleman's basic conclusion of the relative importance of family background and school factors on achievement" (p. 224). His independent reassessment showed that family background is a clearly stronger predictor of student achievement. He noted that, although school factors have an obvious effect on the absolute level of achievement, this does not necessarily mean that improving those factors will reduce the variation in achievement levels. According to Armor, if one wants to reduce this variation, and especially the differential between black and white achievement, family-background factors are the more promising area for improvement.

During the two decades following the Coleman (1966) and Jencks (1972) studies, researchers conducted a number of studies which investigated the relationship between school inputs and student achievement. Some of this research was conducted by educators, but the bulk of the studies were conducted by economists examining the relationship from a production functions point of view.

Bidwell and Kasarda (1975) studied the relationship between various school inputs and student achievement in public school districts in Colorado. They examined the direct effects of variables such as fiscal resources per student and percentage of disadvantaged students upon achievement, as well

as the indirect effects through mediating organizational characteristics of the districts such as the ratio of administrators to teachers and the ratio of professional support staff to teachers. The study found that the direct effects of fiscal resources upon achievement were negligible. Fiscal resources were found to have a strong positive indirect effect upon achievement, however, primarily through the organizational variables of professional support staff and certificated staff holding advanced degrees. This study showed that by assessing some of the indirect effects of variables upon achievement, certain variables that may seem to have no effect upon achievement in other studies may in fact have significant effects.

Kiesling (1969) studied 97 public school districts in New York State to determine the relationship between various inputs and student achievement. The data for this study were longitudinal in nature in that achievement measures were available for the same students at both the fourth and sixth grade levels. Among the inputs examined, only the parental occupation index variable was shown to be significantly related to student achievement. None of the school variables had a significant effect. A nonsignificant negative relationship was seen between achievement and expenditure per pupil on books and supplies. A nonsignificant positive relationship was noted between achievement and expenditure per pupil on principals and supervisory staff, with the strongest relationship being seen at the upper and lower extremes of the parental occupational stratification.

A study by Perl (1973) investigated the relationship between school and family background variables and student achievement for a sample of 3,265 high school seniors. Perl found a highly significant relationship between expenditure per pupil and student achievement, even when he controlled for variables such as teachers' salaries, experience, and degree level and students'

socioeconomic background. Another school variable, the number of volumes in the school library, was found to be positively related to achievement only for students from high income families.

Ribich and Murphy (1975) used longitudinal observations data from the Project Talent national survey of high schools to investigate the long-term effects of increased school spending. Regression coefficients were computed to measure the relationship between expenditures per student and three output measures: achievement test scores, years of schooling completed, and lifetime income. They found that expenditures per pupil were negatively related to test scores, but positively related to educational attainment. A positive (although statistically insignificant) relationship was seen between expenditures and lifetime income, and the implied net gain in lifetime income was less than the amount of the related spending.

Dolan and Schmidt (1987) studied the relationship between student achievement and expenditures in primary and secondary public schools in Virginia. Several expenditure variables, such as teacher salaries (entry level and non-entry level), as well as expenditures for principals, instructional supervisors, and other instructional inputs (textbooks, teachers' aides, etc.) were examined to determine their effects on student achievement. They found a significant link between entry level teacher salaries and student achievement at the elementary school level. By contrast, for non-entry level teacher salaries, no significant positive effect was found. This relationship was found to be largely reversed at the high school level. They concluded that these findings indicated enthusiasm of new teachers has more impact in elementary education than in high school. Expenditures for principals and instructional supervisors were also found to have a more significant positive effect on achievement at the elementary level than in high school. Other instructional

inputs, such as expenditures for textbooks and teachers' aides, were found to have a statistically significant negative impact on achievement.

Sebold and Dato (1981) studied the relationship between school funding and the performance of elementary and secondary students in California on standardized examinations. They investigated four categories of expenditures (general instructional, support services, special education, and auxiliary programs) to determine the relationship of each to student achievement test scores. They found that, of the four categories, only general instructional expenditures had a significantly positive influence on the spectrum of test scores. Sebold and Dato assert that their data support the hypothesis that expenditures and cognitive development are directly related. They conclude that "the equalization of expenditures per ADA across school districts would have a statistically significant, although quantitatively fairly small, impact on the examination scores of students in primary and secondary systems of California" (p. 103).

Hanushek (1986) reviewed a number of studies of educational production functions. These studies, also referred to as input-output analyses or cost-quality studies, rely on econometric methods to separate the various factors influencing students' performance. Hanushek reported that school expenditures per student increased by 135% in real terms from 1960 to 1983. A major component of this growth in per pupil expenditures was the reduction in pupil-teacher ratios. Also adding to the increased costs has been the aging and increased education levels of the current teacher force. With the financial incentives of teacher salary schedules which reward education and experience, these trends have added to the escalation of costs. Hanushek stated that his review of the data showed that these rising costs were not matched by improvement in the performance of students. If one presumes that

schools are attempting to maximize student performance, Hanushek asserted that the evidence indicated that schools are economically inefficient. He found that there existed at best an ambiguous relationship between student performance and the inputs supplied by schools. According to Hanushek, "the fact that a school spends a lot on each of its students simply gives us little information on whether or not it does well in terms of value added to students" (p. 1166).

In this and a subsequent review (Hanushek, 1989), he asserted that several public school policy implications spring from these findings about expenditures and performance. According to Hanushek, since school expenditures have not been shown to be systematically related to student performance, policies should not be formulated principally on the basis of expenditures. He noted that court rulings in school finance cases have almost always been phrased in terms of mandating an elimination of expenditure variations across school districts. He believes that policies arising from such rulings which are based almost solely on expenditures are, at best, misguided. In addition, he asserted that there is little merit for policies which place a primary emphasis on reduction of class sizes or which require that teachers pursue graduate courses to get an additional salary increment. He concluded that one of the keys to the improvement of public education is a more efficient operation of schools, with less waste of resources.

The writings of Hanushek (1986, 1989) and other economists seemed to serve as a challenge to the educational community to re-investigate the issue of school funding and student achievement, which had largely been ignored during the previous decade or so by educational researchers. Another factor in this resurgence of research by educators into the relationship between expenditures and achievement was the testimony in school finance

court cases in several states, including Kentucky, Texas, and Alabama. Educational researchers were called upon to provide expert testimony on behalf of the plaintiffs that would counter defense arguments that the level of educational funding makes little difference in student achievement. As a result of this recent research, the findings reported by Hanushek and others have been challenged as new methods of analyses have resulted in new findings and conclusions.

Hedges, Laine, and Greenwald (1994) conducted a reanalysis of the data examined by Hanushek (1986, 1989) in his earlier reviews of the literature on the relationship between school inputs and student performance. They contend that the analytic method used by Hanushek has low power as an inference procedure to detect effects. Hanushek's conclusion was essentially one of accepting a null hypothesis after attempts to reject it had failed. The probability of making an error in reaching the conclusion to accept the null hypothesis depends on the power of the method used in the attempt to reject it. Thus they contend that the failure to reject a null hypothesis using this low-power procedure is not persuasive evidence that the null hypothesis (resource inputs are unrelated to outcomes) is even approximately true. In fact, the reanalysis of Hedges, Laine, and Greenwald suggested strong support for at least some positive effects of resource inputs and that these effects (especially for per pupil expenditures) are large enough to be of real importance. They conclude by stating

we would not argue that "throwing money at schools" is the most efficient method of increasing educational achievement. It almost surely is not. However, the question of whether more resources are needed to produce real improvement in our nation's schools can no longer be ignored. Relying on the data most often used to deny that

resources are related to achievement, we find that money *does* matter after all. (p. 13)

In a reply to Hedges, Laine, and Greenwald (1994), Hanushek (1994) defended his conclusion that there is no strong or systematic relationship between school expenditures and student performance. This conclusion was meant to summarize a situation in which the vast majority of studies on the relationship between specific resources and student performance showed either statistically insignificant relationships or even a negative relationship (higher resource usage associated with lower student performance). Hanushek was critical of the statistical approach employed by Hedges, Laine, and Greenwald. He asserted that the application of this approach "requires a series of key assumptions and analytical choices that each work to invalidate their technical analysis" (p. 6). For example, Hedges, Laine, and Greenwald eliminated consideration of a large proportion of the evidence that supports "no effect" by ignoring studies that reported statistically insignificant relationships but did not provide information on the estimated direction of effect. Hanushek concluded by stating that even if some school districts do employ their resources efficiently, resulting in effective programs, there is no assurance that overall increases in resources will lead to overall improvements. "It would be very unfortunate if policymakers were confused into believing that throwing money at schools is effective. More serious reform is required if we are to realize the full benefits of our schools" (p. 8).

In a rejoinder to Hanushek (1994), Hedges, Laine, and Greenwald (1994 b) defended their decision to exclude results from studies wherein the direction of the effect, its magnitude, or the p value was unknown. They noted that these nonsignificant results were reported as anecdotes in the text

of articles. They felt that inclusion of such anecdotes would have been difficult to defend, since even the specification of the model was often unclear. They contend, however, that even if those results had been included, the evidence from studies that did report was so overwhelming that their combined significance tests would still have confirmed their overall findings for most variables. According to Hedges, Laine, and Greenwald, the results clearly offer strong evidence of positive effects and little evidence of negative effects. They concluded that the interchange with Hanushek has moved the discussion forward, evolving from Hanushek's position that there is no relation between resources and outputs, to a discussion of how large the positive relations might be and of the characteristics of studies that best reveal this relation.

Lockwood and McLean (1993) investigated the relationship between instructional expenditures and student achievement. They noted that a review of research conducted in this area showed that many studies assumed, and therefore only looked for, a linear relationship between expenditures and student achievement. They reasoned that since the definition and measurement of achievement in school settings puts a limit on achievement, then more money can only hold that level of achievement (assuming that money makes a difference). At the other extreme, if no money was provided for textbooks, materials, etc., with accompanying low achievement, providing very small additional funds (less than five dollars, for example) likely would not have a positive effect on achievement levels. These threshold effects, according to Lockwood and McLean, imply some degree of nonlinearity in the relationship between expenditures and achievement.

They hypothesized that the actual relationship is more an ogive shaped curve than a linear relationship. In this hypothesized relationship, until

funding is increased to some threshold level, the increases have little additional impact. Above that level, increases in achievement accelerate as the funding increases. A threshold is ultimately reached as well at the upper end of the curve where providing more money has little, if any, effect on achievement.

In their analysis, Lockwood and McLean (1993) regressed student achievement variables (from the Stanford Achievement Test) on the instructional expenditures per average daily attendance from the square and cube of these values for the 128 school systems in Alabama. All regression models were significant at the .05 level or better. The multiple R^2 s ranged from .07 to .09 indicating that, with an assumption of a curvilinear relationship, per pupil school expenditures accounted for between 7% to 9% of the student achievement variance. They noted that these results are in conflict with the recent writings of Hanushek (1986, 1989), but support the more recent conclusions of Hedges, Laine, and Greenwald (1994). According to Lockwood and McLean, even though the 7% to 9% of the achievement variance accounted for by instructional expenditures may seem modest, the positive benefits of additional funding, assuming a positive, curvilinear relationship, might not be evident in the data from Alabama. Since Alabama is at the low end of the range of total expenditures nationally, the slope of the hypothesized ogive shaped curve has not yet begun to accelerate. They reasoned that if the study were replicated at the mid-range of the expenditure variable, the relationship would stronger as be the slope of the curve increases.

Ferguson (1991) studied data from almost 900 school districts in Texas to investigate the relationship between school inputs and student outcomes. Ferguson, like Lockwood and McLean (1993), reasoned there might exist

thresholds between which increasing funding would have a clear and direct impact on achievement (above or below which it would not). His evaluation of the data showed threshold effects for both instructional and administrative expenditures. Total instructional expenditures appeared to lose their impact when expenditures were about one standard deviation above the mean of the districts studied. Administrative expenditures, however, appeared to lose their impact about one standard deviation below the mean of district expenditures. These findings lend support to the argument that schools may be spending too much money on administration and not enough on classroom inputs.

Ferguson (1991) also found that better literacy skills among teachers is associated with better student test scores. In fact, he concluded that

beyond school finance reform, what the evidence here suggests most strongly is that teacher quality matters and should be a major focus of efforts to upgrade the quality of schooling. Skilled teachers are the most critical of all schooling inputs. (p. 490)

An article by Murnane (1991) interpreted the evidence relating school district expenditure levels to student achievement gains. Murnane contended that statistical studies which assess the relationships between school resources and student achievement do not provide reliable answers to the question "Does money matter?" Such studies, he asserted, do not adequately address questions of causation. For example, many school districts have relatively high expenditure levels, including state and federal compensatory education funds, because they serve students identified as having low achievement levels. In such a situation, any comparison of achievement levels across districts with different expenditure levels per pupil lends little insight into any beneficial impact of funding on student achievement.

According to Murnane (1991), the logic underlying the argument that money does not matter does not carry over to similar studies of other organizations. This rationale presumes waste when school expenditures do not appear in quantitative studies as having positive relationships with student achievement. It follows from this logic that studies of organizations that face competitive pressures, such as private schools, and private for-profit firms in other sectors of the economy, would show positive relationships between all resources funded by these firms and their measures of output. The evidence from such studies, however, does not bear this out. Studies have shown, for example, that private schools and private sector firms often reward employees for attributes (such as experience beyond five years) not directly related to productivity. Murnane points out the inconsistency of economists who conclude that public schools which do not show positive relationships between all inputs and student outcomes are inefficient, while no such conclusion is reached regarding private sector firms which show the same pattern. He concludes by stating that, even though some school districts may not use resources wisely, it is inappropriate to make judgments about whether or not the resources are being used wisely solely on the results of educational production function studies.

While Murnane (1991) cautioned against the use of expenditure variables that include compensatory education funds in expenditure-achievement studies, Wainer (1993) showed the problems that can be associated with the use of certain measures as achievement variables in such studies. He cited a study, reported in the Wall Street Journal (June 22, 1993), in which the states are rank-ordered by funding level for education and by average scores on the Scholastic Aptitude Test (SAT). In the comparison of the per pupil expenditures in each state with that state's ranking on the SAT, it

was observed that some states that have a high average per pupil expenditure rank rather low on performance on the SAT, while other states that spend much less do very well indeed. Wainer noted that the obvious inference from these data was that spending more money on education, instead of improving students' performance, actually results in lower performance. He pointed out the obvious flaws in an inference based upon such a comparison. Some of the flaws involved the use of state average expenditures as the funding variable used in the comparisons. He noted, for example, that differences exist in the cost of living between states, while within states, expenditures per pupil vary from district to district.

The crux of his article, however, was to point out that average performance on the SAT in a state does not represent the students' academic proficiency in that state. In some states only a very small percentage of students choose to take the SAT (e.g., Iowa - 3%), while in others a large proportion do (e.g., Connecticut - 78%). Wainer (1993) noted that if the top 3% from the Connecticut SAT-takers were chosen, their average scores would almost certainly rank higher than the scores of the Iowa students. Thus the uncertainty associated with who within a state decides to take the SAT makes such a measure unsuitable to be used as an achievement variable in comparisons such as the study cited by Wainer. He went on to demonstrate that the relationship between funding and achievement improved considerably when the National Assessment of Educational Progress (NAEP) ranks for eighth graders in mathematics were substituted for the SAT ranks.

Recent School Finance Court Cases From Other States

During the past 25 years, the issue of variations in per pupil expenditures across school districts became the subject of litigation in a number of states. According to Odden and Picus (1992), the impetus for legal

action was the increasing use of the federal equal protection clause or state education clauses to have traditional school finance inequities declared unconstitutional. Addonizio (1992), in summarizing judicial rulings in school finance cases, noted that the courts have often concluded that a direct relationship exists between per pupil expenditures and the quality of educational programs. The presumption that variations in school expenditures give rise to differences in both educational opportunities and results has led to rulings that a number of state school finance systems violated that state's education clause or the equal protection guarantees of the U.S. Constitution. Such state school funding systems were found to be unconstitutional based on the courts' acceptance of the proposition that school expenditures are the primary determinants of education program quality. The following is a review of judicial rulings in school finance cases that, from a legal perspective, further define the relationship between school funding and student outcomes.

The case of Serrano v. Priest (1971) stands as a landmark in the recent history of school finance litigation. In a precedent-setting opinion that received nationwide media, policy, and legal attention, the California Supreme Court ruled that the California school finance system was unconstitutional. The court ruled that California's school finance system, with its heavy reliance on local property taxes, gave school districts unequal opportunities to raise educational revenues because the property value per child varied widely across school districts. The plaintiffs successfully argued that school financing systems need to be "fiscally neutral," meaning that expenditures per pupil should not be strongly related to local district property wealth per pupil. According to Sebold and Dato (1981), implicit in the Serrano ruling is the presumption that variations in public expenditures per

pupil give rise to differences in the quality of educational services which, in turn, are associated with differences in student outcomes.

The relationship between school funding and student outcomes which was implied in Serrano (1971) was spelled out more explicitly in later school finance cases. One such case was Robinson v. Cahill (1973) in which the New Jersey Supreme Court overturned the New Jersey school finance system. This was considered to be an important case in the school finance reform movement, following only one month after the U.S. Supreme Court, in Rodriguez v. San Antonio School District (1973), had ruled that the Texas school finance system did not violate the Constitution. A loss in the Robinson case would have been a further blow to school finance litigation, following so closely in the wake of the Rodriguez case. The court found New Jersey's funding structure violated the state's constitutional education clause, which required the state to create a thorough and efficient public education system. The court ruled that the "thorough and efficient" clause required an education system that allowed all students equal opportunity to compete in the labor market. It argued that a school finance structure that allowed for wide disparities in per pupil spending that were strongly linked to local property wealth was not a thorough and efficient system. The court's ruling thus asserted that per pupil expenditures have a significant impact on student outcomes, in this case the ability to compete in the labor market.

In 1979, the West Virginia Supreme Court ruled the state's school finance plan unconstitutional based on the "thorough and efficient" language in the state's education article. The court held that "equal protection, applied to education, must mean an equality in substantive educational offerings and results, no matter what the expenditure may be" (Pauley v. Kelly, 1979, p. 865). This application of the equal protection clause, by mandating an

equality not just of educational offerings but also of results, established a judicially recognized link between expenditures and student outcomes.

The Connecticut Supreme Court in Horton v. Meskill (1977) accorded education the status of a fundamental right. The court ruled that the state school finance system, which relied heavily on local property taxes, failed to provide students equal exercise of that right, due to significant disparities in educational expenditures. In overturning the state school funding structure, the court found that a direct relationship exists between per pupil expenditures and the breadth and quality of educational programs.

Fifteen years after the U.S. Supreme Court ruled in the Rodriguez (1973) case that the Texas school finance system did not violate the U.S. Constitution, the system's constitutionality was challenged in state court. The plaintiffs argued that education is a fundamental right under the Texas Constitution, while the state, relying at least in part on the legal precedent of the Rodriguez case, argued that it cannot be construed as such. The case was ultimately decided by the Texas Supreme Court (Edgewood Independent School District v. Kirby, 1991). The court ruled that education is a fundamental right under the Texas Constitution and that equal access to funds is an integral part of that right. The Texas school finance system was struck down because it allowed unequalized local supplements in wealthy school districts. The court rejected the state's defense, in which it argued, among other things, that district wealth was not significantly correlated with student performance.

In 1990, the New Jersey school finance system was again ruled unconstitutional (Abbott v. Burke, 1990). The New Jersey Supreme Court ruled the legislature must develop a new funding formula which would equalize spending across urban and suburban school districts. The court

rejected the state's argument that spending differences are not a major cause of unequal educational program quality. The court found that even though the evidence showed that money alone does not make the difference in program quality, it did not show that money makes no difference. In fact, the court noted that the entire state aid program itself is based on the assumption that money makes a difference in the quality of education.

In Rose v. Council for Better Education, Inc. (1989), the Kentucky Supreme Court considered whether the state had complied with the education clause of the Kentucky Constitution which mandated an efficient education system. Upon reviewing the evidence, the court ruled that Kentucky's wide variation in fiscal and educational resources resulted in unequal educational opportunities throughout Kentucky. After noting large interdistrict variances in resources, the court also cited resource-related disparities in pupil achievement test scores and expert opinion presented at trial that clearly established a positive correlation between such test scores and district wealth. The Kentucky case, which began as a school finance case, ended with the overturning of the entire Kentucky public education system. The court ruled that the system's governance, finance, and programmatic aspects were all unconstitutional, and ordered the Kentucky legislature to create an entirely new education structure.

Underwood (1989) noted that "all plaintiffs in school finance litigation rely on the common assumption that the level of funding of a school district has a direct effect on the quality of the program provided and the education the children receive" (p. 413). In the recent history of school finance litigation a number of court opinions addressing this issue (such as the aforementioned cases) have accepted the existence of a positive correlation between educational expenditures and educational quality. The plaintiffs' establishment

of a positive correlation between expenditures and educational quality is essential, but not necessarily sufficient to win a school funding case. There continues to be considerable disagreement on this issue, however, with an abundance of expert testimony on both sides of the controversy.

Alabama School Finance Court Case

In May 1990 a suit was filed in Montgomery County, Alabama Circuit Court by the Alabama Coalition for Equity, challenging the constitutionality of the state's system for funding public schools. The plaintiffs alleged that this system was both inequitable and inadequate. A chronology of major events in this suit was reported by the Alabama State Department of Education, Office of General Counsel (1995).

Specifically, the plaintiffs contended that Amendment 111, the education clause of the Alabama Constitution, violated the Equal Protection Clause of the 14th Amendment of the United States Constitution. Amendment 111 stated that the Alabama Constitution did not create or recognize a right to a public education. In addition the plaintiffs contended that the state public school funding structure, due to irrational and arbitrary statutes and procedures, resulted in disparities between property-rich and property-poor school districts, in violation of equal protection and due process guarantees of both the Alabama Constitution and United States Constitution.

In January, 1991 the Civil Liberties Union of Alabama filed a similar complaint alleging the plaintiffs were not receiving a minimally adequate education. In March 1991 the court consolidated the two actions and bifurcated the bench trial into a liability and remedy phase. Then in August of that year, the court ruled that Amendment 111 of the Alabama Constitution was unconstitutional, in that it had a racially discriminatory purpose and effect. A part of Section 256 of the Alabama Constitution, which required

racially segregated schools, was also declared unconstitutional. The remainder of Section 256, however, which required the legislature to establish, organize, and maintain a liberal system of public schools throughout the state, was upheld by the court.

In August 1992 the liability portion of the suit was tried in court. Testimony by expert witnesses was presented on behalf of both the plaintiffs and the defendant (the Governor of Alabama). One of the major issues covered in this testimony was the relationship between school expenditures and student performance. Eric Hanushek, whose writings on this topic were detailed earlier in this chapter, testified for the defense, along with a fellow economist, Michael Wolkoff. They asserted in their testimony that funding disparities in Alabama schools were among the lowest in the nation, and that more money alone would not increase student performance. Attorneys for the plaintiffs challenged the assertion of low funding disparities, and forced Wolkoff to admit he had based his conclusions on unweighted data, not weighted data, as he had earlier contended. Ronald Ferguson, whose writings were also detailed earlier in this chapter, testified for the plaintiffs. He asserted that the data showed that many factors, including expenditures, play significant roles in student performance.

In March 1993 the court ruled that Alabama's public school finance system was both inequitable and inadequate, violating both state and federal law. Apparently the court agreed with the position taken by the plaintiffs that the funding inequities and inadequacies seen in Alabama schools were significant factors in schools of substandard quality as measured by, among other things, poor student performance.

In October 1993 the court issued a preliminary remedy order, giving a framework for remedying the deficiencies in the state's public school funding

system. The specific details of a new funding system which would meet the requirements of the framework outlined by the court were to be the responsibility of the legislature.

Since the time of the court's remedy order, several significant events have taken place. The court has granted several continuance motions, pushing back the deadlines for submission of detailed funding reform plans, pursuant to the remedy order. The governor's office has changed hands twice since the court ruling, a number of new legislators have been elected, and a new State Superintendent of Education has been appointed. In August 1995 Judge Gene Reese, the presiding judge who ruled the state's funding system unconstitutional, voluntarily stepped down from the case. A judicial inquiry commission had concluded that there might be an accusation of impropriety due to Judge Reese's promotion of his 1994 candidacy for the Alabama Supreme Court through publicity of his court ruling in the funding case. Judge Sally Greehaw was appointed as the new judge in this ongoing case.

Recent Federal Legislation Impacting School Funding

Many of the education reform efforts in recent years have called for increased levels of funding, especially for instructional programs, in an attempt to improve student performance. The amount of funds available for these school expenditures has been impacted by expenses resulting from regulations contained in several pieces of federal legislation passed by Congress during the last five years.

Nudel (1995) discussed the impact of one of the most significant civil rights bills in the last quarter century, the Americans With Disabilities Act (ADA), passed by Congress in 1990. Title II of the ADA, which went into effect on January 26, 1992, prohibits discrimination on account of disability and requires reasonable accommodation of disabled persons. The substantive

provisions of the ADA spring directly from Section 504 of the Rehabilitation Act of 1973. Under Section 504's rules, public schools have been prohibited for over 20 years from discriminating on account of handicap.

Section 504, however, never provided victims of discrimination the same incentive to bring lawsuits that the ADA now provides. Under the Rehabilitation Act of 1973, for example, compensatory damages for pain and suffering are not available to private litigants. Under the ADA, by contrast, plaintiffs may seek to recover damages for future monetary losses, emotional pain and suffering, mental anguish, and inconvenience.

In addition to the enormous costs involved in such litigation, schools in the United States have calculated that they will need to spend \$5.2 billion in the next 3 years to make their buildings accessible to the disabled, under the rules of the ADA. Therefore, for many school systems, the question is not whether to comply with the ADA, but how to pay for the changes and the legal costs.

In 1989 the United States Supreme Court handed down a series of decisions that made it more difficult for plaintiffs to win claims of employment discrimination. Over the next 2 years, Congress considered a series of bills aimed at reversing or modifying the effect of these Supreme Court decisions. In November of 1991, Congress passed the Civil Rights Act of 1991. Allred (1992) discussed this important piece of legislation and its impact on public schools. This act prohibits discrimination in any aspect of employment--including the making, performance, modification, and termination of contracts.

One of the criticisms leveled at Title VII of the Civil Rights Act of 1964 was the limited scope of relief available to plaintiffs. Under Title VII, the courts could grant equitable relief to a prevailing plaintiff, but could not

assess damages against an employer. The Civil Rights Act of 1991 authorizes the recovery of both compensatory and punitive damages for intentional discrimination, in addition to the relief authorized by Title VII, the ADA, and the Rehabilitation Act of 1973. A potentially far-reaching effect of the Civil Rights Act of 1991 is its provision that a plaintiff may demand a jury trial. Civil rights activists have argued that juries are more sympathetic than judges to discrimination claims and are more willing to award damages. The liability incurred by public school systems will be limited, however, because the act does not authorize the assessment of punitive damages where the employer is a governmental agency. Nevertheless, the act clearly shifts the balance of power back toward plaintiffs in employment litigation and increases the potential liability of employing boards of education. The availability of compensatory damages and jury trials may well spur an increase in such litigation.

One additional law whose regulations have impacted the expenditure of public school funds is the Family and Medical Leave Act of 1993 (FMLA). Marcus (1994) analyzed the FMLA and its impact on employers. The FMLA was signed into law on February 5, 1993, with the effective date of the law being August 5, 1993. Under the FMLA, employees may be entitled to as much as 12 weeks of unpaid leave under certain circumstances. The FMLA confers new rights on qualified employees and creates new obligations for covered employers.

The United States General Accounting Office has estimated that, each year, approximately 2.5 million workers would take leaves of absence under the terms of the FMLA. The cost to employers for maintaining the health insurance for that number of workers out on leave was estimated at \$674 million. To the extent that such workers are employed by boards of education,

school systems will incur significant costs as they comply with the regulations of the FMLA.

Summary of Literature Review

The literature which examines the relationship between school expenditures and student achievement reflects the lively debate this issue has generated over the past two decades. Early studies examining this relationship found inconsistent effects, with these contradictory results being at least partially attributable to the happenstance quality of the data used in some of the studies. The literature in this area also has been somewhat fragmented, with significant research in one discipline often being unknown to researchers in other disciplines. This situation was due, at least in part, to the way researchers from different disciplines phrased research questions, as well as the preferred statistical methods various disciplines brought to the study of this relationship.

In recent years, however, the research in this area has improved in statistical precision, theoretical relevance, and practical value. This research has made some important contributions to understanding the relationship between school inputs and student outcomes. Nevertheless, researchers still have, at times, reached contradictory conclusions, and the literature has chronicled the continuing debate about the nature of the relationship and the resulting educational policy decisions. This debate is exemplified by the recent interchange between the economist Hanushek (1994), and the educational researchers Hedges, Laine, and Greenwald (1994). Hanushek contends that there is no strong or systematic relationship between key school resources and student performance, and thus he warns against "throwing money at schools." Hedges, Laine, and Greenwald, on the other hand, conclude that resource inputs have positive effects on student outcomes large

enough to be of real importance and assert that educational fiscal policies should be formed in view of these effects.

The area of educational funding reform and specifically, funding litigation, has contributed significantly to the literature of school inputs and student outcomes in the last 20 years. School finance court cases have featured plaintiffs who argue that a strong, positive relationship exists between expenditures and achievement, while defendants argue that no such relationship exists. Such cases, and the resulting judicial rulings, have further defined, from a legal perspective, the relationship between school inputs and student outcomes.

Chapter III METHODOLOGY

Introduction

In recent years, researchers from several different fields of study have investigated the relationship between various school inputs and the resultant student outcomes. Most of these studies have examined a broad range of inputs, such as family income, family composition, level of parental education, teacher education and experience, staff ratios, as well as various fiscal resources. Relatively few studies have focused their investigation on specific school district expenditures and their relationship to the outcome of student academic achievement.

This study examined the relationship between each of three categories of Alabama public school expenditures and student academic achievement. In addition, the study investigated whether the relationship between expenditures and achievement is related to the socioeconomic conditions in a school district.

This chapter describes the student population studied, the design of the study, and how the data were collected and analyzed.

Subjects

The subjects in this study were 4th, 7th, and 10th grade students enrolled in the public schools of the state of Alabama. All students in these three grades who took the complete battery of the Stanford Achievement Test (SAT) were included in the study. Those who did not take the complete

battery include Special Education students whose Individualized Educational Plans did not call for them to take the Stanford Achievement Test. The number of students included in the data for this study was approximately 50,000 to 60,000 per grade level.

Research Design

This correlational study investigated the relationship between public school expenditures and student academic achievement. The expenditure variables used in the study were the expenditures per student in each of 127 Alabama public school districts for each of the following categories:

- 1) instruction, which are monies budgeted by a school district to be used at the local school level to pay the costs of direct classroom instruction;
- 2) instructional support, which are similarly budgeted monies to pay the costs of local school administration, counselors, media specialists, and other instructional support services; and
- 3) general administration and central support services, which are monies budgeted to pay the costs of a district's superintendent, central office administrative staff and support personnel, and other systemwide administrative costs. In any given category, expenditures per student means the average amount of money a school district spends for each student in the district. This amount is calculated by dividing the total district expenditures in that category by the average daily attendance (ADA) for the district.

The student achievement variables were the 4th, 7th, and 10th grade district mean complete battery normal curve equivalent scores from the Stanford Achievement Test.

Data Gathering

The per student expenditures data for each public school district were gathered from the Alabama State Department of Education's Annual Report (1994). This document provides the most recent data available on expenditures per student, based on ADA, for each of the expenditure categories examined in this study.

The student achievement data were gathered from information compiled by the Alabama State Department of Education, showing the results of the Spring 1995 administration of the Stanford Achievement Test. This information contained the mean scores by grade level for each public school district in Alabama.

Data Analysis

The relationship between the expenditure and achievement variables was analyzed by first constructing a correlation matrix. This was done by computing Pearson product-moment correlation coefficients between each achievement and expenditure variable.

The achievement variables were then regressed on the expenditure variables to determine whether the relationships between various expenditure categories and achievement were significant.

The data were further analyzed to investigate whether the relationship between expenditures and achievement remained the same when the socioeconomic conditions were held constant. Correlation coefficients, including 95% confidence intervals, were computed for each of four school district clusters. These clusters are homogeneous groupings of school districts based on the socioeconomic conditions of the community served by the school district. Conditions used to group the districts are per capita income, percentage of students eligible for free or reduced-price lunches, and the yield

per mill per student of district tax. These confidence intervals were compared to determine whether there was a significant difference in the relationship between expenditures and achievement for students in the school district clusters.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

This study examined the relationship between school expenditures and student academic achievement, using data from 127 public school districts in Alabama. In addition, the study investigated whether the relationship between expenditures and achievement was related to the socioeconomic conditions in a school district. This chapter presents a discussion of the results obtained during the data analysis of the research. The results are reported in four sections: 1) the relationship between instructional expenditures and student achievement; 2) the relationship between instructional support expenditures and student achievement; 3) the relationship between general administration and central support services expenditures and student achievement; 4) a comparison of the expenditures/achievement relationships, based on school district clusters.

The Relationship Between Instructional Expenditures and Student Achievement

The relationship between instructional expenditures and student achievement was analyzed by first computing Pearson product-moment correlation coefficients between these expenditures and the achievement scores at the 4th, 7th, and 10th grade levels. The achievement variables were then regressed on the instructional expenditures variable and bivariate

regression analyses were conducted to determine whether the relationships between these variables were statistically significant.

Table 1 shows the calculated Pearson correlations (Pearson r), coefficients of determination (r^2), F -ratios, and p -values between the independent variable (instructional expenditures) and each dependent variable (student achievement at the 4th, 7th, and 10th grade levels).

Table 1

Instructional Expenditures as Correlates of Student Achievement

	<u>Pearson r</u>	r^2	<u>F-ratio</u>	<u>p-value</u>
Fourth Grade	.309	.096	13.219	<.001
Seventh Grade	.288	.083	11.250	.001
Tenth Grade	.232	.054	7.039	.009

The results presented in Table 1 indicate that a significant relationship exists between instructional expenditures and student achievement at all three grade levels examined. The alpha level for statistical significance that was used in this study was .05. The calculated F -ratios at all three grade levels have p -values which make them significant even at the .01 level. The relationship between these two variables appears to be strongest at the 4th grade level, where the coefficient of determination (r^2) value of .096 indicates that approximately 10 % of the variation in the dependent variable (achievement) is accounted for by the independent variable (instructional expenditures).

The Relationship Between Instructional Support Expenditures and Student Achievement

The relationship between instructional support expenditures and student achievement was analyzed by computing Pearson product-moment correlation coefficients between these expenditures and the achievement scores at the 4th, 7th, and 10th grade levels. The achievement variables were then regressed on the instructional support expenditures variable and bivariate regression analyses were conducted to determine whether the relationships between these variables are statistically significant.

Table 2 shows the calculated Pearson correlations (Pearson r), coefficients of determination (r^2), F -ratios, and p -values between the independent variable (instructional support expenditures) and each dependent variable (student achievement at the 4th, 7th, and 10th grade levels).

Table 2

Instructional Support Expenditures as Correlates of Student Achievement

	<u>Pearson r</u>	r^2	<u>F-ratio</u>	<u>p-value</u>
Fourth Grade	.153	.023	2.977	.087
Seventh Grade	.115	.013	1.649	.202
Tenth Grade	.111	.012	1.560	.214

The results presented in Table 2 indicate that instructional support expenditures are not significantly related to academic achievement at any of the three grade levels examined. The calculated F -ratios at all three grade levels have p -values that exceed the alpha level of .05. Even at the 4th grade,

where the relationship shows the highest correlation among the three grade levels, the r^2 value of .023 indicates that only about 2 % of the variation in the achievement variable is accounted for by the instructional support expenditures variable.

The Relationship Between General Administration and Central Support Services Expenditures and Student Achievement

The relationship between the central office administrative and support expenditures and student achievement was also analyzed by computing correlation coefficients between these expenditures and the achievement scores at the 4th, 7th, and 10th grade levels. The achievement variables were then regressed on the central office expenditures variable and bivariate regression analyses were conducted to determine whether the relationships between these variables were statistically significant.

Table 3 shows the calculated correlation coefficients (Pearson r), coefficients of determination (r^2), F -ratios, and p -values between the independent variable (central office expenditures) and each dependent variable (student achievement at the 4th, 7th, and 10th grade levels).

Table 3

General Administration and Central Support Services Expenditures as Correlates of Student Achievement

	Pearson r	r^2	F -ratio	p -value
Fourth Grade	.139	.019	2.445	.120
Seventh Grade	.057	.003	0.407	.524
Tenth Grade	-.006	<.001	0.004	.947

The results presented in Table 3 indicate that central office expenditures are not significantly related to academic achievement at any of the three grade levels examined. The calculated F -ratios at all three grade levels have p -values that exceed the alpha level of .05. Even at the 4th grade, where the correlation is the highest among the three grade levels, the r^2 value of .019 indicates that less than 2 % of the variation in the achievement variable is accounted for by the central administration and support expenditures variable. Not only are the correlations between these expenditures and achievement the lowest among the categories of expenditures studied, the relationship at the 10th grade level shows a slight negative correlation.

A Comparison of the Expenditures/Achievement Relationships, Based on School District Clusters

This study also investigated whether the relationship between various expenditures and student achievement remains the same when the socioeconomic conditions are held relatively constant. Correlation coefficients, including 95 % confidence intervals, were computed between each achievement and expenditure variable for each of four school district clusters. These clusters are homogeneous groupings of school districts based on the socioeconomic conditions of the community served by the school district. The 95 % confidence intervals were computed using the procedure outlined by Glass and Hopkins (1984). This procedure involves the transformation of each correlation coefficient to a statistic known as Fisher's Z , the calculation of confidence intervals on each Z_r , followed by the transformation of the confidence intervals back to units of r .

Table 4 shows the calculated correlation coefficients (Pearson r), coefficients of determination (r^2), p -values, and 95 % confidence intervals between each independent variable (expenditures by category) and each dependent variable (student achievement by grade level) for the school districts in Cluster 1 (highest socioeconomic level).

Table 4

Expenditures as Correlates of Academic Achievement in Cluster 1 School Districts

Variables	Pearson r	r^2	p -value	95 % C. I.
Instruction/SAT4	.598	.357	.024	(.099, .857)
Instruction/SAT7	.676	.458	.008	(.227, .888)
Instruction/SAT10	.725	.525	.003	(.316, .906)
Inst. Supp./SAT4	.076	.006	.795	(-.474, .583)
Inst. Supp./SAT7	.173	.030	.555	(-.393, .645)
Inst. Supp./SAT10	.358	.128	.209	(-.214, .746)
Gen. Adm./SAT4	.740	.548	.002	(.344, .912)
Gen. Adm./SAT7	.718	.515	.004	(.302, .904)
Gen. Adm./SAT10	.791	.626	.001	(.449, .931)

The results presented in Table 4 indicate that a statistically significant relationship exists between instructional expenditures and student achievement as well as between general administration expenditures and achievement among Cluster 1 school districts at all three grade levels examined. In both cases, the relationship appears to be strongest at the 10th grade level, where the coefficient of determination (r^2) values indicate that approximately 53 % and 63 % respectively, of the variation in the dependent

variable is accounted for by the independent variable. By contrast, the results presented in Table 4 indicate that instructional support expenditures are not significantly related to student achievement among Cluster 1 school districts at any of the three grade levels examined.

Table 5 shows the calculated correlation coefficients (Pearson r), coefficients of determination (r^2), p -values, and 95 % confidence intervals between each independent variable (expenditures by category) and each dependent variable (student achievement by grade level) for the school districts in Cluster 2 (second highest socioeconomic level).

Table 5

Expenditures as Correlates of Academic Achievement in Cluster 2 School Districts

Variables	Pearson r	r^2	p -value	95 % C. I.
Instruction/SAT4	.231	.054	.122	(-.064, .488)
Instruction/SAT7	.090	.008	.552	(-.206, .371)
Instruction/SAT10	.060	.004	.694	(-.238, .347)
Inst. Supp./SAT4	.155	.024	.305	(-.142, .426)
Inst. Supp./SAT7	.076	.006	.618	(-.219, .358)
Inst. Supp./SAT10	-.026	.001	.866	(-.317, .269)
Gen. Adm./SAT4	.100	.010	.509	(-.196, .379)
Gen. Adm./SAT7	-.045	.002	.765	(-.331, .249)
Gen. Adm./SAT10	.003	<.001	.987	(-.290, .296)

The results presented in Table 5 indicate that school system expenditures are not significantly related to student academic achievement

among Cluster 2 school districts. Regardless of the category of expenditures or the grade level of achievement, no combination of these variables examined approached the level of significance. Even the variables that are the most highly correlated among the Cluster 2 districts (instructional expenditures and 4th grade achievement) have a coefficient of determination (r^2) value that indicates that only about 5 % of the variation in the achievement variable is accounted for by the expenditures variable.

Table 6 shows the calculated correlation coefficients (Pearson r), coefficients of determination (r^2), p -values, and 95 % confidence intervals between each independent variable (expenditures by category) and each dependent variable (student achievement by grade level) for the school districts in Cluster 3 (second lowest socioeconomic level).

Table 6

Expenditures as Correlates of Academic Achievement in Cluster 3 School Districts

Variables	Pearson r	r^2	p -value	95 % C. I.
Instruction/SAT4	-.206	.042	.185	(-.477, .101)
Instruction/SAT7	-.073	.005	.643	(-.365, .233)
Instruction/SAT10	-.248	.061	.109	(-.510, .057)
Inst. Supp./SAT4	-.198	.039	.202	(-.471, .109)
Inst. Supp./SAT7	-.297	.088	.053	(-.549, .004)
Inst. Supp./SAT10	-.280	.078	.069	(-.536, .022)
Gen. Adm./SAT4	.102	.010	.515	(-.205, .390)
Gen. Adm./SAT7	.065	.004	.680	(-.240, .358)
Gen. Adm./SAT10	-.144	.021	.357	(-.426, .163)

The results presented in Table 6 indicate that school system expenditures are not significantly related to student academic achievement among Cluster 3 school districts. Seven of the nine expenditure/achievement relationships examined for Cluster 3 school districts are negatively correlated, indicating that increases in expenditures tend to be associated with decreases in the level of achievement. Even though none of the relationships in Cluster 3 are statistically significant, the two which approach the level of significance are both negatively correlated.

Table 7 shows the calculated correlation coefficients (Pearson r), coefficients of determination (r^2), p -values, and 95 % confidence intervals between each independent variable (expenditures by category) and each dependent variable (student achievement by grade level) for the school districts in Cluster 4 (lowest socioeconomic level).

Table 7

Expenditures as Correlates of Academic Achievement in Cluster 4 School Districts

Variables	Pearson r	r^2	p -value	95 % C. I.
Instruction/SAT4	.119	.014	.579	(-.298, .499)
Instruction/SAT7	.005	<.001	.983	(-.408, .416)
Instruction/SAT10	-.092	.009	.668	(-.478, .324)
Inst. Supp./SAT4	-.291	.085	.167	(-.622, .127)
Inst. Supp./SAT7	-.500	.250	.015	(-.756, -.111)
Inst. Supp./SAT10	-.403	.162	.051	(-.694, .000)

Gen. Adm./SAT4	.033	.001	.880	(-.376, .431)
Gen. Adm./SAT7	-.258	.067	.234	(-.606, .172)
Gen. Adm./SAT10	-.354	.125	.090	(-.662, .059)

The results presented in Table 7 indicate that a statistically significant relationship exists between instructional support expenditures and student achievement among Cluster 4 school districts at the 7th grade level. The same relationship at the 10th grade level approaches the level of significance. In both cases, the variables are negatively correlated, indicating that increases in expenditures tend to be associated with decreases in the level of achievement. In addition, four other nonsignificant expenditure/achievement relationships among Cluster 4 districts are negatively correlated.

The 95 % confidence intervals around each correlation coefficient for a school district cluster were compared among the corresponding correlations for other clusters. For example, the confidence intervals around the instructional expenditures/4th grade achievement correlation for each cluster were examined to determine whether a significant difference existed in this relationship for students living under the various socioeconomic conditions represented by the four clusters.

With only a few exceptions, the confidence intervals around corresponding correlations for each cluster have numerical ranges which overlap, indicating that the relationships do not differ significantly from cluster to cluster. In a few cases, however, the confidence intervals for corresponding correlations indicate statistically significant differences exist among the expenditures/achievement relationships for various levels of socioeconomic conditions. Among instructional expenditures, the 95 % confidence intervals indicate that the relationship between these expenditures

and student achievement at the 10th grade level for Cluster 1 districts differs significantly from the same relationship among Cluster 3 districts. The correlation for these variables in Cluster 3 is negative, while the corresponding correlation in Cluster 1 is strongly positive.

The relationship between general administration expenditures and achievement at the 7th grade level among Cluster 1 districts is significantly different from the same relationship among Cluster 2 districts as well as Cluster 4 districts, based on the 95 % confidence intervals. The correlation for these variables in Cluster 1 is strongly positive, while the corresponding variables in Clusters 2 and 4 are negatively correlated.

The general administration expenditures/achievement relationship at the 10th grade level among Cluster 1 districts is indicated by the confidence intervals to be significantly different from the same relationship among districts in Clusters 2, 3, and 4. The correlation for these variables in Cluster 1 is the highest correlation of variables for any cluster, while the corresponding variables in the other three clusters show either very little correlation or are negatively correlated.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FUTURE RESEARCH

Summary of the Study

This study investigated the relationship between public school expenditures and student academic achievement. The role that educational spending plays in improving academic performance has been a much-debated subject in recent years, often emerging as the central issue in education reform efforts. A number of such reform efforts have been undertaken over the past several decades, often having been mandated by state legislatures in an attempt to improve student academic performance.

The difficult problems facing public education, and particularly the decline in student performance on standardized achievement tests, have been well documented in the reports issued by several national task forces in recent years. The average student, emerging from a typical public school, often possesses skills and knowledge that are inadequate for the successful entry into the skilled labor force or transition into higher education. The various efforts to increase the level of student performance have provoked extensive discussion concerning how to accomplish this objective, with much of the debate centering around the link, if any, that exists between school expenditures and academic achievement.

This study reviewed a number of studies and reports that have investigated the relationship between spending and achievement. These

studies reported findings that were often contradictory, with some finding a significant positive relationship between funding and student achievement, while others found no such relationship.

The landmark Coleman Report (Coleman et al., 1966) was the first major research into the relationship between school expenditures and student achievement. It found that differences in school funding account for only a small fraction of the variance in student achievement. The report led to a large research effort to compile additional evidence about this relationship.

A number of other studies were reviewed that also found no significant relationship between expenditures and achievement. Among these were Jencks et al. (1972), Smith (1972), Armor (1972), and Kiesling (1969). After an extensive review, Hanushek (1986) concluded that there existed at best an ambiguous relationship between student performance and the inputs supplied by schools. In this and a subsequent review (Hanushek, 1989), he asserted that school expenditures have not been shown to be systematically related to student performance.

Not all investigations of this relationship came to this conclusion, however. Several that were reviewed as a part of this study found a significant positive relationship between per pupil expenditures and achievement. Among these are studies by Perl (1973), Sebold and Dato (1981), Ferguson (1991), Hedges, Laine, and Greenwald (1994), and Lockwood and McLean (1993). Ferguson, as well as Lockwood and McLean, concluded that a curvilinear relationship exists between school expenditures and student achievement and that, until funding is increased to some threshold level, the increases have little additional impact.

The study also reviewed a number of court cases in which the courts have concluded that a direct relationship exists between per pupil

expenditures and the quality of educational programs. This presumption has led to rulings that a number of state school finance systems were unconstitutional (including Alabama's, based on a 1993 court ruling).

This correlational study examined the relationship between each of three categories of school expenditures--instruction, instructional support, and general administration and central support services--and student performance as measured by the Stanford Achievement Test. The subjects were 4th, 7th, and 10th grade students enrolled in the public schools of Alabama.

The data were analyzed by computing Pearson product-moment correlation coefficients between each achievement and expenditure variable, with the achievement variables then being regressed on the expenditure variables to determine whether the relationships were significant. In addition, confidence intervals were computed for each of four school district clusters, and these were compared to determine if there was a significant difference in the relationship between expenditures and achievement for students in the various clusters.

Conclusions of the Study

The results obtained during this investigation into the relationship between school expenditures and student achievement lead to four primary conclusions, which are related to the study's four basic research questions. These conclusions, with accompanying discussion, are presented in this section.

1. There is a significant, positive relationship between Alabama public school instructional expenditures and student academic achievement. Regression analysis results indicate that this relationship exists across student age groupings--whether elementary, middle school, or high school. At each age level, larger expenditures to pay the costs of direct classroom instruction

are associated with higher achievement. This positive relationship between instructional expenditures and achievement does not, of course, imply that these expenditures are the only factor determining the level of student performance. Other factors certainly are related to achievement. Nevertheless, this study's finding of a relationship strong enough to be statistically significant even at the .01 level of significance is clearly at odds with conclusions such as those of Hanushek (1986, 1989), Kiesling (1969), and others, who concluded that expenditures are not systematically related to student performance.

This finding supports the conclusions of Sebold and Dato (1981), Ferguson (1991), and Lockwood and McLean (1993) that a significant relationship exists between instructional expenditures and student achievement. It also lends credence to the conclusions reached by the courts in many state school finance cases (including Alabama) that a direct relationship exists between per pupil expenditures and the quality of educational programs.

2. Because instructional expenditures comprise the bulk (approximately 80%) of the total per pupil expenditures investigated in this study, one might assume that the relationship between instructional expenditures and achievement extends to instructional support expenditures as well. This conclusion is not justified, however, based on the findings of this study. These findings lead instead to the conclusion that instructional support expenditures are not significantly related to the academic achievement of Alabama public school students. Higher levels of spending at the local school level to pay such costs as local school administrators, counselors, and media specialists are not associated with higher levels of student achievement at any of the three grade levels investigated. This appears to support the conclusion

of Hanushek (1986, 1989) and other economists that increased expenditures in an area which is not systematically related to achievement may result in economic inefficiency. It should be noted, however, that instructional support expenditures comprise only a small portion (approximately 17%) of the expenditures examined in this study and an even smaller portion of overall expenditures, so that the amount of spending under consideration here is relatively small.

3. This study's findings indicate that general administration and central support services expenditures are not significantly related to the academic achievement of Alabama public school students. Of the three categories of expenditures examined in this study, this category, which pays the costs of a district's superintendent, central office staff, and other systemwide administration shows the weakest relationship to student achievement. The correlations between these expenditures and achievement are the lowest among the categories of expenditures studied, with less than 2% of the variation in achievement being accounted for by variations in these expenditures. Although the percentage of funds going to general administration and central support services is quite small (about 3% of the expenditures studied), those who argue that increases in such funds would result in an inefficient allocation of resources appear to have some justification for such a position.

4. This study also compared the relationships between various expenditures and student achievement found within homogeneous groupings of school districts. These groupings, known as school district clusters, are based on the socioeconomic conditions of the community served by a school district. The study's findings indicate that the relationship between an expenditure category and achievement which exists within a cluster often

differs from the same relationship when it is based on data from all 127 districts.

Expenditures for instruction, for example, are significantly related to achievement when data from all districts are considered. However, when each cluster is considered separately, only the relationship within Cluster 1 (highest socioeconomic level) is significant, while no significant relationships are seen among the other three clusters. General administration and central support expenditures are not significantly related to achievement when all districts are considered, but among Cluster 1 districts a significant relationship exists between these two variables. As was the case with instructional expenditures, the relationships between general administration expenditures and achievement within the other three clusters are not significant.

By constructing confidence intervals around the correlation coefficients for each cluster, the data show that, in several instances, statistically significant differences exist in the expenditures/achievement relationship from one socioeconomic level (cluster) to another. These differences between clusters are seen for instructional expenditures as well as general administration and central support expenditures. For both expenditure categories, the significant difference exists when comparing the relationship in Cluster 1 (highest socioeconomic level) with one of the district clusters of lower socioeconomic level. When such a significant difference exists, in every case the Cluster 1 correlation indicates a significant positive relationship, while the corresponding correlation from Cluster 2, 3, or 4 indicates no significant relationship. Only the instructional support expenditures category showed no significant differences in the relationships among the various clusters.

The fact that the relationships between two categories of expenditures and student achievement are statistically significant for Cluster 1 school districts, while not significant for other district clusters, gives strong support to the conclusions of Lockwood and McLean (1993), as well as Ferguson (1991). Based on findings in their studies, they hypothesized that the relationship between expenditures and achievement is a curvilinear, rather than linear relationship. In such a relationship, until funding is increased to some threshold level, increases in expenditures will not be systematically associated with higher levels of achievement. Above that level, increases in achievement accelerate as funding increases, until a second threshold is reached where providing more money has little, if any, impact on achievement.

The findings of this study point toward the same conclusion about the nature of the relationship between expenditures and achievement. Among Cluster 1 school districts, where the higher socioeconomic conditions lead to higher tax bases which, in turn, allow for higher levels of expenditures, both instructional and general administration expenditures are strongly related to achievement. Among school district clusters characterized by lower socioeconomic conditions, where per pupil expenditures are at lower levels, no significant relationship is seen between expenditures and achievement. The correlations between these two expenditure categories and achievement for Cluster 1 districts that are significantly higher than those for other clusters indicate that such districts' expenditures are above the threshold level needed to have a significant impact on achievement. Education reform efforts, which seek to raise the level of student achievement, would therefore appear to be justified in calling for increases in these expenditures, considering the pattern of their relationship with achievement. In addition, the fact that general

administration and central support expenditures show an apparently curvilinear relationship with achievement, the earlier conclusion that increases in such expenditures might result in an inefficient allocation of resources no longer appears to be warranted.

Consideration must be given, of course, to the instructional support category of expenditures, where no significant relationship with achievement was found, whether examining all 127 districts together or separated by clusters. One obvious possible conclusion is that instructional support expenditures simply are not systematically related to student achievement. Another possible explanation, however, given the pattern of cluster correlations seen for other expenditure categories, is that the level of spending for instructional support in even the wealthiest Alabama school districts may not have reached the threshold necessary to begin seeing a significant relationship with achievement.

Implications for Future Research

This study's purpose was to investigate the relationship between Alabama public school expenditures and student academic achievement. Because the study was confined to Alabama school districts and was limited to achievement data from 4th, 7th, and 10th grade students, generalizations to other populations may be limited. A major conclusion of this study was that the higher correlations seen among Alabama districts with higher per pupil expenditures provide evidence for a curvilinear relationship between expenditures and achievement. A similar study which examines school districts outside of Alabama should prove useful through a comparison of its findings to those of this study. Because the level of education funding in Alabama is among the lowest in the nation, such a study would likely provide data from districts with higher per pupil expenditures than those in Alabama,

above the hypothesized threshold level. If expenditures above this threshold level were systematically related to accelerated increases in achievement, this would support not only the conclusion of a curvilinear relationship, but would support Lockwood and McLean's (1993) hypothesis that the relationship is defined by an ogive shaped curve, with lower and upper thresholds.

An expanded study that examines additional expenditure categories and achievement data from other grade levels should also be conducted. Such an expanded study would provide further insight into the nature and extent the expenditures/achievement relationship.

This study was not meant to be an investigation of all possible factors involved in student achievement. The conclusions regarding significant relationships between expenditures and achievement do not imply that expenditures are the only, or even the primary factor involved in achievement. The evidence simply indicates that, above a certain level, some expenditures have a significant impact on achievement. Another study which includes other variables such as extent of parents' education, teacher experience, and student intellectual level would provide useful information about the extent to which variations in achievement are accounted for by such factors, thus adding to the overall understanding of the factors involved in student achievement.

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