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The Impact of School Resources on Elementary Students' Achievement in Reading and Mathematics in a Selected Wisconsin School District

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THE IMPACT OF SCHOOL RESOURCES ON ELEMENTARY STUDENTS' ACHIEVEMENT IN READING AND MATHEMATICS IN A SELECTED WISCONSIN SCHOOL DISTRICT

by

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The purpose of this study was to determine which of the selected school resources had the greatest impact on reading and mathematics achievement of third and fifth grade students in an intermediate-sized Wisconsin school district. While the majority of input-output studies in education have focused on minority and lower socioeconomic populations, this study's population was nonminority and represented all socioeconomic groups.

The sample included 145 third and 145 fifth grade students. Data on 82 independent variables were collected and analyzed. The students' achievement test scores in reading and mathematics served as the dependent variables. Four research questions concerning the relationship between school resources and achievement were established. Stepwise multiple linear regression analysis was used to examine the relationship between the independent and dependent variables.

The student-related variables that contributed toward achievement in reading and/or mathematics included the following: instructional level in reading, instructional level in mathematics, family income, father's occupation and mother's education, age, days absent, custodial parent, attitude toward subject and teacher, and years in present school. Included among the teacher/classroom variables that contributed

toward achievement were the undergraduate college the teacher attended, minutes per day of reading and mathematics instruction, expenditures on mathematics textbooks, years teaching experience, and the "structured-ness" of the school. The principal-related variables that contributed toward achievement included the Leader Behavior Description Questionnaire production score, sex, administrative certificates, and the college from which the principal's master's degree was earned.

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VITA

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She attended the public schools in Schuyler, Nebraska, graduating from high school in 1965. In May, 1969, she was awarded the Bachelor of Arts degree in History from Marquette University in Milwaukee, Wisconsin. She earned the Master of Arts degree in History from the University of Wisconsin-Milwaukee in May, 1975, and the degree of Master of Education in Educational Administration from Loyola University of Chicago in February, 1976.

From 1969 to 1973 she taught at St. Robert School, Shorewood, Wisconsin, and at St. Bernard School, Wauwatosa, Wisconsin. She was an editor at Scott, Foresman and Co., Glenview, Illinois, from 1973 to 1975. During the 1975-76 school year she served as an administrative intern through Loyola University of Chicago's Department of Administration and Supervision in School District 13, Bloomingdale, Illinois. She was an assistant principal at Dirksen Junior High School in School District 149, Dolton, Illinois, from 1976 to 1978. In 1978 she became Principal of Merrill Middle School, Oshkosh, Wisconsin. During the 1980-81 school year she served as a graduate assistant in the Department of Administration and Supervision of Loyola University of Chicago. Since August, 1981, she has been employed as Principal of Palos West Elementary School, School District 118, Palos Park, Illinois.

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CHAPTER I

INTRODUCTION

Public education is an integral part of life in the United States. During most of the 20th Century it has been the social institution charged with the responsibility of teaching children the necessary skills to become productive workers and of instilling in the nation's children the attitudes and values to become good citizens. In 1960 $15.9 billion were spent in providing elementary and secondary public schools with the resources to carry out these tasks. In 1970 the amount spent had risen to $41 billion, and in 1980 $96.4 billion were spent.[1]

Accompanying the growth in expenditures for education has been an increasing concern for accountability--achieving the most efficient use of the resources devoted to education. The demand for accountability includes fiscal accountability and instructional accountability. The direct relationship between public concern for the cost of education and the demand for accountability was demonstrated by the Gallup Polls of public attitude toward education. Americans rated the financial crisis as the number one problem of local schools in 1971, the number three

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[1] United States Bureau of the Census, Statistical Abstract of the United States, 1982-83 (Washington D.C.: Government Printing Office, 1982), p. 136.

problem in 1978, and the number four problem in 1983.[2] Taxpayers wanted to know how efficiently their educational dollars had been spent before they would agree to support new school programs. School people were urged to adopt business management techniques for resource allocation and planning. School administrators were introduced to management by objectives, Program Evaluation and Review Techniques (PERT), and Program Planning and Budgeting System (PPBS).

The demand for instructional accountability was endorsed by many sources, including President Nixon in his message to Congress on Education Reform in 1970. The President stated:

> In developing these new measurements, we will want to begin by comparing the actual educational effectiveness of schools in similar economic and geographic circumstances. We will want to be alert to the fact that in our present educational system we will often find our most devoted, most talented, hardest working teachers in those very schools where the general level of achievement is lowest. They are often there because their commitment to their professions sends them where the demands upon their profession are the greatest.
>
> From these considerations we derive another new concept, "accountability." School administrators and school teachers alike are responsible for their performance and it is in their interest as well as the interests of their pupils that they be held accountable. . .[3]

Official endorsements of the accountability movement prompted the preparation and enactment of legislation in many states. In recent years

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[2]George Gallup, "The Third Annual Survey of the Public's Attitudes Toward the Public Schools, 1971," Phi Delta Kappan 53 (September 1971):41; George Gallup, "The 10th Annual Survey of the Public's Attitudes Toward the Public Schools, 1978," Phi Delta Kappan 60 (September 1978):34; and George Gallup, "The 15th Annual Survey of the Public Attitudes Toward the Public Schools, 1983," Phi Delta Kappan 65 (September 1983):34.

[3]Richard M. Nixon, "Special Message to Congress on Education Reform," March 3, 1970.

nearly 40 states have established minimum competency testing programs covering the basic skills of reading, writing, and mathematics.[4]

To exacerbate the status of American public education even further revenue available to local school districts is dwindling due to declining enrollments, soaring energy costs, taxpayer revolts, and federal budget cuts. Ever since California voters approved Proposition 13 in 1978, the mood of the country has moved steadily toward lower spending for social programs like education. By 1981, 17 states had adopted either constitutional or statutory limits on taxation or spending.[5] President Reagan's budget for fiscal year 1982 included a 20% cutback in the overall budget for elementary and secondary education.[6] Reagan's budget for fiscal year 1985 asks for an allocation for education of about $500 million less than President Carter's 1981 budget.[7]

Given this climate of escalating costs, declining revenues, and a greater interest in accountability, local school district administrators need to develop different ways to allocate limited school resources to maximize the school's principal product--student achievement. One

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[4] W. James Popham, "The Case for Minimum Competency Testing," Phi Delta Kappan 63 (October 1981):89.

[5] Chris Piplo, "Rich States, Poor States," Phi Delta Kappan 62 (June 1981):722.

[6] "Reagan Budget Has Chops and Blocs," Education USA 23 (February 16, 1981):198.

[7] "Reagan, Carter Fourth Budget Requests," Education USA 26 (February 6, 1984):183.

tool that can be used to provide useful data to school administrators is an input-output study. Through an input-output study school district officials can determine the relative impact of the different input variables, such as student, teacher, principal, and school characteristics, on school outputs, which are typically measured as student achievement in reading or mathematics.

Background of the Study

Input-output studies in education have been conducted for about 25 years. The approach to input-output analysis used most frequently is the education production function. The production function expresses mathematically the relationship between school inputs, such as student, teacher, principal, and school characteristics, and school outputs--student achievement. With the production function model, an attempt is made to determine the relative impact of the different input variables on the output measure(s).[8]

Until recently, input-output studies in education have relied upon aggregated data using measures of central tendency over large populations and geographic areas. Typically these studies report student achievement as the mean test scores for the sample and the inputs as the

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[8]Richard A. Rossmiller and Terry G. Geske, Economic Analysis of Education: A Conceptual Framework (Madison, Wisconsin: Wisconsin Research and Development Center for Cognitive Learning, 1977), pp. 1-10; and R. Gary Bridge, Charles M. Judd, and Peter R. Moock, The Determinants of Educational Outcomes (Cambridge, Massachusetts: Ballinger Publishing Company, 1979), pp. 1-6.

averages for the selected resources, for example, the average years of teacher experience, the average number of library books per school, or the average daily attendance of a school. These studies utilizing aggregated data have, for the most part, concluded that out-of-school variables, such as socioeconomic status, have a more significant impact on student achievement than in-school variables.[9]

In the middle 1970's disaggregated data or data collected on individual students were used in several input-output studies.[10] Disaggregated data allow the researcher to focus on the achievement of individual students rather than on the mean achievement of students. These studies which utilized disaggregated data revealed some interesting findings and conclusions about in-school variables. Thus input-output studies which utilize disaggregated data are more useful to local school district administrators than studies which utilize aggregated data.

To date most input-output studies have focused on minority and low socioeconomic populations. Given the federal government's efforts, particularly in the 1960's, to provide an equal educational opportunity for all students, this concentration on minority populations was not

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[9]Rossmiller and Geske, pp. 1-10.

[10]Anita A. Summers and Barbara L. Wolfe, "Which School Resources Help Learning? Efficiency and Equity in Public Schools," Federal Reserve Bank of Philadelphia Review (February 1975):4-29; and Richard C. Murnane, The Impact of School Resources on the Learning of Inner City Children (Cambridge, Massachusetts: Ballinger Publishing Co., 1975).

surprising. The Coleman study published in 1966 and the dozen or so studies which reanalyzed the Equal Educational Opportunity data[11] were evidence of this focus on minority populations.

The populations used for input-output studies typically consisted of several school districts or one large urban system. Examples of input-output studies utilizing samples from several school systems include the Benson,[12] Kiesling,[13] and Cohn[14] studies. Benson collected data from 249 California school districts; Kiesling's sample included 102 New York school districts; and Cohn studied 377 high schools in Iowa. The Katzman,[15] Summers and Wolfe,[16] and Murnane[17] studies serve as examples of studies of large urban school systems. The Boston Public School

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[11] James S. Coleman et al., Equality of Educational Opportunity, (Washington, D.C.: U.S. Department of Health, Education and Welfare, 1966). The EEO data bank included approximately 450,000 non-whites and 195,000 whites in its sample.

[12] Charles S. Benson et al., State and Local Fiscal Relationships in Public Education in California (Sacramento, California: Senate of the State of California, 1965).

[13] Herbert J. Kiesling, "Measuring a Local Government Service: A Study of School Districts in New York State," Review of Economics and Statistics 49 (August 1967):356-67.

[14] Elchanon Cohn, "Economies of Scale in Iowa High School Operations," Journal of Human Resources 3 (Fall, 1968):422-34.

[15] Martin T. Katzman, "Distribution and Production in a Big City Elementary School System," Yale Economic Essays 8 (Spring 1968):201-256.

[16] Summers and Wolfe, pp. 4-29.

[17] Murnane, pp. 5-10.

System was studied by Katzman; Summers and Wolfe studied the Philadelphia School System; and the New Haven, Connecticut School System was the focus of Murnane's work.

Purpose of The Study

The purpose of this input-output was to determine which of the selected school resources had the greatest impact on reading and mathematics achievement of third and fifth grade students in an intermediate-sized Wisconsin school district. The application of an input-output study to an intermediate-sized school district was intended to yield conclusions that would be useful to the administrators of the school district studied and to administrators in other intermediate-sized school districts.

Disaggregated data were used in this input-output study. Because most of the data were operationalized on a per-student basis, the analysis focused on the impact of specific school resources on the achievement of individual students. The uniqueness of this research study was in the population studied. The population represented by the sample was predominantly nonminority, and it included all socioeconomic groups. As indicated previously, the majority of input-output studies have focused on minority and lower socioeconomic populations. Secondly, the sample for this study consisted of one intermediate-sized school district rather than a number of school districts or one large urban school system. Because this study's sample was nonminority and represented all socioeconomic groups in one intermediate-sized school district, it

resembles about 7% of the school districts throughout the United States which represents about 18% of the students in K-12 public schools.[18] Therefore, the study's findings are useful to school administrators who are interested in manipulating school resources to maximize student achievement.

Limitations

Input-output studies are not without their limitations. Those applicable to this study are given below:

1. The first limitation encompasses the reliability of the quantitative data gathered on the independent variables. While a concerted effort was made to gather reliable data on the 82 independent variables, several of the independent variables, namely the variables that described the results of the Attitude Toward School Inventory, the Dimensions of Schooling Questionnaire, and the Leader Behavior Description Questionnaire, were only as reliable as the individuals who completed them were honest in their responses.

2. Data for all the independent variables in the study were not aggregated to the level of the student. The unit of observation for each student-related independent variable was the individual student while the teacher/classroom-related independent variables were aggregated at the level of the classroom, and the principal-related and school-related variables were aggregated at the level of the school.

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[18] Sandra Pulman, ed., Standard Education Almanac 1982-83 (Chicago: Professional Publications, 1982), p. 42.

3. Due to the time and manpower restraints of the researcher, this study measured the inputs and outputs at just one point in time. If longitudinal data had been employed, the inferences drawn from the results of the study would be even more noteworthy.

4. The problem of multicollinearity, which exists when independent variables are highly correlated with each other, can affect the results of a study using multiple regression analysis. Even though an attempt was made to control the problem of multicollinearity by eliminating one or more of the independent variables from the regression model when the correlation among independent variables was $\geq .60$, the problem of multicollinearity still remains a limitation.

5. Due to the time and manpower restraints of the researcher, this study's population included only one school district. Had the sample been drawn from several school districts, the findings could be generalized even more.

6. Since the independent variables in the regression models did not account for nearly all (90% or more) of the total variance in the dependent variable, the possibility existed that other independent variables could have altered the correlations of the independent variables already in the models.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Input-output studies in education have been conducted for several decades. As in other areas of research, researchers conducting input-output studies have learned from previous studies, and subsequent studies are more sophisticated and reveal more about the impact of various school resources--inputs--on school outputs, which are usually measured as student achievement.

In the earliest input-output studies, data were aggregated at either the school or school district level. Perhaps the most well known input-output study is the Equality of Educational Opportunity Report, commonly referred to as the Coleman Report.[1] The data in this study were aggregated at both the individual student and school level. Following this landmark report, several researchers sought to improve upon Coleman and his associates' analysis of the data by utilizing the EEO data in their own studies. Several recent input-output studies have made major contributions to the literature because the researchers employed disaggregated data. Disaggregated data allow the researchers to focus on the achievement of individual students.

For organizational purposes this review of the related literature is broken into five sections. The first section deals with input-output studies utilizing aggregated data. In the second section the

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[1] Coleman et al.

Coleman Report and related studies which used the EEO data are discussed. The third section deals with the input-output studies which utilized disaggregated data. The fourth section discusses several important studies from the related literature on school effectiveness studies. A brief summary highlighting the findings of the input-output studies reviewed concludes Chapter II.

Input-Output Studies Utilizing Aggregated Data

The first large scale input-output study was conducted in 1956 for the Educational Testing Service by Mollenkopf and Melville.[2] The unit of analysis in this study was the school, and the researchers' nationwide sample consisted of approximately 9,500 ninth grade students in 100 schools and 8,400 twelfth grade students in 106 schools. Data on the 34 independent variables were obtained from questionnaires completed by the school principals while the dependent variables were drawn from special tests designed by the Educational Testing Service to measure aptitude and achievement. The researchers attempted to control for socioeconomic factors and used multiple regression techniques in the analysis of the data. Mollenkopf and Melville reported significant relationships between student achievement and the following school resources: number of special staff; class size; student-teacher ratio; and instructional expenditures per student.

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[2]William G. Mollenkopf and S. Donald Melville, A Study of Secondary School Characteristics as Related to Test Scores (Princeton: Educational Testing Service, 1956).

Another of the early input-output studies was done in 1959 for the State of New York by Goodman.[3] In this study, commonly referred to as the Quality Measurement Project, the school district was the unit of analysis. The sample consisted of 70,000 seventh and eleventh graders in 102 school districts. After controlling for the effects of the parents' socioeconomic status, Goodman, as did Mollenkopf and Melville, found relationships between student achievement and the number of special staff and instructional expenditures per student. In addition Goodman found teacher experience as measured by the number of teachers in a district with five or more years of experience and classroom atmosphere as measured by an observational rating of the teachers' "student orientedness" significantly related to student achievement.

A 1962 input-output study by Thomas[4] utilized Project Talent[5] and 1960 census data. The school served as the unit of analysis and tenth and twelfth grade students in 206 schools in communities with populations of between 2,500 and 25,000 comprised the sample. Thirty-two

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[3]Samuel M. Goodman, The Assessment of School Quality (Albany, New York: The University of the State of New York, State Education Department, 1959).

[4]J. Alan Thomas, "Efficiency in Education: A Study of the Relationship Between Selected Inputs and Mean Test Scores in a Sample of Senior High Schools" (Ph.D. Dissertation, Stanford University, 1962).

[5]The Project Talent survey, which was conducted in 1960, was a cooperative project of the U.S. Office of Education, the University of Pittsburgh, and the American Institute for Research. The data bank contains information on approximately 300,000 students in a stratified random sample of 1,000 high schools. The students provided detailed information about themselves and also completed aptitude, ability, achievement and interest tests, and the school principals completed questionnaires describing the nature of the schools' resources.

independent variables, which included data on home, school, and community resources, and eighteen dependent measures of student achievement were analyzed using multiple regression techniques. After taking home and community factors into account, Thomas found significant relationships between student achievement and beginning teacher salaries, teacher experience, and the number of volumes in the school library.

Two important input-output studies were completed in 1965. One of these studies was conducted by Herbert J. Kiesling and focused on some New York school districts; the other was completed by Charles S. Benson and his associates for the California State Senate, centering on some California school districts. In Benson's study[6] the unit of analysis was the school district, and the sample consisted of fifth grade students in 249 California school districts. Data for the independent variables, which included socioeconomic and demographic information about school district expenditures, were compiled from 1960 census information and school district records. Reading achievement test scores served as the dependent variable. The sample was divided into three groups based on district size. Multiple regression analysis revealed teacher salaries and instructional expenditures per student to be positively related to student achievement even when socioeconomic variables were taken into account. For medium-sized school districts (2,000 to 4,500) Benson found that the salaries of administrators were positively related to student achievement.

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[6] Benson et al.

In his study Kiesling[7] reexamined the Quality Measurement Project data. As in the Benson study, Kiesling's unit of analysis was the school district. The sample included sixth grade students in 97 New York school districts, and Kiesling divided the sample into large and small and urban and rural school districts. Dependent variables consisted of the mathematics, verbal, and composite scores on the Iowa Tests of Basic Skills while independent variables included socioeconomic attributes of the community, per student expenditure, and school district size. Kiesling found that the relationship between student achievement and per student expenditures was stronger in urban school districts, particularly urban districts containing relatively large populations of disadvantaged students, and the relationship between student achievement and expenditures was considerably weaker in rural school districts.

In 1967 Burkhead, Fox, and Holland[8] conducted an input-output study which included 39 Chicago high schools, 22 Atlanta high schools, and a sample of 177 high schools from the Project Talent data. Data for this study were aggregated at the level of the school. Burkhead and his associates found that for the Chicago schools newer school buildings were associated with lower dropout rates and teacher experience and family income were positively related to the students' reading scores. For the Atlanta schools the researchers reported that lower rates of teacher turnover were found to be positively associated with student verbal

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[7]Kiesling, "Measuring a Local Government Service," pp. 356-67.

[8]Jesse Burkhead, Thomas Fox, and John Holland, Input and Output in Large City High Schools (Syracuse, New York: Syracuse University Press, 1967).

ability. For the Project Talent sample teachers' beginning salary and years of experience and the age of the school building were all positively related to student test scores.

Four input-output studies were published in 1968. One of these studies was conducted by Katzman[9] who used data from 56 Boston elementary school districts. In addition to the typical variables used in previous studies Katzman included an index of student cultural advantage, the degree of school overcrowding, size of the school district, and the student attrition rate as independent variables and school "holding power," student "aspirations," and school attendance as dependent variables. Katzman employed multiple regression techniques and found significant relationships between student gains in reading scores and the percentage of students in the attendance area, and the percentage of teachers with 1-10 years of teaching experience.

Cohn's[10] input-output study was also published in 1968. His sample consisted of 377 Iowa high school districts. The output measure was the gain in student achievement scores between tenth and twelfth grades, and Cohn used eight school and teacher-related variables as input measures. Using multiple regression techniques he found that the higher the teachers' salary and the fewer the number of different teaching assignments for the teacher, the higher the student test scores.

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[9]Katzman, pp. 201-256.

[10]Cohn, pp. 422-34.

Raymond's[11] study of West Virginia school districts was also published in 1968. Comprising the sample were approximately 5,000 students who entered West Virginia University between 1963 and 1966 from 49 West Virginia county school districts. The freshmen year performance of the sampled students as measured by their grade point averages and scores on the ACT test served as the dependent variables. Raymond grouped the students by county and found a significant relationship between student performance and teacher salaries, with the average salary for elementary teachers having a stronger effect on student performance than the average salary for secondary teachers.

The fourth input-output study published in 1968 was conducted by Ribich.[12] As in the studies by Thomas and Burkhead and others, Ribich utilized data from the Project Talent data bank. Ribich's subsample included approximately 6,300 twelfth grade male students who ranked in the lowest quintile on measures of socioeconomic status. Expenditures per student was found to be significantly related to student achievement.

In 1969 and 1970 Kiesling published the results of two input-output studies. For both of these studies the unit of analysis was the school district. In the 1969 study[13] the sample consisted of 97 New York

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[11] Richard Raymond, "Determinants of the Quality of Primary and Secondary Public Education in West Virginia," Journal of Human Resources 3 (Fall 1968):450-69.

[12] Thomas I. Ribich, Education and Poverty (Washington, D.C.: Brookings, 1968).

[13] Herbert J. Kiesling, The Relationship of School Inputs to Public School Performance in New York State (Santa Monica, California: The Rand Corporation, 1969).

school districts and the data were collected from New York State Department of Education records. The sample was divided into five groups based on the family breadwinner's occupation, and the school districts were divided into urban and nonurban categories. Using multiple regression techniques, Kiesling found a significant relationship between student achievement, as measured by the mean sixth grade test scores on the Iowa Test of Basic Skills, and parental occupation index for all urban and nonurban subgroups. In most cases Kiesling found a negative relationship between student achievement and per student expenditure in urban districts while in nonurban districts per student expenditures did not have a significant effect on student achievement.

The sample for Kiesling's 1970 study[14] consisted of fifth and eighth grade students in 86 New York school districts. The dependent and independent variables as well as the statistical techniques employed in this study were quite similar to those used in his 1969 study. Kiesling found that student achievement was positively related to the amount of school resources devoted to central administrative and supervisory responsibilities, the level of teacher certification, and the student-teacher ratio.

Using the data on the 39 Chicago high schools that were used in the 1967 Burkhead and others study, Fox[15] conducted his own study in 1969.

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[14]Herbert J. Kiesling, The Study of Cost and Quality of New York School Districts (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970).

[15]Thomas G. Fox, "School System Resource Use in Production of Interdependent Educational Outputs," paper presented at joint meeting of the American Astronautical Society and Operations Research Society, Denver, Colorado, 1969.

For this study he used two of his original output measures--school attrition rate and reading scores--and included several new school input measures, namely the employment status of students, the percentage of student class hours in vocational courses, school building utilization rate, and man-years of teacher and support staff committed to the school. Fox found that total teacher man-years, total expenditures for textbooks and library books, and vocational class student hours had a significant relationship with both student reading scores and school "holding power."

In a 1969 study Bowles[16] utilized a sample of black twelfth grade males for whom Project Talent data were available. The unit of analysis was the school, with some of the variables measured at the individual student level. With individual student reading scores as the dependent variable, only class size was found to be significant while large class size and ability grouping were negatively related and the amount of teacher graduate work was positively related. Using mathematics scores as the dependent variable, ability grouping and the age of the school building were found to have a negative effect and per student expenditures and teacher graduate work had a positive effect. Using the third dependent measure--general academic aptitude--teacher graduate work had a positive relationship while class size and ability grouping were found to have negative relationships.

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[16]Samuel S. Bowles, Educational Production Functions (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1969).

For his study Tuckman[17] selected a subsample of 1,001 senior high schools from the current population survey of 10,700 elementary and secondary schools. Instead of using achievement measures as outputs, Tuckman used the percentage of students completing high school, the percentage continuing their education beyond high school, the percentage attending a four-year college, the percentage attending a two-year college, and the percentage attending other educational institutions. He found significant relationships between these output measures and the number of teachers with ten years of experience and the number of teachers with master's degrees.

Also utilizing the Project Talent data was Perl.[18] His sample consisted of approximately 3,300 males who were high school seniors in 1960 and who completed follow-up questionnaires one and five years after their graduation. As output measures Perl used test scores on abstract reasoning, general information, and verbal ability. These achievement measures and the family background characteristics used as independent variables were measured at the individual level while teacher and school characteristics were all aggregated at the level of the school. Perl found statistically significant relationships between student achievement and the father's educational level, the mean family income of the

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[17]Howard P. Tuckman, "High School Inputs and Their Contributions to School Performance," The Journal of Human Resources 6 (Fall 1971): 490-509.

[18]Lewis J. Perl, "Family Background, Secondary School Expenditures, and Student Ability," Journal of Human Resources 8 (Spring 1973): 156-80.

student body, and per student expenditures. When Perl stratified the sample by family income, he found that class size had an impact on the achievement of low income students and that the percentage of time that teachers spent in their teaching specialty had an impact on the achievement of high income students.

An input-output study involving 104 of the 178 public school districts in Colorado was conducted by Bidwell and Kasarda in 1975.[19] The school district served as the unit of analysis in this study, and the data were gathered from the 1969-70 annual reports of the school districts and from the 1971 summary report of the Colorado Department of Education. The major focus of this study was to examine the organizational structure of school districts. Bidwell and Kasarda's results indicate that student-teacher ratio and administrative intensity depress the median levels of achievement in mathematics and reading while staff qualifications and the percent of non-white students were found to have consistently direct effects on median achievement levels. They also found that school district fiscal resources have important indirect effects on achievement through their direct effects on school district structure and staff qualifications.

Winkler[20] conducted an input-output study in a California school district to examine the role that racial and social compositions of

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[19]Charles E. Bidwell and John D. Kasarda, "School District Organization and State Achievement," American Sociological Review 40 (February 1975):55-70.

[20]Donald R. Winkler, "Educational Achievement and School Peer Group Composition," Journal of Human Resources 10 (Spring 1975):189-205.

school peer groups play in educational production. Winkler utilized two samples composed of 388 black students and 385 white students chosen from the schools of a large urban school district during the 1964-65 school year. The student achievement scores--sixth and eighth grade percentile scores on the Stanford Reading Test--and the family background measures were measured at the individual level while student body, school, and teacher variables were aggregated at the school level. Using separate regression equations for each dependent variable for black and white students, Winkler found that teacher salary was consistently related to achievement for both samples, with the relationship stronger in the case of the white students; and that teacher's attendance at more "prestigious" colleges was consistently related to achievement for both samples. Also among Winkler's findings were that the socioeconomic composition of the peer group and the racial composition of the peer group are related to white achievement (the former a negative relationship, the latter in a positive direction), but they are not consistently related to achievement of black students; and that the change in racial composition of peers from elementary to junior high schools is related to achievement for blacks, but not for whites.

Another input-output study published in 1975 was conducted by Cohn and Millman.[21] All data in this study were aggregated at the level of the school, and the sample consisted of 53 schools in Pennsylvania.

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[21] Elchanon Cohn and Stephan D. Millman, Input-Output Analysis in Public Education (Cambridge, Massachusetts: Ballinger Publishing Company, 1975).

Twelve dependent variables were included, ranging from a self-concept index to mathematics and verbal test scores to a measure of health habits. For the two measures of academic achievement Cohn and Millman found that the teacher's teaching load and the number of curriculum units per grade had a negative impact on student achievement while verbal skills were positively affected by the number of administrative manhours per student and negatively affected by the number of auxiliary manhours and mathematics achievement were negatively related to the number of paraprofessionals included in the support staff.

The Coleman Report and Related Input-Output Studies

Published in 1966, the Equality of Education Opportunity (EEO) study[22] was the first large scale input-output study of the nation's schools. Commonly referred to as the Coleman Report, this study, which was commissioned by Congress as part of the 1964 Civil Rights Act, affected the American concept of equality of educational opportunity and also had a major effect on the methods used in educational production studies. The sample consisted of approximately 645,000 students in grades 1, 3, 6, 9, and 12 in about 3,100 schools throughout the country. The 93 independent variables were grouped into four major categories--home background characteristics, teacher characteristics, student body characteristics, and school facilities and curriculum characteristics.

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[22]Coleman et al.

Scores from a battery of tests administered by the Educational Testing Service served as dependent variables, although verbal achievement was the only dependent variable for which results were reported.

Coleman and his associates found that home background characteristics were the most important variables in explaining the variance in achievement levels for all four major subgroups of students--southern and northern blacks and southern and northern whites. Student body characteristics were the second most important group of variables in explaining the variance in the achievement of black children. Among school variables teacher characteristics had the greatest impact in explaining achievement of southern black children. For all racial and regional groups teacher characteristics had much less explanatory power than the home background variables. The least important variables were the school facilities and curriculum ones.

The Coleman study generated considerable controversy. Many researchers were unwilling to accept the findings that school resources had little or no effect upon student achievement. Critics cited three major flaws in the study, namely poor measurement of school resources, inadequate control for socioeconomic background, and inappropriate statistical technique.[23] Soon after the Coleman Report was published, other researchers began to reanalyze the EEO data and have corrected some of the problems of the original study.

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[23]Samuel Bowles and Henry M. Levin, "The Determinants of Scholastic Achievement--An Appraisal of Some Recent Evidence," Journal of Human Resources 3 (Winter 1968):3-24.

In one of the first reanalyses of the EEO data, Hanushek[24] took a subsample of all urban elementary schools for the Northeast and Great Lakes regions that had at least five black sixth graders (242 schools). His unit of analysis was the school. Unlike the Coleman findings, Hanushek found teacher characteristics to be important in both black and white achievement. Teachers' experience had a positive and significant relationship to student achievement for all dependent variables--white verbal scores, white mathematics scores, black verbal scores, and black mathematics scores--and the relationship between teachers' verbal score and student achievement was positive and significant for all equations except black mathematics achievement.

In Bowles'[25] reanalysis of the EEO data he selected a subsample consisting of 1,000 black twelfth grade students. As in the Coleman study, outputs and background variables were measured at the individual level while school and teacher characteristics were aggregated at the school level. He found teachers' verbal ability, science laboratory facilities, and length of the school year significantly related to student achievement as measured by student verbal ability scores.

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[24]Eric A. Hanushek, Education and Race: An Analysis of the Educational Process (Lexington, Massachusetts: Lexington Books, 1972).

[25]Samuel S. Bowles, "Towards an Educational Production," in Education, Income, and Human Capital, ed. W. Lee Hansen (New York: Columbia University Press, 1970), pp. 11-70.

Levin,[26] in his reanalysis of the EEO data, utilized a subsample consisting of 597 white 6th graders in 36 schools in a large Eastern city who had attended no other school. Background and the dependent variables were aggregated at the level of the individual level while the school resources were measured on the school level. Levin found a significant relationship between student achievement and two teacher-related variables--teacher experience and the quality of the undergraduate institutions attended by the teachers.

In another reanalysis of the EEO data Michelson[27] used the same subsample examined by Levin--597 white sixth graders from a large Eastern city--plus a second subsample consisting of 458 black sixth graders from the same city. Data were aggregated as in the original EEO study--dependent variables and background variables at the individual level and teacher and school variables at the school level. Michelson's study focused on teacher "specificity" because he theorized that different types of children need different types of teachers and different types of teaching methods to learn most effectively. Michelson's regression equations accounted for more variance in white achievement than in black achievement. According to his findings, students' parents' education was more important for black children than for white children. With

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[26]Henry M. Levin, "A New Model of School Effectiveness," in Do Teachers Make a Difference? (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970), pp. 56-78.

[27]Stephan Michelson, "The Association of Teacher Resourceness With Children's Characteristics," in Do Teachers Make a Difference? (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970), pp. 120-68.

respect to his major area of study--teacher characteristics--teacher experience and teacher verbal ability had an effect on white achievement, but not for black achievement while the teachers' college major was found to be negatively associated with black reading achievement and positively associated with white mathematics achievement.

In a 1971 study Guthrie and his associates[28] utilized EEO data in their study of a sample of 5,284 sixth grade students in 80 Michigan elementary schools. The sample was divided into ten subgroups based on their socioeconomic status. Among the independent variables found to be significant for at least half of the socioeconomic groups were: teacher verbal ability; teacher attitude; the number of classrooms per 1,000 students; school enrollment; number of library volumes per student; and the age of the school building.

Smith's[29] reanalysis of the EEO data was published in 1972. In his study Smith utilized a subsample that included the northern black and white students in grades 6, 9, and 12 and included the same independent and dependent variables Coleman and others had used for this subsample. After controlling for several errors and omissions that he had identified in the original analysis, Smith concluded that the Coleman findings had underestimated the importance of family background factors.

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[28]James W. Guthrie et al., Schools and Inequality (Cambridge, Massachusetts: MIT Press, 1971).

[29]Marshall S. Smith, "Equality of Educational Opportunity: The Basic Findings Reconsidered," in On Equality of Educational Opportunity, ed. Frederick Mosteller and Daniel P. Moynihan (New York: Random House, 1972), pp. 230-342.

Instead of home background characteristics explaining 10 percent of the variance in achievement between schools as in the original study, Smith found family background characteristics explaining from 50 to 70 percent of the variance for white students and about 30 percent for black students. Further, Smith's reanalysis of the data did not support Coleman's findings of the decreasing importance of family background from grades 6 to 12; Smith found an increasing relationship through the years between family background and verbal achievement. Smith also found no evidence to support the EEO conclusion that the composition of the student body influenced verbal achievement. Agreeing with the EEO findings, Smith concluded that school facilities and teacher variables had little effect on verbal achievement.

In 1972 and 1973 three reports by Mayeske and others were published. Commissioned by the U.S. Office of Education, these reports were an effort to reanalyze the massive data collected by the Equality of Educational Opportunity Survey. The first Mayeske report[30] focused on the school as the unit of analysis. Student attitudes and motivations and student achievement were selected as output measures while independent variables included students' home background, school characteristics and facilities, student programs and policies, and school personnel and personnel expenditures. Mayeske and others used the statistical techniques of regression analysis and partition

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[20]George W. Mayeske et al., A Study of Our Nation's Schools Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1972).

of multiple correlation. The study confirmed Coleman's finding that the influence of public schools on a child's level of achievement is rarely independent of his or her social background. Among the school variables those related to a school's personnel were shown to have the greatest effect on student outcomes while expenditures, school facilities, and student programs and policies were found to have a negligible effect on student outcome.

The second Mayeske report[31] focused on student achievement rather than school achievement. Again the major conclusion--that all school-related factors depended greatly on the student's family background--confirmed the EEO study's findings. Mayeske and others found that only about 4 percent of the variance in achievement was explained by school-related variables.

In the third Mayeske report[32] the student outcome studied was the students' attitude toward life. As in the other two Mayeske reports, school-related variables proved much less important in affecting students' attitudes toward life than socioeconomic status and home background variables and achievement.

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[31] George W. Mayeske et al., A Study of the Achievement of Our Nation's Students (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1973).

[32] George W. Mayeske et al., A Study of the Attitude of Our Nation's Students (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1973).

Boardman and others[33] developed a simultaneous-equations model to reanalyze a subsample of the EEO data. In this model the dependent variables consisted of verbal, nonverbal, mathematics, reading, and general information achievement. The independent variables included peer, environmental, and school-related variables. These researchers found that the average teachers' verbal score, the teacher-student ratio, teacher experience, teacher turnover, and school facilities were all positively and significantly related to the measures of student achievement. Also found to be related to student achievement were existence of problems in the school (negatively) and a school policy of regular administration of intelligence and achievement tests (positively).

Wiley[34] used EEO data on 2,519 sixth graders in the Detroit Metropolitan area to study the relationship between the amount of schooling and educational achievement. Specifically he selected reading, mathematics, and verbal achievement scores as output measures and average daily attendance, number of hours in the school day, number of days in the school year, students' role, number of children in the family, and possessions in the child's home as input measures. He concluded that increasing the quantity of schooling can result in gains in achievement.

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[33]Anthony E. Boardman et al., "A Simultaneous Equations Model of the Educational Process: The Coleman Data Revisited with an Emphasis upon Achievement," in 1973 Social Statistics Section Proceedings of the American Statistical Association, (Washington, D.C.: American Statistical Association, 1973), pp. 62-71.

[34]David E. Wiley, "Another Hour, Another Day: Quantity of Schooling, a Potent Path for Policy," in Schooling and Achievement in American Society ed. William H. Sewell, Robert M. Hauser, and David L. Featherman (New York: Academic Press, 1976), pp. 225-65.

For example, Wiley's analysis projected a 65% gain in reading comprehension scores and a 30% gain in verbal ability and mathematics achievement for a 24% increase in the quantity of schooling.

Input-Output Studies Utilizing Disaggregated Data

The first input-output study which utilized the individual student as the unit of analysis was conducted by Hanushek.[35] His sample included 1,061 third grade students in a large California school district during the 1968-69 school year. The sample was stratified into three groups: 515 white children from blue collar homes; 323 white children from white collar homes; and 140 Mexican-American children from blue collar homes. Data for the study included variables reflecting the family backgrounds of the children, reading achievement test scores for each of the children from grades one through three, and variables reflecting the background and education of each child's second and third grade teachers.

Hanushek concluded that teacher characteristics were related to achievement for white children but not for the Mexican-American children. He also found that the recentness of a teacher's educational experience was significantly related to achievement for the two white groups; that the teacher's verbal ability affects achievement only for the white blue collar group of children; and that the percentage of time spent by a teacher on discipline affects achievement among blue collar children.

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[35]Hanushek, pp. 1-25.

Hanushek did not find teacher experience and the teacher's educational level to be significantly related to student achievement.

Another input-output study utilizing disaggregated data was conducted by Murnane.[36] He studied the impact of school resources, particularly teacher characteristics, on the cognitive achievement of inner city children in the New Haven, Connecticut, public schools. Murnane's sample included 875 black children in 15 elementary schools. The sample was divided into three subgroups, and each subgroup was followed over the period of one school year. To measure cognitive achievement (output), the students' standard scores on the Metropolitan Achievement Tests of Reading and Arithmetic were used. Input variables included teacher characteristics (years of teaching experience, highest degree attained, undergraduate major, undergraduate grade point average, sex, and race); student characteristics (school attendance, family income, and sex); and class characteristics (class size, student turnover, and mean initial achievement of the class).

Based on the results gained through regression analysis techniques, Murnane concluded that certain teacher characteristics have a critical impact on student achievement. For example, he found that the effectiveness of teachers increased dramatically in the first few years of teaching, reaching a peak in the third to fifth year of teaching. Other findings were that male teachers were on the average more effective in teaching black inner city children than were female teachers with

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[36]Murnane.

the same amount of experience; that black teachers with less than six years of experience were on the average more successful in teaching reading to black children than white teachers with similar experience levels were; and that children's reading achievement was more highly influenced by their background and prior experience than was their mathematics achievement.

The other major study utilizing disaggregated data was conducted by Summers and Wolfe.[37] Their sample included almost 2,000 students at various grade levels in over 150 public schools in Philadelphia, Pennsylvania. Students' scores on the Iowa Tests of Basic Skills over a three-year period were used as the output measure. Approximately 60 input variables were studied, and these resources were divided into three classifications: socioeconomic, school resources, and school climate. Examples of socioeconomic variables included were: sex, race, family income, attendance, and residential moves. Examples of school resources includedwere: size of school, size of class, teacher's experience, teacher's national teacher examination score, teacher's credits beyond B.A., and race. Examples of school climate variables included: percent of low income pupils, percent of high achievers in school, number of disruptive incidents, and percent of minority students.

The researchers used multiple regression analysis to examine the relationship between the resource inputs and school outputs. Summers and Wolfe concluded that school inputs, particularly teachers and class

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[37] Summers and Wolfe, pp. 4-29.

size, and school climate inputs, especially racial composition, achievement mixture, and disruptive incidences, did influence student achievement. The researchers found that many school resources were effective in improving the achievement of all students and that many school resources were particularly effective when they were directed to particular types of students. For example, Summers and Wolfe found that socioeconomic disadvantaged students can bring their achievement levels closer to advantaged students if teachers from more prestigious colleges instruct them. High ability students learned more by assigning experienced teachers to work with them in elementary school. In addition, reducing the number of disruptive incidents in schools, increasing racial integration, and having more high achievers in a student body appeared to result in increasing student achievement.

Selected School Effectiveness Studies

A review of the related literature would not be complete without including several important school effectiveness studies. Two differences exist between school effectiveness studies and input-output studies in education. The first is that school effectiveness studies generally include independent variables related to the processes and climates of schools rather than independent variables related to the characteristics of students, teachers, and principals. Secondly, while some of the school effectiveness studies employ multiple regression analysis, most of the studies employ case study evaluation in their

analysis.[38] While this research study was modeled after other input-output studies in education, the findings of some of the school effectiveness studies did contribute toward the selection of some of the variables.

Brookover and others[39] observed two matched pairs of elementary schools in Michigan. The categories of independent variables were social inputs, student body composition and other personnel inputs; social structure, school size, open or closed classrooms; and social climate, school culture as the norms, expectations and feelings about the school held by the staff and the students. The dependent variables were the mean school achievement in reading and mathematics, mean student self-concept, and mean student self-reliance. The researchers found that more than 85% of the between-school variance in mean reading and mathematics achievement was explained by this combination of social system variables. Thus an effective school was described as one characterized by high evaluations of students, high expectations, high norms of achievement, with the appropriate patterns of reinforcement and instruction in which students acquire a sense of control over their environment.

In Edmonds and Frederiksen's study,[40] they utilized two sets of data to form their conclusions. One set included 2500 of the 10,000

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[38]Stewart C. Purkey and Marshall S. Smith, "Too Soon to Cheer? Synthesis of Research on Effective Schools," Educational Leadership 40 (December 1982):64-69.

[39]Wilbur Brookover et al., School Social Systems and Student Achievement. (New York: Praeger, 1979), pp. 135-148.

[40]Ronald Edmonds, "Effective Schools for the Urban Poor," Educational Leadership 37 (October 1979):15-27.

students in the 20 schools in Detroit's Model Cities' Neighborhood. The mean mathematics and reading scores for the 20 schools were compared with citywide norms, and the schools were defined as effective or ineffective. The second phase of the project was a reanalysis of the EEO data. The researchers identified 55 effective schools in the Northeast quadrant of the EEO study. After studying these data Edmonds and Frederiksen identified the following as characteristics of effective schools: they have strong administrative leadership; they have high academic expectations for all students; they have a safe and orderly environment; the curriculum emphasizes basic skills and is appropriate to the needs of the students; and student progress is monitored on a regular basis.

Rutter and others[41] studied 12 inner-city high schools in London. This longitudinal study was conducted from 1970 to 1974, and it attempted to measure school outcomes in terms of students' in-school behavior, attendance, examination success, and delinquency. The researchers found that the high schools varied in outcome in the four areas above, that these variations were associated with the characteristics of schools as social institutions, and that it was a school's ethos that influenced students as a group. School ethos included the style and quality of school life, patterns of student and teacher behavior, how students were treated as a group, the management of groups of students within the school, and the care and maintenance of buildings and grounds.

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[41] Michael Rutter et al., Fifteen Thousand Hours. (Cambridge, Massachusetts: Harvard University Press, 1979), pp. 30-42, 175-176.

Summary and Conclusions

Scholars in the field of educational production function research do not agree on the findings of the major input-output studies. Averch and his associates concluded:

> Overall, the input-output studies provide very little evidence that school resources, in general, have a powerful impact upon student outcomes. When we examine the results across studies we find that school resources are not consistently important. The particular resources that seem to be significant in one study do not prove to be significant in other studies that include the same resources in the analysis.[42]

Guthrie, after reviewing 19 major input-output studies, concluded:

> From an inspection of these digested results it is evident that there is a substantial degree of consistency in the studies' findings. The strongest findings by far are those which relate to the number of quality of professional staff, particularly teachers. Fifteen of the studies we reviewed find teacher characteristics, such as verbal ability, amount of experience, salary level, amount and type of academic preparation, degree level, job satisfaction, and employment status (tenured or nontenured), to be significantly associated with one or more measures of pupil performance.[43]

Adopting a middle of the road approach to the findings of major input-output studies was Cohn. Following his review of the literature, he wrote:

> The lack of consistent results displayed in the preceding section should not surprise anyone. Only in recent years has educational research begun to receive the attention it deserves, and even more recently has the development of our education production function come into its own. It may therefore be unrealistic to expect uniform results across such idiosyncratic and situational conditions as exist in American education at this point.[44]

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[42] Harvey A. Averch et al., How Effective is Schooling? A Critical Review and Synthesis of Research Findings (Santa Monica, California: The Rand Corporation, 1972), p. 148.

[43] James W. Guthrie, "A Survey of School Effectiveness Studies," in Do Teachers Make a Difference? (Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970), p. 45.

[44] Cohn and Millman, pp. 46-47.

Clearly additional input-output studies are needed. Because the recent studies which employed disaggregated data yielded more useful results than previous studies utilizing aggregated data, additional studies should utilize disaggregated data. Because the majority of K-12 students in the United States are nonminority and because much of the research to date has focused on minority students, additional studies should focus on nonminority populations. Because the majority of school systems in the country are either small or intermediate-sized and because many of the input-output studies conducted thus far have centered on rather large school systems, additional studies should center on small or intermediate-sized school districts. Thus this input-output study will include disaggregated data and will focus on an intermediate-sized school system whose population is predominantly nonminority.

CHAPTER III

DESIGN AND METHODOLOGY

The purpose of this study was to determine which of the selected school resources had the greatest impact on reading and mathematics achievement of third and fifth grade students in an intermediate-sized Wisconsin school district. Four research questions directed the study.

Research Questions

1. Do student-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?
2. Do teacher-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?
3. Do principal-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?
4. Do school-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?

Selection of the Sample

An intermediate-sized school district in Wisconsin served as the sample for this study. As indicated earlier, the researcher defined the population as those school districts that are nonurban, predominantly nonminority, and varied in socioeconomic representation. This school district from which the data were gathered served a community of approximately 50,000 people and the surrounding rural area.

During the 1980-81 school year this K-12 school district's enrollment of 9,184 students included 31 American Indians, 85 students of Asian background, 31 Black students, and 28 students of Hispanic origin. The total of 175 minority students was 1.9% of the total student population. Of the 3,647 students in the sixteen K-5 elementary schools, 450 students, or 12.1%, received free lunch and 189 students, or 5.2%, received reduced lunch. Further evidence of this cross section of socio-economic groups was found by examining the occupations and educational levels of the fathers of the 290 students in the sample. These data are presented in Table 1.

The random sample of 290 was selected from third and fifth grade students. These two grade levels were selected because previous studies[1] had examined data from these levels and because similar data on students in grades three and five were available. The sample consisted of five randomly selected students from each of the 29 classrooms at the third and fifth grade levels. Therefore 145 third grade students and 145 fifth grade students comprised the sample. A random numbers table was used to select the students from each classroom.

Selection of the Independent Variables

After reviewing the published input-output studies, the independent variables to be included in the study were selected. In all, data on 82 independent variables were collected and analyzed. For

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[1] For example, see Hanushek; and Kiesling, The Relationship of School Inputs to Public School Performance in New York State.

TABLE 1

OCCUPATIONS AND EDUCATIONAL LEVELS
OF FATHERS OF STUDENTS IN SAMPLE

OCCUPATION	NUMBER	EDUCATION	NUMBER
General Factory Worker	92	Some High School	14
Skilled Workers	70	Completed High School	172
Managers	31	Some College	25
Professionals	37	Completed Bachelor's	38
Sales-Related	15	Completed Master's	3
Other	10	Completed Doctorate	3
[1]No Data	35	[1]No Data	35

[1]Father not living in home.

organizational purposes, the independent variables were divided into four categories: student-related variables; teacher/classroom-related variables; principal-related variables; and school-related variables. The unit of analysis for each student-related independent variable was the individual student while the teacher/classroom independent variables were aggregated at the level of the classroom and the principal-related and school-related independent variables were aggregated at the level of the school. The selection of the independent variables in each of the four categories will be discussed in this section of the chapter.

Student-Related Independent Variables

Data on 22 student-related independent variables were collected. Nine of these variables related to family background characteristics, namely family size, mother's education, father's education, mother's occupation, father's occupation, family income, ethnic group, custodial parent, and birth order. The other variables included sex, age, days absent, years in present school, Title I status, instructional level in reading, instructional level in mathematics, report card grades in reading, report card grades in mathematics, overall report card grades, and the raw scores on the subtests of the Attitude Toward School Inventory: Attitude Toward School-General, Attitude Toward School-Subject, and Attitude Toward School-Teacher.

Several studies have included family size variables. According to these studies, children from bigger families do less well in school.[2]

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[2]Bowles, "Towards an Educational Production," pp. 11-70; Hanushek, Education and Race, Chapters 4 and 5; Levin, pp. 55-78; Michelson, pp. 120-68; and Winkler, pp. 189-205.

Eight input-output studies included parents' education as an independent variable.[3] In general, these studies found that parents' education seemed to affect positively the mathematics and verbal achievement of elementary students even when other measures of family background were controlled for. In this study data on the education of both the mother and father were included. With respect to parents' occupational status, four previous studies included data on parental occupation as an independent variable.[4] In all these studies the findings showed that the higher the parents' occupational status, the higher their children's reading and mathematics achievement. As in the case of the educational level, the occupational level of both the mother and father were included in this study.

Relative to family income, several input-output studies have found that family income seemed to have a positive effect on reading achievement.[5] Because actual family income for the students comprising the sample were not available, data on whether the student qualified to receive free lunch, reduced lunch, or had sufficient family income to qualify for neither were used as an indicator of family income level.

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[3]Bidwell and Kasarda, pp. 55-70; Bowles, Educational Production Functions; Bowles, "Towards an Educational Production," pp. 11-70; Hanushek, Chapters 4 and 5; Levin, pp. 55-78; Michelson, pp. 120-68; Murnane; and Perl, pp. 156-80.

[4]Bowles, Educational Production Functions; Katzman, "Distribution and Production in a Big City Elementary School System," pp. 201-56; Kiesling, The Relationship of School Inputs to Public School Performance; and Michelson, pp. 120-68.

[5]Burkhead, Fox, and Holland,; and Perl, pp. 156-80.

Ethnic group data have been used in many input-output studies. The most common use of ethnic data has been to partition the data so that separate regression analyses can be run for blacks, whites, or other ethnic groups. In their reanalysis of the EEO data Mayeske and others included data on ethnic group in a single production function and concluded that schools produce more learning in students who are white or Oriental-American than in Mexican-American, Indian-American, Puerto Rican, or Negro students.[6] The Mayeske and others work also included data on custodial parent(s). They found that schools produce more learning in students who have both parents in the home rather than only one or neither parent in the home.[7] To date birth order has not been included as an independent variable in input-output studies. The finding that first-borns are academically superior as a group has been fairly well established.[8] In a recent study on the relationship between birth order and academic achievement, Green found that only children were the most likely to make high grades, with later-born children least likely to make high grades, and first-born in a middle position.[9] Later-born children were over-represented with respect to both medium and low grades.

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[6]Mayeske, A Study of Our Nation's Schools, p. 2.

[7]Ibid., p. 53.

[8]John Nisbet, "Family Environment and Intelligence," in Education, Economy and Society ed. A.H. Halsey (New York: The Free Press, 1967), pp. 273-87.

[9]Ernest J. Green, Birth Order, Parental Interest, and Academic Achievement (San Francisco: R and E Research Associates, Inc., 1978).

Of the nonhome background student-related variables included in this study, the variables for age, sex, and school attendance have commonly been used in previous input-output studies. Studies have found that the older a child was relative to his or her classmates, the less well that child performed on achievement tests.[10] Studies which included sex as an independent variable reported that reading achievement had been greater for girls than for boys while mathematics achievement had been greater for boys than for girls.[11] Relative to school attendance previous input-output studies have found that reading and mathematics achievement benefited significantly from time spent in school.[12]

In addition to the above-described nonhome background student-related variables, data were collected on the years in present school; Title I status; instructional levels in reading and mathematics; overall report card grades and reading and mathematics report card grades. These variables were included because they made the production function more complete.

The other independent variables included in this section on student-related variables dealt with a measure of student attitude toward school. To date variables relating to the affective domain in input-output studies have been rather uncommon. Only four studies included

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[10]Levin, pp. 55-78; and Michelson, pp. 120-68.

[11]Levin, pp. 55-78; Michelson, pp. 120-68; and Murnane.

[12]Murnane; and Wiley, pp. 225-65.

such variables,[13] and these affective measures were primarily limited to measures of self-concept. As suggested by Bridge, Judd, and Moock,[14] a measure of student attitude toward school was included in this study. Both Bloom[15] and Jackson[16] stress the importance of including measures of the affective domain in evaluating the educational process. Interestingly the available empirical studies dealing with the relationship of student attitude and acheivement pointed to an absence of a direct link between the way students view their school life and their school achievement.[17]

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[13]Bowles, "Towards andEducational Production," pp. 11-70; Levin, pp. 55-78; Michelson, pp. 120-68; and Cohn and Millman.

[14]Bridge, Judd, and Moock, p. 289.

[15]Benjamin S. Bloom, Human Characteristics and School Learning (New York: McGraw Hill Book Company, 1976), pp. 73-107.

[16]Philip W. Jackson, Life in Classrooms (New York: Holt, Rinehart and Winston, Inc., 1968), pp. 41-81.

[17]Richard C. Diedrich, "Teacher Perceptions as Related to Teacher-Student Similarity and Student Satisfaction with School" (Ph.D. Dissertation, University of Chicago, 1966); Ned A. Flanders, Teacher Influence, Pupil Attitudes and Achievement (Washington, D.C.: U.S. Government Printing Office, 1965); Philip W. Jackson and Jacob W. Getzels, "Psychological Health and Classroom Functioning: A Study of Dissatisfaction with School Among Adolescents," Journal of Educational Psychology 50 (December 1959):295-300; L.F. Malpass, "Some Relationships Between Students' Perceptions of School and Their Achievement," Journal of Educational Psychology 44 (December 1953):475-82; Samuel Tenenbaum, "Attitudes of Elementary School Children to School, Teachers, and Classmates," Journal of Applied Psychology 28 (April 1944):134-41; and Sister M. Amatora Tschechtelin, Sister M. John Frances Hipskind and H.H. Remmers, "Measuring the Attitudes of Elementary School Children Toward Their Teachers," Journal of Educational Psychology 31 (March 1940):195-203.

Teacher and Classroom-Related Independent Variables

Eighteen independent variables that related to either teacher or classroom characteristics were included in this study. The independent variables relating directly to teacher characteristics were sex, age, years of teaching experience, undergraduate college attended, year bachelor's degree received, teaching certificates held, highest degree plus credits earned, salary, Dimensions of Schooling Questionnaire classroom score, and Dimensions of Schooling Questionnaire general score. The independent variables relating to the classroom included the following: class size; whether the classroom consisted of one grade level or two; expenditures for reading textbooks; expenditures for supplies for reading; expenditures for mathematics textbooks; expenditures for supplies for mathematics; minutes per day of reading instruction; and minutes per day of mathematics instruction. Data on each of these variables were aggregated to the level of the classroom.

Sex of the teacher has not been commonly used as an independent variable in input-output studies. Only the Murnane[18] and Perl[19] studies have examined this variable. Murnane found that men seemed to be more effective than women in teaching black inner-city school children while Perl found that men seemed to be less effective than women in teaching abstract reasoning to low income school seniors. A number of previous

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[18] Murnane.

[19] Perl, pp. 156-80.

input-output studies included a variable for the number of years of teaching experience.[20] In all of these studies a positive relationship was found between the number of years of teaching experience and student achievement. In all except the Murnane study teaching experience was aggregated at the level of the school or district. The Murnane study aggregated teaching experience data at the level of the student's classroom teacher and found that teaching experience over the first two years positively affected student achievement. However, additional years of experience showed no relationship to achievement. In this study, teaching experience was aggregated to the individual student's teacher.

Several input-output studies have included an independent variable for the type of education the teachers have received.[21] When the variable on education type was aggregated at the level of the ability track within the school there seemed to be a positive relationship between the prestige of a teacher's undergraduate institution and the reading achievement of the students. Data on whether the teachers in the sample attended the local university, which was not very prestigious, or another college or university, were included. Data on the year the 58 teachers in the sample received their bachelor's degrees were included as an independent variable. The only study to include a similar variable

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[20]Burkhead, Fox, and Holland; Hanushek, Chapters 4 and 5; Katzman, "Distribution and Production in a Big City Elementary School System," pp. 201-56; Levin, pp. 55-78; Michelson, pp. 189-205; Murnane; Perl, pp. 156-80;and Summers and Wolfe, pp. 4-29.

[21]Levin, pp. 55-78; Murnane; Summers and Wolfe, pp. 4-29; and Winkler, pp. 120-68.

was Hanushek's.[22] He included data on the recency of a teacher's last course or degree and found that the more recent a teacher's last educational experience, the more students seemed to achieve in reading.

Only three input-output studies have included data on teacher certification, and none of these studies dealt with the kinds of certificates held by teachers.[23] The data in each of these studies was aggregated at either the school or district level and dealt with whether the teachers were certified and/or tenured. The studies concluded that there is no relationship between student acheivement and a teacher's being certified or tenured. Data on teacher certification for this study included the type of certificate each held, that is, a K-8 certificate, a 1-3 certificate, a 4-6 certificate, or a specialist's certificate.

A variable which described the amount of teacher education was included in seven previous input-output studies.[24] The amount of teacher education had a positive effect on reading and verbal achievement. At the elementary level the relationship between the amount of teacher education and student achievement in mathematics was negative. A number of input-output studies included an independent variable on teachers'

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[22]Hanushek, Chapter 3.

[23]Katzman, "Distribution and Production in a Big City Elementary School System," pp. 201-56; Perl, pp. 156-80; and Michelson, pp. 120-68.

[24]Bidwell and Kasarda, pp. 55-70; Bowles, Educational Production Function: Final Report; Burkhead, Fox, and Holland; Katzman,"Distribution and Production in a Big City Elementary School System," pp. 201-56; Perl, pp. 156-80; Murnane; and Summers and Wolfe, pp. 4-29.

salaries.[25] In all of these studies salary was aggregated at the level of the school or district and was found to be positively related to student achievement.

To date no input-output studies included age or a measure of "teacher-structuredness" as independent variables. Because data on the age of the teachers were readily available, and because age was a variable that would yield interesting and potentially useful findings, data on age were included. A measure on "teacher-structuredness" was included as an independent variable because Medley[26] found student achievement to be greater when the teacher engaged the students in more teacher-directed activities in a more structured classroom.

At least nine previous studies included class size as an independent variable.[27] The findings were inconclusive, because adding another student to a class was found to have sometimes a positive effect

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[25]Burkhead, Fox, and Holland; Cohn, pp. 422-34; Cohn and Millman; Kiesling, The Relationship of School Inputs to Public School Performance in New York State; Perl, pp. 156-80; and Winkler, pp. 189-205.

[26]Donald M. Medley, "The Effectiveness of Teachers," in Research on Teaching, ed. Penelope L. Peterson and Herbert J. Walberg (Berkeley, California: McCutchen Publishing Corporation, 1979), pp. 11-27.

[27]Bidwell and Kasarda, pp. 55-70; Bowles, Educational Production Function: Final Report; Burkhead, Fox, and Holland; Cohn, pp. 422-34; Katzman, "Distribution and Production ina Big City Elementary School System," pp. 201-56; Kiesling, The Relationship of School Inputs to Public School Performance in New York State; Murnane; Perl, pp. 156-80; and Winkler, pp. 180-205.

on student achievement, sometimes a negative effect, and sometimes no effect. The independent variable which indicated whether the class consisted of one grade level or two was unique to this study because no previous study included such a variable. This variable was included because 12 of the 58 classrooms in the study consisted of two grade levels.

Measures of school expenditures per pupil have been included as independent variables in several input-output studies.[28] The findings from these studies indicated that while expenditures per pupil have a positive effect on student achievement, the effect is indirect. There were two differences between how the variable was used in previous studies and in the present study. In this study expenditures per pupil were measured at the level of the classroom rather than at the district or school level. Also the expenditures per pupil in this study were the amount of money spent on either textbooks or instructional supplies, which were more specific expenditures than the overall expenditures per pupil utilized in other studies.

Wiley[29] and Rosenshine[30] included measures of time in their studies and concluded that student achievement can be improved by increasing the quantity of schooling. In this study the minutes per day

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[28]Bidwell and Kasarda, pp. 55-70; Burkhead, Fox, and Holland; Cohn and Millman; and Perl, "Family Background, Secondary School Expenditures, and Student Ability," pp. 156-80.

[29]Wiley, pp. 225-65.

[30]Barak V. Rosenshine, "Content, Time and Direct Instruction," in Research on Teaching, ed. Penelope L. Peterson and Herbert J. Walberg (Berkeley, California: McCutchen Publishing Corporation, 1979), pp. 28-56.

of mathematics instruction and the minutes per day of reading instruction were used as independent variables.

Principal-Related Independent Variables

Fourteen principal-related variables were included in this study. These variables were as follows: the years experience as a principal; years experience as a principal in present school; years teaching experience; administrative certificates held; college from which master's degree was earned; major area of master's degree program; credits beyond master's degree; salary; age; sex; and raw scores on the following subtests of the Leader Behavior Description Questionnaire: structure; tolerance of freedom; consideration; and production. Data on each of these variables were aggregated to the level of the individual principal.

Of the 14 principal-related independent variables included in this study, three were utilized in previous studies--years of experience as a principal,[31] credits beyond a master's degree,[32] and salary.[33] None of these variables were found to have a significant relationship with student achievement. These independent variables were included for two reasons. First, because only three input-output studies have utilized principal-related variables, not enough empirical evidence

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[31] Kiesling, The Study of Cost and Quality of New York School Districts; and Summers and Wolfe, pp. 4-29.

[32] Ibid.

[33] Kiesling, The Relationship of School Inputs to Public School Performance in New York State.

exists to discount their impact on student achievement. Second, several recent school effectiveness studies found that principals can positively affect student achievement.[34]

Three variables related to the principal's experience were included--years experience as a principal, years experience as a principal in present school, and years teaching experience. These variables were included because experience of the teacher was found to contribute toward achievement. Four independent variables related to the certification and the training of the principals were included, namely administrative certificates held, college from which master's degree was earned, major area of master's degree program, and credits beyond master's degree. These variables were included because similar variables for teachers were used in previous studies. Independent variables for the principals' salary, age, and sex were also included. As in the case of the variables related to the principals' experience and training, the variables for salary, age, and sex were included because similar variables for teachers were used.

Raw scores on the following subtests of the Leader Behavior Description Questionnaire were included as variables: structure, tolerance of freedom, consideration, and production. These variables were

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[34]For example, see Gilbert R. Austin, "Exemplary Schools and the Search for Effectiveness," Educational Leadership 37 (October 1979): 10-14; and Robert E. Klitgaard and George Hall, A Statistical Search for Unusually Effective Schools (Santa Monica, California: The Rand Corporation, 1973), pp. 74-82.

included because they measured the leadership style of the principal. School effectiveness studies found that strong, direct principal leadership was a significant factor in affecting good student achievement.[35]

School-Related Independent Variables

Data on 28 school-related independent variables were included in this study. Included among these variables were the following: enrollment; regular education teachers; student-teacher ratio; special education students; special education staff; special education teacher aides; Title I students; Title I teachers; Title I teacher aides; art, physical education, and music teachers; full-time equivalency of the principal; full-time equivalency of the media specialist; free lunch students; reduced lunch students; teacher aides; number of classes; number of classes with two grade levels; number of library books; date building built; additions to building; renovations to building; square footage of the building; building appraisal; property appraisal; outside appraisal; number of classrooms; number of special classrooms; and percentage of budget spent. Data on these variables were aggregated at the level of the school.

For organizational purposes, the school-related independent variables were divided into three categories: staff-related variables; enrollment and student body characteristics; and resources and physical

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[35]For example, see Austin, pp. 10-14; and Klitgaard and Hall, pp. 74-82.

plant. Ten of the variables were in the staff-related category. They were the following: regular education teachers; student-teacher ratio; special education staff; special education teacher aides; Title I teachers; Title I teacher aides; art, physical education, and music teachers; full-time equivalency of the principal; full-time equivalency of the media specialist; and teacher aides.

The variable student-teacher ratio was used in four previous input-output studies,[36] and it was found to have a significant relationship only in the Bidwell and Kasarda study. A variable similar to the variable full-time equivalency of the principal was used in previous studies. Several studies included a variable on the nonteaching staff, and the results were mixed.[37] When the variable measured the administrators per teacher the relationship with achievement was negative and when the variable measured the per pupil expenditures on administrative staff, the relationship with achievement was positive. None of the other staff-related variables were included in previous studies. These variables were included because the data were readily available and because staff assignments can be controlled by school district policy-makers.

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[36]Bidwell and Kasarda, pp. 55-70; Burkhead, Fox, and Holland; Kiesling, The Relationship of School Inputs to Public School Performance in New York State; and Winkler, pp. 180-205.

[37]Bidwell and Kasarda, pp. 55-70; Burkhead, Fox, and Holland; Cohn and Millman; Kiesling, The Relationship of School Inputs to Public School Performance in New York State; and Winkler, pp. 189-205.

The second category of school-related independent variables included those variables related to the enrollment and student-body characteristics. The seven variables included in this category were as follows: enrollment; special education students; Title I students; free lunch students; reduced lunch students; number of classes; and number of classes with two grade levels.

Only one of these variables, enrollment, was included in previous input-output studies. Three previous studies concluded that there seemed to be no relationship between the enrollment of the school or district and student achievement.[38] The other variables related to enrollment and student-body characteristics were not used in previous empirical studies. Data on these variables were included because they were readily available.

The third category of school-related independent variables was resources and physical plant. Included in this category were the following variables: number of library books; date the building was built; additions to the building; renovations to the building; outside appraisal; number of classrooms; number of special classrooms; and percentage of budget spent.

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[38]Burkhead, Fox, and Holland; Katzman, "Distribution and Production in a Big City Elementary School System," pp. 201-56; and Perl, pp. 156-80.

The independent variable, number of library books, has been used in several previous studies.[39] The Thomas study found a positive relationship between student achievement and the number of library books while the other studies showed no consistent relationship between student achievement and the number of library books. Three input-output studies have included a variable on the age of the building.[40] In these studies no consistent relationship between student achievement and age of the building was found. Two previous studies included a variable on physical plant.[41] In both studies this variable was represented by the appraisal of the building and was found not to have a significant relationship with achievement.

The other independent variables in this category of resources and physical plant variables have not been used in previous studies. Seven of these variables, namely additions to building, renovations to building, square footage, property appraisal, outside appraisal, number of classrooms, and number of special classrooms, relate to the physical characteristics of the school building. Data on these variables were included because they were available and because they were specific

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[39] Burkhead, Fox, and Holland; Levin, pp. 55-78; Michelson, pp. 120-68; Perl, pp. 156-80; and Thomas.

[40] Bowles, Educational Production Function: Final Report; Burkhead, Fox, and Holland; and Perl, pp. 156-80.

[41] Cohn, pp. 422-34; and Kiesling, The Relationship of School Inputs to Public School Performance in New York State.

breakdowns on the school buildings. The final variable--percent of the budget spent--indicated the degree to which the principal spent the money allocated to the school during the 1980-81 school year. This variable was included because the data were available and because school administrators can control this variable.

Selection of the Dependent Variables

Five subtests of the Iowa Tests of Basic Skills were selected as the dependent variables in this study. The subtests were reading vocabulary, reading comprehension, mathematics computation, mathematics concepts, and mathematics problem solving. Achievement test scores were selected because they have traditionally been considered the school's product and because they have been used in the vast majority of previous input-output studies.[42]

Collection of Data on Student-Related Independent Variables

The data for all the student-related independent variables, except the measures of student attitude toward school, were collected on a chart developed by the researcher (Appendix A) and completed by either the classroom teacher or the building principal. Much of the personal information on the students, such as sex, ethnic group, instructional levels, was known by the teacher without referring to school records.

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[42]Averch et al., p. 35.

Other data, namely, birth date, birth order, and days absent, were taken from the child's cumulative record or an information card completed by the child's parent and kept on file in the school office.

To measure student attitude toward school, a suitable instrument was needed. Standardized instruments measuring attitude toward school for children in the elementary grades have generally been scarce.[43] The most comprehensive listing of available instruments for measuring elementary school students' attitudes toward school was found in Henerson and others.[44] Among the instruments reviewed were the following: SCAMIN The Self-Concept and Motivation Inventory: What Face Would You Wear?;[45] Primary Children's Attitude Scales;[46] Self-Observation Scales;[47] Minnesota School Affects Assessment;[48] and Attitude Toward School Inventory.[49]

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[43]William A. Mehrens and Irwin J. Lehmann, Standardized Tests in Education (New York: Holt, Rinehart and Winston, Inc., 1969), p. 264.

[44]Marlene E. Henerson, Lynn Lyons Morris, and Caroly Taylor Fitz-Gibbon, How to Measure Attitudes (Beverly Hills, California: Sage, 1978).

[45]Norman J. Milchus, George A. Farrah, and William Reitz, SCAMIN The Self-Concept and Motivation Inventory: What Face Would You Wear? (Dearborn Heights, Michigan: Person-O-Metrics, 1968).

[46]Joan C. Barker Lunn, Primary Children's Attitude Scales (Slough Berks, Great Britain: National Foundation for Educational Research in England and Wales, 1967).

[47]A. Jackson Stenner and William G. Katzenmeyer, Self Observation Scales (Durham, North Carolina: NTS Research Corporation, 1974).

[48]Minnesota School Affects Assessment (Minneapolis: University of Minnesota Center for Educational Development, 1980).

[49]Robert S. Meier and Ernest D. McDaniel, Attitude Toward School Inventory (LaFayette, Indiana: Purdue University Press, 1973).

Five criteria were used in evaluating these instruments: the format had to be self-reporting; the instrument had to be reliable and valid internally and externally; the primary focus of the instrument had to be attitude toward school; the instrument required no modification for elementary students; and the administration and scoring of the instrument had to be reasonable in cost. All of the instruments met the first two criteria. The Self-Observation Scales did not meet either the third or the fifth criteria. The SCAMIN and the Minnesota School Affects Assessment failed to meet the fifth criterion and the Primary Children's Attitude Scales did not meet the fourth criterion. The Attitude Toward School Inventory met all criteria, and therefore was the instrument used in this research project.[50]

The Attitude Toward School Inventory consisted of three subtests: Attitude Toward School-General; Attitude Toward School-Teacher; and Attitude Toward School-Subject (Appendix B). The student ratings on this instrument were obtained for the 290 students in the sample during May 1981.

After the student-related data were collected, the data were operationalized so they could be used in the statistical analysis. Dummy variables were used for the following variables: sex, Title I status,

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[50]For information on the validity and reliability of the Attitude Toward School Inventory, see Robert S. Meier and Ernest D. McDaniel, "Development of the Attitude Toward School Inventory-Grades 4-6," paper presented at the annual meeting of the American Psychological Association, Chicago, Illinois, August 31, 1975.

and ethnic group. Ordinal values were established for the following variables: family income; custodial parent(s); occupation of mother and father; education of mother and father; instructional levels for reading and mathematics; and report cards in reading and mathematics; and overall report card grades. Actual values were used for the remaining student-related independent variables, namely age, number of children in the family, birth order, years in present school, days absent, and the raw scores on the subtests of the Attitude Toward School Inventory. The operationalization of these data are presented in Table 2.

Collection of Data on Teacher/Classroom-Related Independent Variables

The data for all the teacher/classroom-related independent variables except the measures of "structuredness" were collected from either school district records or a questionnaire completed by the 58 teachers. School district records provided data on the following independent variables: sex, age, years teaching experience, undergraduate college attended, year bachelor's degree received, teaching certificates held, highest degree plus credits earned, salary, class size, and whether the class consisted of one or two grade levels. Data on the expenditures for reading textbooks, reading supplies, mathematics textbooks, and mathematics supplies were taken from the purchase requisition records maintained by the business office. Data on the number of minutes per day of instruction in reading and mathematics were obtained from a questionnaire completed by the teachers (Appendix C).

TABLE 2

STUDENT-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Sex	0 = Boys 1 = Girls	A
Ethnic group	1 = White 2 = Black 3 = Spanish 4 = Asian 5 = Other	2,3,4,5 = 0 1 = 1
Age	B	Age expressed in months
Number of children in family	B	B
Birth order	B	"1" being the oldest and so forth
Family income	1 = Free lunch 2 = Reduced lunch 3 - Qualifies, but did not apply 4 = Does not qualify	1,3 = 1 2 = 2 4 = 3
Custodial parent	1 = Mother & father 2 = Mother 3 = Father 4 = Parent & stepparent 5 = Other	3,5 = 1 2,4 = 2 1 = 3
Mother's occupation	1 = Skilled 2 = General factory 3 = Manager 4 = Professional 5 = Homemaker 6 = Retail sales 7 = Food service 8 = Clerical 9 = Unemployed	9 = 1 2,6,7,8 = 2 1,5 = 3 3 = 4 4 = 5

A = Dummy variable as indicated under data collection

B = Actual value

TABLE 2 (Continued)

STUDENT-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Father's occupation	Same as mother's occupation	Same as mother's occupation
Mother's education	1 = Some high school 2 = Finished high school 3 = Some college 4 = Finished college 5 = Finished master's 6 = Finished doctorate	Values as in data collection
Father's education	Same as mother's education	Same as mother's education
Title I services	0 = Receives Title I services 1 = Does not receive Title I services	A
Years in present school	B	B
Days absent	B	B
Instructional level-reading	1 = High 2 = Average 3 = Low	3 = 1 2 = 2 1 = 3
Instructional level-mathematics	Same as instructional level-reading	Same as instructional level-reading
Report card grades-reading	1 = A 2 = B 3 = C 4 = D 5 = F	5 = 1 4 = 2 3 = 3 2 = 4 1 = 5
Report card grades-mathematics	Same as report card grades-reading	Same as report card grades-reading

A = Dummy variable as indicated under data collection

B = Actual value

TABLE 2 (Continued)

STUDENT-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Report card grades-overall	Same as report card grades-reading	Same as report card grades-reading
Attitude toward school-general	B	Raw score
Attitude toward school-subjects	B	Raw score
Attitude toward school-teacher	B	Raw score

A = Dummy variable as indicated under data collection

B = Actual value

Selecting an instrument to measure teacher "structuredness" was not an easy task because such instruments are rather scarce. Among the instruments reviewed were the following: Teaching Self-Rating Inventory;[51] A Self-Appraisal Scale for Teachers;[52] Opinionnaire on Attitudes Toward Education;[53] and the Dimensions of Schooling Questionnaire.[54] Four criteria were used in evaluating these instruments. These criteria were as follows: the format had to be self-reporting; the primary focus of the instrument had to be a measure of "structuredness;" the instrument had to have been used in previous research studies; and the administration and scoring of the instrument had to be reasonable in cost. All of the instruments met the first, third, and fourth criteria, but the only instrument that met the second criterion was the Dimensions of Schooling Questionnaire[55] (Appendix D).

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[51]Harold F. Burks, Teacher Self-Rating Inventory (Huntington Beach, California: Arden Press, 1971).

[52]Howard Wilson, A Self-Appraisal Scale for Teachers (Irvine, California: Administrative Research Associates, Inc., 1957).

[53]Henry C. Lindgren, Opinionnaire on Attitudes Toward Education (San Francisco, California: California State University of San Francisco, 1961).

[54]Ross E. Traub, Joel Weiss, C.W. Fisher, and Don Musella, Dimensions of Schooling Questionnaire (Toronto, Ontario, Canada: The Ontario Institute for Studies in Education, 1980).

[55]For further information on the Dimensions of Schooling Questionnaire, see Ross E. Traub, Joel Weiss, C.W. Fisher, and Don Musella, "Closure On Openness: Describing and Quantifying Open Education," Interchange 3 (1972):69-84.

The 32-item Dimensions of Schooling Questionnaire (DISC) was divided into two subtests. The raw scores on item numbers 1-4 which described the teacher's perception of the "structuredness" of the school were added for the variable on the general structuredness of the school while the raw scores on items 5-28 were added to create the variable classroom structuredness. All 58 teachers in the study completed the DISC inventory during May, 1981.

After the teacher/classroom-related data were collected, the data were operationalized so they could be used in the statistical analysis. Dummy variables were used for the following variables: sex, undergraduate college attended, teaching certificates held, and whether the class consisted of one or two grade levels. Ordinal values were established for the variables highest degree plus credits and the year the bachelor's degree was received. Actual values were used for the remaining teacher/classroom independent variables--age, years teaching experience, class size, salary, minutes per day of reading instruction, minutes per day of mathematics instruction, DISC-general score, DISC-classroom score, and expenditures for reading textbooks, reading supplies, mathematics textbooks, and mathematics supplies. The operationalization of these data are presented in Table 3.

Collection of Data on Principal-Related Independent Variables

The data for all the principal-related independent variables, except the scores on the Leader Behavior Description Questionnaire, were collected from the school district records. The LBDQ was

TABLE 3

TEACHER/CLASSROOM-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Sex	0 = Male 1 = Female	A
Age	B	B
Years teaching experience	B	B
Undergraduate college attended	0 = Local state university 1 = Not local state university	A
Year bachelor's degree received	B	B
Teaching certificates held	0 = K-8 or 1-8 1 = 1-3, 4-6, or Specialist's	A
Highest degree plus credits	1 = Bachelor's 1.5 = Bachelor's + 15 2.0 = Master's 2.5 = Master's + 15 3.0 = Master's + 30	Values as in data collection
Class size	B	B
Whether class had 1 or 2 grade levels	0 = One grade level 1 = Two grade levels	A
Expenditures for reading textbooks	B	B
Expenditures for reading supplies	B	B
Expenditures for mathematics textbooks	B	B
Expenditures for mathematics supplies	B	B

A = Dummy variable as indicated under data collection

B = Actual value

TABLE 3 (Continued)

TEACHER/CLASSROOM-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Minutes per day reading instruction	B	B
Minutes per day mathematics instruction	B	B
Structuredness-general	B	Raw score
Structuredness-classroom	B	Raw score

A = Dummy variable as indicated under data collection

B = Actual value

administered to the 13 principals in May, 1981 (Appendix E). Raw scores on the four subtests--structure, tolerance of freedom, consideration, and production--were used in the statistical analysis.

After the principal-related data were collected, the data were operationalized so they could be used in the statistical analysis. Dummy variables were employed for the following principal-related independent variables: administrative certificates held; college from which master's degree was earned; major area of master's degree program; and sex. Ordinal values were established for the variable describing the credits beyond the master's degree. Actual values were used for the other principal-related independent variables, namely age; years experience as a principal; years experience as a principal in present school; years teaching experience; salary; and raw scores on the four subtests of the Leader Behavior Description Questionnaire. The operationalization of these data are presented in Table 4.

Collection of Data on School-Related Independent Variables

The data for the school-related independent variables were collected from school district records. After these data were collected, they were operationalized so that they could be used in the statistical analysis. Ordinal values were used for three independent variables, namely the date the school was built, additions to the building, and renovations to the building. Actual values were used for all the other school-related independent variables. The operationalization of these data are presented in Table 5.

TABLE 4

PRINCIPAL-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Years experience as a principal	B	B
Years experience as a principal in present school	B	B
Years teaching experience	B	B
Administrative certificates held	0 = Elementary principal and teaching 1 = Elementary principal, teaching and other	A
College master's earned	0 = Branch of University of Wisconsin 1 = Not a branch of University of Wisconsin	A
Major area of master's degree	0 = Education 1 = Administration	A
Credits beyond master's	B	B
Salary	B	B
Age	B	B
Sex	0 = Male 1 = Female	A
LBDQ-structure	B	Raw score
LBDQ-tolerance of freedom	B	Raw score
LBDQ-consideration	B	Raw score
LBDQ-production	B	Raw score

A = Dummy variable as indicated under data collection

B = Actual value

TABLE 5

SCHOOL-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Enrollment	B	B
Full-time equivalency-regular education teachers	B	B
Student-teacher ratio	B	B
Special education students	B	B
Special education staff	B	B
Special education teacher aides	B	B
Title I students	B	B
Title I teachers	B	B
Title I teacher aides	B	B
Art, physical education, and music teachers	B	B
Full-time equivalency principal	B	B
Full-time equivalency media specialist	B	B
Free lunch students	B	B
Reduced lunch students	B	B
Teacher aides	B	B
Number of classes	B	B
Number of split classes	B	B

A = Dummy variable as indicated under data collection

B = Actual value

TABLE 5 (Continued)

SCHOOL-RELATED INDEPENDENT VARIABLES

VARIABLE	DATA COLLECTION	OPERATIONALIZED DATA
Number of library books	B	B
Date building built	0 = Before 1900 1 = Between 1900-1950 2 = Between 1951-1969 3 = After 1969	Values as in data collection
Additions to building	0 = No additions 1 = Additions	A
Renovations to building	0 = No renovations 1 = Renovations	A
Square footage	B	B
Building appraisal	B	B
Property appraisal	B	B
Outside appraisal	B	B
Number of classrooms	B	B
Number of special classrooms	B	B
Percent of budget spent	B	B

A = Dummy variable as indicated under data collection

B = Actual value

Collection of Data for the Dependent Variables

The Iowa Tests of Basic Skills have been administered by the school district under study to students in grades 3, 5, 7, and 9 in March each year. School district officials provided the 1981 results of the ITBS for the 290 students in the sample. Students' scores on the five subtests--reading vocabulary, reading comprehension, mathematics computation, mathematics concepts, and mathematics problem solving--were converted into raw scores for use in the statistical analysis.

Statistical Procedures

Multiple regression analysis has been the basic statistical tool used in input-output studies.[56] For this study the researcher chose to use step-wise multiple regression analysis because it reexamines at every step the variables brought into regression in previous steps. The procedure automatically selects the step at which a variable enters the regression, eliminating the researcher's a priori judgments about which variables should be entered first in regression. Draper and Smith found that the stepwise regression procedure improved on the forward selection procedure and recommended its use.[57]

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[56] Bridge, Judd, and Moock, p. 69.

[57] Norman Draper and Harry Smith, Applied Regression Analysis (New York: John Wiley and Sons, Inc., 1966), pp. 171-72.

The specific stepwise linear regression program employed in this study was the Statistical Package for the Social Sciences regression program.[58] This program provided the following output:

1. Descriptive statistics--mean, standard deviation, and variance.
2. Basic regression statistics.
   a. R - Multiple R which produces the Multiple R, R^2, adjusted R^2, and standard error.
   b. Coeff. - Regression coefficients which produce the unstandardized regression coefficient (B), the standard error of B, and standardized regression coefficient (Beta).
   c. Cha - Change in R^2 which produces the change in R^2 between steps, F value for change in R^2, and significance level of F.
   d. F - F value for B and significance level of F.
   e. History - Step history which produces one line of information for each step: the step number, Multiple R, R^2, significance, change in R^2, significance of the change, and the variable name.

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[58] C. Hadlai Hull and Norman H. Nie, Statistical Package for the Social Sciences Update 7-9 (New York: McGraw-Hill Book Company, 1981), pp. 94-121.

In determining the independent variables for each regression model the following factors were considered:

1. frequency of the independent variables.
2. correlation of the independent variables with the dependent variables.
3. multicollinearity among independent variables.
4. presence of independent variables in one or more of the models.
5. contribution of the independent variable as determined by the percent of the dependent variable explained by the independent variable.

Frequencies for all independent variables were run. After studying the results, the variables ethnic group, Title I status, and sex of the teacher were deleted from the regression models for Grade 3 because only 2.8% of the sample was nonwhite, only 9% of the sample received Title I reading services, and only 10.3% of the teachers were male. The variables ethnic group, Title I services, and whether the class consisted of one or two grade levels were eliminated from the regression models for Grade 5 because only 4.8% of the sample was nonwhite, only 5.5% of the sample received Title I reading services, and only 13.8% of the classes consisted of two grade levels.

To study the correlations between the dependent and the independent variables Pearson correlations were run on both the Grade 3 and the Grade 5 data. These results were used to determine the sets of independent variables to be included in the final regression models (Appendix G and Appendix H).

To test for the presence of multicollinearity in multiple regression analysis, the coefficient of multiple determination between each independent variable and the remaining independent variables was used.[59] Correlations of all independent variables in each of the four categories of independent variables were run (Appendix I and Appendix J). Due to the multicollinearity of several of the independent variables a new variable total of the student's father's occupation and mother's education was created. In selecting other independent variables for inclusion in the regression models the multicollinearity was considered, and the independent variable of those interrelated that explained the highest percent of the variance in the dependent variable was selected.

After utilizing the final two considerations--the presence of independent variables in one or more of the models and the percent of the dependent variable explained by the independent variable--the four regression models were developed.

For the Grade 3 sample the regression models were as follows:

Total reading = Total reading (Attitude toward school-subject, College from which principal's master's earned, Custodial parent, Instructional level in reading, LBDQ production, Minutes of reading instruction, Sex of principal, Total of student's father's occupation and mother's education, Undergraduate college of teacher,

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[59] Bridge, Judd, and Moock, p. 136.

Years in present school, Years teaching experience of teacher)

Total mathematics = Total mathematics (Attitude toward school-subject, Expenditures for mathematics text-books, Family income, Instructional level in mathematics, LBDQ production, Minutes of mathematics instruction, Sex of principal, Undergraduate college of teacher, Years teaching experience of teacher)

For the Grade 5 sample the regression models were as follows:

Total reading = Total reading (Administrative certificates held, Age of student, Custodial parent, Days student absent, Instructional level in reading, Structuredness of school, Total of student's father's occupation and mother's education, Years teaching experience of teacher)

Total mathematics = Total mathematics (Administrative certificates held, Age of student, Attitude toward school-teacher, Days student absent, Family income, Instructional level in mathematics, LBDQ production, Minutes of mathematics instruction, Sex of principal, Undergraduate college teacher attended, Years teaching experience of teacher)

CHAPTER IV

ANALYSIS OF THE DATA

To answer the research questions outlined in Chapter III four stepwise multiple regression analyses were run, using the statistical procedures enumerated in Chapter III. The results of these analyses are presented in this chapter. For organizational purposes this chapter is divided into six sections: profile of the sample; multiple regression results for total reading and Grade 3; multiple regression results for total reading and Grade 5; multiple regression results for total mathematics and Grade 3; multiple regression results for total mathematics and Grade 5; and answers to the research questions.

Profile of the Sample

In the four multiple regression models 20 independent variables were found to contribute toward achievement in reading or mathematics. These independent variables and the dependent variables are described in this section.

The dependent and independent variables used in the multiple regression models for the grade three sample are presented in Table 6. The two dependent variables were total mathematics raw score and total reading raw score. The total mathematics raw score consisted of the students' raw scores on the computation, concept, and problem solving subtests of the Iowa Tests of Basic Skills. The mean value for the total

TABLE 6

VARIABLES USED IN MULTIPLE REGRESSION MODELS FOR GRADE 3 SAMPLE

DEPENDENT VARIABLES

Total mathematics raw score

Total reading raw score

INDEPENDENT VARIABLES

Attitude toward school-subject raw score

College from which principal's master's earned

Custodial parent

Expenditures per student on mathematics textbooks

Family income

Instructional level in mathematics

Instructional level in reading

LBDQ production score

Minutes per day of mathematics instruction

Minutes per day of reading instruction

Sex of the principal

Total of student's father's occupation and mother's education

Undergraduate college teacher attended

Years student in present school

Years teaching experience of teacher

mathematics raw score was 60.09 which represented a national percentile rank of approximately 58%. The total reading raw score consisted of the students' raw scores on the vocabulary and comprehension subtests of the Iowa Tests of Basic Skills. The mean value for the total reading raw score was 51.483 which represented a national percentile rank of approximately 58%.

For the third grade sample of 145 students 15 independent variables were found to contribute toward achievement in reading or mathematics. The mean value of the variable attitude toward school-subject raw score was 53.662. The students' scores on this subtest of the Attitude Toward School Inventory ranged from 18 to 70. For the variable college from which principal's master's was earned, 50 students in the sample had a principal who earned a master's degree from a branch of the University of Wisconsin and 95 students in the sample had a principal who earned a master's degree from another college or university. For the variable custodial parent, 121 students lived with both their natural parents, 21 students lived with their natural mother, and 3 students lived with either their natural father or another adult. For the variable expenditures per student on mathematics textbooks the mean was 1.663. The range of expenditures within the sample was from no money spent on textbooks to $4.02 per student. For the variable family income 20 students received free lunch, 8 students received reduced lunch, and 117 students' families did not qualify for free or reduced lunch.

For the grade three sample, 17 students were classified as low in mathematics, 85 students as average in mathematics, and 43 students as high in mathematics. In reading the students were classified as

follows: 22 students as low, 78 students as average, and 45 students as high. The mean value of the variable Leader Behavior Description Questionnaire production score was 32.138. This represented the average raw score of the principals on the production subtest of the LBDQ instrument. The principals' scores on this subtest ranged from 23 to 45. For the variables minutes per day of mathematics instruction and minutes per day of reading instruction the mean values were 48.793 and 86.931 respectively. For the third grade sample, the minutes per day of mathematics instruction ranged from 30 to 60 while the minutes per day of reading instruction ranged from 50 to 125.

For the variable sex of the principal 30 grade three students had a female principal and 115 students had a male principal. Of the 13 principals in the sample two were women. The breakdown for the variable total of student's father's occupation and mother's education was as follows:

Father's occupation		Mother's education	
Unemployed/no father	18	Some high school	7
Factory worker	49	Completed high school	112
Sales-related	9	Some college	9
Skilled worker	33	Completed college	16
Manager	16	Completed master's	1
Professional	20		

For the variable undergraduate college teacher attended 105 students had teachers who attended the local university and 40 students had teachers who attended another college or university. Of the 29

third grade teachers in the sample, 21 attended the local university. For the variable years teaching experience of the teacher the mean value was 15.103. The years of teaching experience of the 29 teachers in the sample ranged from two to 37. For the variable years student in present school the mean value was 3.642. Of the 145 students in the third grade sample, 120 of them had attended their present school all four years while 25 students had attended their present school for less than four years.

The dependent and independent variables used in the multiple regression models for the grade five sample are presented in Table 7. The two dependent variables were total mathematics raw score and total reading raw score. The total mathematics raw score consisted of the students' raw scores on the computation, concept, and problem solving subtests of the Iowa Tests of Basic Skills. The mean value for the total mathematics raw score was 73.814 which represented a national percentile rank of approximately 64%. The total reading raw score consisted of the students' raw scores on the vocabulary and comprehension subtests of the Iowa Tests of Basic Skills. The mean for the total reading raw score was 63.731 which represented a national percentile rank of approximately 62%.

Fifteen independent variables were found to contribute toward achievement in mathematics or reading in the grade five sample. For the variable administrative certificates of the principal, 100 students in the sample had a principal who held only an administrative certificate and 45 students had a principal who held an administrative certificate

TABLE 7

VARIABLES USED IN MULTIPLE REGRESSION MODELS FOR GRADE 5 SAMPLE

DEPENDENT VARIABLES

Total mathematics raw score

Total reading raw score

INDEPENDENT VARIABLES

Administrative certificates of principal

Age in months of student

Attitude toward school-teacher raw score

Custodial parent

Days student absent

Family income

Instructional level in mathematics

Instructional level in reading

LBDQ production raw score

Minutes per day of mathematics instruction

Sex of principal

Structuredness of school

Total of student's father's occupation and mother's education

Undergraduate college teacher attended

Years teaching experience of teacher

and an additional certificate in either reading or guidance. Of the 13 principals in the sample, nine held only an administrative certificate. For the variable age in months of the student the mean value was 134.117 which meant that the average fifth grader in the sample was about 11 years 2 months old. The age in months of the 145 students in the sample ranged from 126 to 151. The mean value for the variable attitude toward school-teacher raw score was 54.366. The students' scores on this subtest of the Attitude Toward School Inventory ranged from 21 to 75. For the variable custodial parent 109 students lived with both their natural parents, 33 students lived with their natural mother, and 3 students lived with either their natural father or another adult. For the variable days student absent the mean value was 3.966. The range of days absent for fifth grade students in the sample was from 0 to 26.

For the variable family income 21 students received free lunch, ten students received reduced lunch, and 114 students' families did not qualify for free or reduced lunch. For the grade five sample 25 students were classified as low in mathematics, 67 students were classified as average in mathematics, and 53 students were classified as high in mathematics. In reading the students were classified as follows: 24 students as low, 66 students as average, and 55 students as high. The mean value of the variable Leader Behavior Description Questionnaire production score was 32.138. This represented the average raw score of the principals on the production subtest of the LBDQ instrument. The principals' scores on this subtest ranged from 23 to 45. For the variable minutes per day of mathematics instruction the mean value was 51.034. For the

fifth grade sample the minutes per day of mathematics instruction ranged from 30 to 60.

For the variable sex of the principal 25 grade five students had a female principal and 120 students had a male principal. Of the 13 principals in the sample two were women. The mean value for the variable structuredness of the school was 19.241. This represented the teachers' raw scores on the general structuredness subtest of the Dimensions of Schooling Questionnaire. The scores on this subtest of the DISC ranged from 16 to 23. The breakdown for the variable total of student's father's occupation and mother's education were as follows:

Father's occupation		Mother's education	
Unemployed/no father	27	Some high school	5
Factory workers	43	Completed high school	109
Sales-related	6	Some college	17
Skilled workers	37	Completed college	14
Managers	15		
Professionals	17		

For the variable undergraduate college teacher attended 105 students had teachers who attended the local university and 40 students had teachers who attended another college or university. Of the 29 fifth grade teachers in the sample, 21 attended the local university. For the variable years teaching experience of the teacher the mean value was 12.586. The years of teaching experience of the 29 teachers in the grade five sample ranged from 3 to 26.

Multiple Regression Results for Total Reading and Grade 3

The regression results for total reading and Grade 3 are presented in Table 8. The independent variables in the regression model explained approximately 53% of the total variance in the dependent variable. The first three independent variables stepping in accounted for almost 48% of the variance in the dependent variable and were significant at or beyond the .05 level. The remaining eight independent variables explained increasingly smaller variances in the dependent variable as they stepped in, and none were significant at the .05 level.

The variable instructional level in reading of the student accounted for nearly 43% of the variance in the dependent variable, total reading raw score. The relationship between the instructional level in reading and total reading raw score was positive. The variable custodial parent stepped in second behind instructional reading level in the regression model and was significant at the .01 level. This indicated that with whom the student lived accounted for nearly 3% of the variance in the dependent variable. The variable undergraduate college teacher attended stepped in third in the regression model, explained just over 2% of the variance in the dependent variable and was significant at the .017 level. The relationship between the custodial parent and total reading was positive while a negative relationship between the undergraduate college teacher attended and total reading was found.

The remaining eight variables in the regression model which were not significant at the .05 level did, however, explain some of the variance in the dependent variable as they stepped in. The variable

TABLE 8

MULTIPLE REGRESSION RESULTS FOR TOTAL READING (TOTALR) AND GRADE 3

Step	Variable	Change in TOTALR As Variable Changes By One Unit	Percent of TOTALR Explained By Variable
1	Instructional level in reading	107.353	.4288*
2	Custodial parent	6.920	.0265*
3	Undergraduate college teacher attended	-5.795	.0215**
4	Minutes per day of reading instruction	3.118	.0114
5	Years teaching experience of teacher	3.576	.0128
6	Years student in present school	2.568	.0091
7	LBDQ production score	2.467	.0087
8	College from which principal earned master's degree	-1.639	.0057
9	Total of student's father's occupation and mother's education	1.366	.0048
10	Sex of principal	.170	.0006
11	Attitude toward school-subject raw score	.044	.0002

* Significant at .01 level
**Significant at .05 level

minutes per day of reading instruction and years teaching experience of teacher stepped in fourth and fifth respectively in the regression model, and each variable explained slightly more than 1% of the variance in the dependent variable. The sixth and seventh variables to enter the regression model were years student in present school and LBDQ production score, and each of these variables accounted for almost 1% of the variance in total reading, the dependent variable. The variables college from which principal's master's earned and total of student's father's occupation and mother's education were the eighth and ninth variables to enter the regression model, and each of them explained approximately .5% of the variance in the dependent variable. The last two independent variables that stepped in the regression model--sex of the principal and attitude toward school-subject score--each explained less than .10% of the variance in total reading. Of the eight variables, seven had a positive relationship with total reading. Only the college from which principal's master's earned had a negative relationship with total reading.

Multiple Regression Results for Total Reading and Grade 5

The regression results for total reading and Grade 5 are presented in Table 9. The independent variables in the regression model explained over 54% of the total variance in the dependent variable. The first three independent variables stepping in accounted for over 52% of the variance in total reading and were significant at or beyond the .05 level. The remaining five independent variables explained increasingly

TABLE 9

MULTIPLE REGRESSION RESULTS FOR TOTAL READING (TOTALR) AND GRADE 5

Step	Variable	Change in TOTALR As Variable Changes By One Unit	Percent of TOTALR Explained By Variable
1	Instructional level in reading	117.6404	.4514*
2	Age in months of student	-12.5371	.0445*
3	Days student absent	-9.1415	.0307**
4	Structuredness of school	1.9001	.0063
5	Administrative certificates of principal	-1.7875	.0059
6	Custodial parent	.9677	.0032
7	Total of student's father's occupation and mother's education	.2798	.0009
8	Years teaching experience of teacher	.0883	.0003

* Significant at .01 level
**Significant at .05 level

smaller variances in the dependent variable as they stepped in, and none were significant at the .05 level.

The variable instructional level in reading stepped in first and was significant at the .000 level. The instructional level in reading accounted for slightly more than 45% of the variance in the dependent variable. The relationship between the instructional level in reading and total reading was positive. The variable age in months of student stepped in second behind the instructional reading level in the regression model and was significant at the .001 level. This indicated that the age of the student accounted for over 4% of the variance in the dependent variable. Stepping in third in the regression model was the variable the days student absent. This variable explained slightly over 3% of the variance in the dependent variable and was significant at the .003 level. The relationships between the age in months of the student and total reading and between the days the student was absent and total reading were negative.

The remaining five variables in the regression model which were not significant at the .05 level did, however, explain some variance in the dependent variable as they stepped in. The variables structuredness of the school and administrative certificates of the principal stepped in fourth and fifth respectively in the regression model, and each variable explained approximately .5% of the variance in the dependent variable. The variable custodial parent stepped in sixth and explained .32% of the variance in total reading. The last two variables that stepped in the regression model--total of student's father's occupation

and mother's education and years teaching experience of the teacher--each explained less than .10% of the variance in the dependent variable. Of these five independent variables four had a positive relationship with the dependent variable, total reading. Only the variable administrative certificates of the principal had a negative relationship with total reading.

Multiple Regression Results for Total Mathematics and Grade 3

The regression results for total mathematics and Grade 3 are presented in Table 10. The independent variables in the regression model explained over 54% of the total variance in the dependent variable. The first five independent variables stepping in accounted for almost 52% of the variance in the dependent variable and were significant at or beyond the .05 level. The remaining four variables explained increasingly smaller variances in the dependent variable as they stepped in, and none were significant at the .05 level.

The variable instructional level in mathematics stepped in first and was significant at the .000 level. The instructional level in mathematics of the student accounted for nearly 43% of the variance in the dependent variable. The relationship between instructional level in mathematics and total mathematics was positive. The variable undergraduate college the teacher attended stepped in second behind instructional level in mathematics in the regression model, explained over 3% of the variance in the dependent variable, and was significant at the .005 level. The family income variable stepped in third in the regression model, accounted for slightly more than 2% of the variance in total mathematics

TABLE 10

MULTIPLE REGRESSION RESULTS FOR TOTAL MATHEMATICS (TOTALM) AND GRADE 3

Step	Variable	Change in TOTALM As Variable Changes By One Unit	Percent of TOTALM Explained By Variable
1	Instructional level in mathematics	106.8257	.4276*
2	Undergraduate college teacher attended	-8.5915	.0327*
3	Family income	6.4206	.0235**
4	Minutes per day of mathematics instruction	5.2370	.0186**
5	Expenditures per student on mathematics textbooks	-4.8471	.0168**
6	Attitude toward school-subject raw score	2.8096	.0096
7	Years teaching experience of teacher	1.7235	.0059
8	LBDQ production score	1.4825	.0050
9	Sex of principal	.7852	.0027

* Significant at .01 level
**Significant at .05 level

and was significant at the .012 level. Stepping in fourth in the regression model was minutes per day of mathematics instruction. This variable explained almost 2% of the variance in the dependent variable and was significant at the .025 level. The fifth variable to step in the regression model was expenditures per student on mathematics textbooks, and it explained slightly less than 2% of the variance in the dependent variable and was significant at the .029 level. The relationships between family income and total mathematics and between minutes per day of mathematics instruction and total mathematics were positive while the relationships between expenditures per student on mathematics textbooks and total mathematics and between undergraduate college the teacher attended and total mathematics were negative.

The remaining four variables in the regression model which were not significant at the .05 level did, however, explain some variance in the dependent variable as they stepped in. The variable attitude toward school-subject score stepped in sixth and explained approximately 1% of the variance in the dependent variable. The variables years teaching experience of teacher and LBDQ production score stepped in seventh and eighth respectively, and each variable explained about .5% of the variance in total mathematics. The last variable to step in the regression model was sex of the principal which accounted for about .3% of the variance in the dependent variable. The relationships between these independent variables and the dependent variable were positive.

Multiple Regression Results for Total Mathematics and Grade 5

The regression results for total mathematics and Grade 5 are presented in Table 11. The independent variables in the regression model explained over 63% of the variance in the dependent variable. The first four independent variables stepping in accounted for over 61% of the variance in the dependent variable and were significant at or beyond the .005 level. The remaining seven variables explained increasingly smaller variances in the dependent variable as they stepped in, and none were significant at the .05 level.

The variable instructional level in mathematics stepped in first and was significant at the .000 level. The instructional level in mathematics of the student accounted for almost 55% of the variance in the dependent variable. The relationship between instructional level in mathematics and total mathematics was positive. The variable age in months of the student stepped in second behind instructional level in mathematics in the regression model and was significant at the .003 level. This indicated that the age of the student accounted for almost 3% of the variance in the dependent variable. Stepping in third in the regression model was days the student was absent. This variable explained slightly more than 2% of the variance in the dependent variable and was significant at the .005 level. The relationships between age in months of the student and total mathematics and between days the student was absent and total mathematics were negative. The LBDQ production score variable stepped in fourth, explained over 1% of the variance in total

TABLE 11

MULTIPLE REGRESSION RESULTS FOR TOTAL MATHEMATICS (TOTALM) AND GRADE 5

Step	Variable	Change in TOTALM As Variable Changes By One Unit	Percent of TOTALM Explained By Variable
1	Instructional level in mathematics	173.3209	.5479*
2	Age in months of student	-9.0596	.0271*
3	Days student absent	-8.1393	.0232*
4	LBDQ production score	5.1550	.0143**
5	Sex of the principal	3.3262	.0091
6	Years teaching experience of teacher	1.5283	.0042
7	Administrative certificates of principal	-1.0160	.0028
8	Minutes per day of mathematics instruction	.2699	.0007
9	Attitude toward school-teacher raw score	.2491	.0007
10	Undergraduate college teacher attended	-.1599	.0004
11	Family income	.0830	.0002

* Significant at .01 level
**Significant at .05 level

mathematics, and was significant at the .025 level. The relationship between the independent variable LBDQ production score and the dependent variable total mathematics was positive.

The remaining seven variables in the regression model which were not significant at the .05 level did, however, explain some of the variance in the dependent variable as they stepped in. The variable sex of the principal stepped in fifth and explained approximately 1% of the variance in the dependent variable. The variables years teaching experience of the teacher and administrative certificates of the principal stepped in sixth and seventh respectively, with years teaching experience of the teacher explaining about .5% and administrative certificates of the principal explaining about .3% of the variance in total mathematics. The relationship between years teaching experience of the teacher and total mathematics was positive, and the relationship between administrative certificates of the principal and total mathematics was negative.

The last four variables to enter the regression model--minutes per day of mathematics instruction, attitude toward school-teacher score, undergraduate college the teacher attended, and family income--each explained less than .1% of the variance in the dependent variable. The variables minutes per day of mathematics instruction, attitude toward school-teacher score, and family income had positive relationships with total mathematics while undergraduate college the teacher attended had a negative relationship with total mathematics.

Answers to Research Questions

The answers to the four research questions are based on the results of the four regression models. The answers to the research question are presented in this section.

Research Question Number 1

> Do student-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?

Seven independent variables were found to contribute toward achievement in reading. These variables are presented in Table 12. For both third grade students and fifth grade students the instructional level in reading of the student accounted for the greatest variance in the dependent variable. The variables total of the student's father's occupation and mother's education and the student's custodial parent contributed toward achievement in reading for both third grade students and fifth grade students. For third grade students the variables attitude toward school-subject raw score and years student in present school were found to contribute toward achievement in reading. The variables age in months of the student and days student absent were found to contribute toward achievement in reading for fifth grade students.

Six independent variables contributed toward achievement in mathematics, and these variables are presented in Table 13. The variable instructional level in mathematics accounted for the greatest variance in mathematics achievement. The variable family income contributed toward achievement in mathematics for both third grade students and fifth grade students. Three variables--age of the student, days student absent, and

TABLE 12

STUDENT-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN READING

Variable	Grade 3 Percent of Total Reading Explained By Variable	Grade 5 Percent of Total Reading Explained By Variable
Instructional level in reading	.4288	.4514
Total of student's father's occupation and mother's education	.0048	.0009
Age in months of student		.0045
Days student absent		.0307
Custodial parent	.0265	.0032
Attitude toward school-subject raw score	.0002	
Years student in present school	.0091	

TABLE 13

STUDENT-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN MATHEMATICS

Variable	Grade 3 Percent of Total Mathematics Explained By Variable	Grade 5 Percent of Total Mathematics Explained By Variable
Instructional level in mathematics	.4276	.5479
Family income	.0235	.0002
Age in months of students		.0271
Days student absent		.0232
Attitude toward school-subject raw score	.0096	
Attitude toward school-teacher raw score		.0007

attitude toward school-teacher raw score--were found to contribute toward achievement in mathematics for fifth grade students. For third grade students the independent variable attitude toward school-teacher raw score contributed toward achievement in mathematics.

Research Question Number 2

> Do teacher-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?

Four teacher-related variables contributed toward achievement in reading. These variables are presented in Table 14. The variables years teaching experience of the teacher contributed toward achievement in reading for both grades three and five students. For third grade students the variable undergraduate college attended by the teacher and minutes per day of reading instruction were found to contribute toward acheivement in reading. The variable structuredness of the school contributed toward achievement in reading for fifth grade students.

The four teacher-related variables that were found to contribute toward achievement in mathematics for third and fifth grade students are presented in Table 15. Three variables--undergraduate college attended by the teacher, minutes per day of mathematics instruction, and years teaching experience of the teacher--contributed toward achievement in mathematics for both third and fifth grade students. For grade three students the variable expenditures per student on mathematics textbooks also contributed toward achievement in mathematics.

Research Question Number 3

> Do principal-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?

TABLE 14

TEACHER-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN READING

Variable	Grade 3 Percent of Total Reading Explained By Variable	Grade 5 Percent of Total Reading Explained By Variable
Undergraduate college attended by teacher	.0215	
Minutes per day of reading instruction	.0114	
Years teaching experience of teacher	.0128	.0003
Structuredness of school		.0063

TABLE 15

TEACHER-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN MATHEMATICS

Variable	Grade 5 Percent of Total Mathematics Explained By Variable	Grade 5 Percent of Total Mathematics Explained By Variable
Undergraduate college attended by teacher	.0327	.0004
Minutes per day of mathematics instruction	.0186	.0007
Expenditures per student on mathematics textbooks	.0168	
Years teaching experience of teacher	.0059	.0042

Four principal-related variables were found to contribute toward achievement in reading. These variables are presented in Table 16. Three variables--LBDQ production score, sex of the principal, and college from which principal's master's was earned--contributed toward achievement in reading for the third grade sample. The variable administrative certificates held by the principal contributed toward achievement in reading for the fifth grade sample.

Three principal-related variables were found to contribute toward achievement in mathematics. These variables are presented in Table 17. The variables LBDQ production score and sex of the principal were found to contribute toward achievement in mathematics for both the third grade sample and the fifth grade sample. The independent variable administrative certificates of the principal contributed toward achievement in mathematics for the grade five sample.

Research Question Number 4

> Do school-related variables contribute toward achievement in reading and mathematics for third and fifth grade students?

No school-related variables were found to contribute toward achievement in reading and mathematics.

TABLE 16

PRINCIPAL-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN READING

Variable	Grade 3 Percent of Total Reading Explained By Variable	Grade 5 Percent of Total Reading Explained By Variable
LBDQ production score	.0087	
Sex of the principal	.0006	
Administrative certificates of principal		.0059
College from which principal's master's earned	.0057	

TABLE 17

PRINCIPAL-RELATED VARIABLES THAT CONTRIBUTE TOWARD ACHIEVEMENT IN MATHEMATICS

Variable	Grade 3 Percent of Total Mathematics Explained By Variable	Grade 5 Percent of Total Mathematics Explained By Variable
LBDQ production score	.0050	.0143
Sex of the principal	.0027	.0091
Administrative certificates of principal		.0028

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

This chapter begins with a brief summary of the research presented to this point in the dissertation. In the second section of the chapter, the conclusions drawn from the study are presented. The implications of the results and the implications for future research are explored in the final section of the chapter.

Summary

The purpose of this study was to determine which of the selected school resources had the greatest impact on reading and mathematics achievement of third and fifth grade students in an intermediate-sized Wisconsin school district. While input-output studies in education have been conducted for about 25 years, this study differed from other studies because of its population. While the overwhelming majority of input-output studies have focused on minority and lower-socioeconomic populations, this study's population was predominantly nonminority and represented all socioeconomic groups. Thus this study's population more closely resembles the populations of most school districts, and therefore the findings are intended to be useful to school district administrators who are interested in manipulating school resources to maximize student achievement.

The study's sample included 145 randomly selected third grade students and 145 randomly selected fifth grade students. Data on 82

independent variables were collected and analyzed. The students' achievement test scores in reading and mathematics served as the dependent variables. Four research questions concerning the relationship between school resources and achievement were established. Stepwise multiple linear regression analysis was used to examine the relationships between the dependent and independent variables.

The results indicated that some of the independent variables in three of the four categories, namely student-related variables, teacher/classroom-related variables, and principal-related variables, contributed toward achievement in reading and/or mathematics for the students in the sample. The student-related independent variables that were found to contribute included the following: instructional level in reading, instructional level in mathematics, family income, total of student's father's occupation and mother's education, student's age, days student was absent, custodial parent, student's attitude toward the subject, student's attitude toward the teacher, and years student has been enrolled in present school. Included among teacher/classroom-related independent variables that contributed toward achievement were the undergraduate college the teacher attended, minutes per day of reading instruction, minutes per day of mathematics instruction, expenditures per student on mathematics textbooks, years teaching experience of teacher, and "structuredness" of school. The four principal-related independent variables that were found to contribute toward achievement included the Leader Behavior Description Questionnaire production score of the principal, sex of the principal, administrative certificates held by the principal, and college from which principal's master's degree was earned.

Conclusions

For the purposes of organization and clarity, the conclusions include the findings reported in Chapter IV.

Conclusions for Total reading and Grade 3

1. The regression model explained approximately 53% of the variance in total reading raw score. Of the 11 independent variables in the model, three were significant at or beyond the .05 level, and together these three variables accounted for almost 48% of the variance in total reading. Instructional level in reading accounted for approximately 43% of the variance in the dependent variable and had a positive relationship with total reading. The variable custodial parent which had a positive relationship with total reading explained about 3% of the variance in the dependent variable. The undergraduate college attended by the teacher variable accounted for slightly more than 2% of the variance in the dependent variable and had a negative relationship with total reading.

2. Although none of the other eight independent variables in the regression model were significant at or beyond the .05 level, each of these variables explained some of the variance in total reading raw score. The variables minutes per day of reading instruction, years teaching experience of the teacher, years student in present school, and the Leader Behavior Description Questionnaire production score each explained approximately 1% of the variance in the dependent variable. The variables college from which the principal's master's was earned and total of student's father's occupation and mother's education each

accounted for about .5% of the variance in total reading. The last two independent variables that entered the regression model--sex of the principal and attitude toward school-subject score--each explained less than .10% of the variance in the dependent variable. Of these eight variables, seven had positive relationships with total reading. Only the variable college from which the principal's master's was earned had a negative relationship with total reading.

3. Given these findings, the following conclusions can be drawn for this population:

a. Students with higher instructional levels in reading achieved more in reading than students with lower instructional levels in reading.

b. With whom the student lived had an impact on achievement in reading. Third grade students who lived with both natural parents achieved more in reading than the third grade students who did not live with both natural parents.

c. Grade three students who had teachers who graduated from colleges or universities other than the local university achieved less in reading than students whose teachers attended the local university.

d. Students who received more minutes per day of instruction in reading achieved more in reading than students who received fewer minutes per day of reading instruction.

e. Students whose teachers had more years of teaching experience achieved more in reading than students whose teachers had fewer years of teaching experience.

f. Students who had attended the same school for a longer period of time achieved more in reading than students who had attended the same school for a shorter period of time.

g. Students who attended schools managed by principals whose scores on the Production subtest of the Leader Behavior Description Questionnaire were higher achieved more in reading than students who attended schools where the principals had lower Production scores.

h. Students who attended schools in which the principals earned master's degrees from a branch of the University of Wisconsin achieved more in reading than students who attended a school in which the principals' master's degrees were earned at another college or university.

i. Students whose fathers had more prestigious occupations and whose mothers had more education achieved more in reading than students whose fathers had less prestigious occupations and whose mothers had less education.

j. Third grade students who attended schools in which the principal was female achieved more in reading than students who attended schools that had a male principal.

k. Students whose scores on the Subject subtest of the Attitude Toward School Inventory were higher achieved more in reading than students whose ATTS scores were lower.

Conclusions for Total reading and Grade 5

1. The regression model explained over 54% of the variance in total reading raw score. Of the eight independent variables in the model, three were significant at or beyond the .05 level, and together these

variables accounted for over 52% of the variance in the dependent variable. The instructional level in reading accounted for slightly more than 45% of the variance in total reading, and the relationship between the instructional level in reading and total reading was positive. The variables age of the student and days student absent explained approximately 4% and 3% respectively of the variance in the dependent variable. The relationships between age of the student and total reading and between days student absent and total reading were negative.

2. Although none of the other five independent variables in the regression model were significant at or beyond the .05 level, each of these variables explained some of the variance in total reading. The variables structuredness of the school and administrative certificates of the principal each explained approximately .5% of the variance in the dependent variable. The custodial parent variable accounted for .32% of the variance in total reading. The last two variables that entered the regression model--total of student's father's occupation and mother's education and years teaching experience of the teacher--each explained less than .10% of the variance in the dependent variable. Of these five independent variables four had positive relationships with the dependent variable. Only the variable administrative certificates of the principal had a negative relationship with total reading.

3. Given these findings, the following conclusions can be drawn for this population:

a. Students with higher instructional levels in reading achieved more in reading than students with lower instructional levels in reading.

b. Fifth grade students who were older than their peers achieved less in reading than students who were approximately the same age as their peer group.

c. Students who were absent from school more days achieved less in reading than students who were absent fewer days.

d. Students who attended a school that was described by their teacher as "structured" achieved more in reading than students who attended a school that was described by their teacher as less "structured."

e. Students who attended a school in which the principal held a certificate in either reading or guidance in addition to an administrative certificate achieved less in reading than students who attended a school in which the principal held only an administrative certificate.

f. With whom the student lived had an impact on achievement in reading. Fifth grade students who lived with both natural parents achieved more in reading than fifth grade students who did not live with both natural parents.

g. Students whose fathers had more prestigious occupations and whose mothers had more education achieved more in reading than students whose fathers had less prestigious occupations and whose mothers had less education.

h. Students whose teachers had more years of teaching experience achieved more in reading than students whose teachers had fewer years of teaching experience.

Conclusions for Total mathematics and Grade 3

1. The regression model explained over 54% of the variance in total mathematics raw score. Of the nine independent variables in the model, five were significant at or beyond the .05 level, and together these variables accounted for over 54% of the variance in total mathematics. Instructional level in mathematics accounted for approximately 43% of the variance in the dependent variable and had a positive relationship with total mathematics. The variable undergraduate college the teacher attended explained approximately 3% of the variance in total mathematics. The variables family income, minutes per day of mathematics instruction, and expenditures on mathematics textbooks each explained about 2% of the variance in the dependent variable. The relationships between family income and total mathematics and between minutes per day of mathematics instruction were positive while the relationships between expenditures on mathematics textbooks and total mathematics and between undergraduate college the teacher attended and total mathematics were negative.

2. Although none of the other four independent variables in the regression model were significant at or beyond the .05 level, each of the variables explained some of the variance in total mathematics. The variable attitude toward school-subject score explained about 1% of the variance in the dependent variable. The variables years teaching experience of the teacher and Leader Behavior Description Questionnaire production score each accounted for about .5% of the variance in total mathematics. The variable sex of the principal explained about .3% of

the variance in the dependent variable. The relationships between these independent variables and total mathematics were positive.

3. Given these findings, the following conclusions can be drawn for this population:

a. Students with higher instructional levels in mathematics achieved more in mathematics than students with lower instructional levels in mathematics.

b. Grade three students who had teachers who graduated from colleges or universities other than the local university achieved less in mathematics than students whose teachers attended the local university.

c. Students whose family income levels were higher achieved more in mathematics than students whose family income levels were lower.

d. Students who received more minutes per day of instruction in mathematics achieved more in mathematics than students who received fewer minutes per day of instruction in mathematics.

e. Students who attended schools in which more money was spent on mathematics textbooks achieved less in mathematics than students who attended schools in which less money was spent on mathematics textbooks.

f. Students whose scores on the Subject subtest of the Attitude Toward School Inventory were higher achieved more in mathematics than students whose ATTS scores were lower.

g. Students whose teachers had more years of teaching experience achieved more in mathematics than students whose teachers had fewer years of teaching experience.

h. Students who attended a school whose principal's score on the Production subtest of the Leader Behavior Description Questionnaire

was higher achieved more in mathematics than students who attended a school where the principal had a lower LBDQ Production score.

Conclusions for Total mathematics and Grade 5

1. The regression model explained over 53% of the variance in the total mathematics raw score. Of the 11 variables in the model, four were significant at or beyond the .05 level, and together these variables accounted for over 60% of the variance in total mathematics. The variable instructional level in mathematics accounted for approximately 55% of the variance in the dependent variable. The relationship between instructional level in mathematics and total mathematics was positive. The variables age of student and days student absent explained approximately 3% and 2% respectively of the variance in the dependent variable. The relationships between age of the student and total mathematics and between days student absent and total mathematics were negative. The variable Leader Behavior Description Questionnaire production score explained more than 1% of the variance in the dependent variable and had a positive relationship with total mathematics.

2. Although none of the other seven independent variables in the regression model were significant at or beyond the .05 level, each of the variables explained some of the variance in total mathematics. The variable sex of the principal accounted for approximately 1% of the variance in the dependent variable. The variables years teaching experience of the teacher and administrative certificates of the principal explained about .5% and .3% respectively of the variance in total mathematics. The relationships between sex of the principal and total

mathematics and between administrative certificates of the principal and total mathematics were negative, and the relationship between years teaching experience of the teacher and total mathematics was positive. The last four variables that entered the regression model--minutes per day of mathematics instruction, attitude toward school-teacher score, undergraduate college the teacher attended, and family income--each explained less than .1% of the variance in the dependent variable. The variables minutes per day of mathematics instruction, attitude toward school-teacher score, and family income had positive relationships with total mathematics while undergraduate college the teacher attended had a negative relationship with total mathematics.

3. Given these findings, the following conclusions can be drawn for this population:

a. Students with higher instructional levels in mathematics achieved more in mathematics than students with lower instructional levels in mathematics.

b. Fifth grade students who were older than their peer group achieved less in mathematics than students who were approximately the same age as their peer group.

c. Students who were absent from school more days achieved less in mathematics than students who were absent fewer days.

d. Students who attended schools whose principals' scores on the Production subtest of the Leader Behavior Description Questionnaire were higher achieved more in mathematics than students who attended schools where the principals had lower LBDQ Production scores.

e. Students who attended schools in which the principal was female achieved more in mathematics than students who attended schools that had a male principal.

f. Students whose teachers had more years of teaching experience achieved more in mathematics than students whose teachers had fewer years of teaching experience.

g. Students who attended schools in which the principals held a certificate in either reading or guidance in addition to an administrative certificate achieved less in mathematics than students who attended schools in which the principals held only an administrative certificate.

h. Students who received more minutes per day of instruction in mathematics achieved more in mathematics than students who received fewer minutes per day of instruction in mathematics.

i. Students whose scores on the Teacher subtest of the Attitude Toward School Inventory were higher achieved more in mathematics than students whose ATTT scores were lower.

j. Students whose teachers graduated from colleges or universities other than the local university achieved less in mathematics than students whose teachers graduated from the local university.

k. Students whose family income levels were higher achieved more in mathematics than students whose family income levels were lower.

Implications of the Study

The final section of this chapter presents the implications of this research study. First, the implications for educational policy and practice are explored, and then the implications for future research are presented.

Implications for Policy and Practice

This research study is useful to both the administrators of the school district that was studied and the policymakers of other school districts, especially intermediate-sized districts that serve school populations that are nonminority and that represent a cross-section of socioeconomic groups. The input-output model utilized in this study can be adapted by school district administrators to analyze the resources within the school district. The results of their analysis can be used to manipulate the available resources to maximize student achievement.

In this study the components of the educational system (students, teachers, principals, schools) were analyzed in relation to their effects on the outputs of schooling (reading and mathematics achievement scores). The analysis suggested that a particular combination of human and material resources accounted for a certain percentage of achievement in reading and mathematics. More importantly, the analysis suggested that increases in certain resources would appear to increase reading and mathematics achievement, while increases in other resources would appear to decrease or have little or no impact on achievement. Among the policy and practice implications for the population under study were the following:

1. The instructional levels in reading and mathematics were found to greatly impact achievement in reading and mathematics, respectively. Thus school administrators should carefully monitor the achievement of students, especially in the early elementary grades, to insure maximum achievement. Intervention strategies to improve achievement that were suggested by this study could be utilized. Among these strategies could be assigning the most experienced teachers to lower achieving students, increasing the time devoted to reading and mathematics instruction, improving the attitude of the students toward the subject and the teacher, or assigning the most "productive" principals to the schools with the most low achieving students.

2. Several family characteristics, namely the occupation of the father and the education of the mother, the custodial parents, and the income level, were found to have an impact on reading and mathematics achievement. Students whose father's occupational level and mother's educational level were lower, students who did not live with both natural parents, and students whose income levels were lower were found to achieve less in reading and mathematics. Even though school administrators cannot change these characteristics, they should be aware of the family characteristics of students and make every attempt to place students who are disadvantaged by these characteristics in the best possible situation in school.

3. Fifth grade students who were older than their classmates were found to achieve less in both reading and mathematics. Given this finding, it is most appropriate for school administrators to reexamine their retention and placement practices.

4. Fifth grade students who were absent from school more frequently were found to achieve less in both reading and mathematics. Therefore school administrators should review their procedure for monitoring student attendance and implement strategies for improving student attendance.

5. Student attitude toward the subject and the teacher were found to have a positive effect on student achievement in reading and mathematics. Given this finding, school administrators should establish ways to assess student attitude and develop and implement strategies for improving student attitude toward the subject and the teacher.

6. Third grade students who have attended their present school for a longer period of time achieve more in reading than third grade students who have attended their present school for a shorter period of time. Thus school administrators should carefully monitor the adjustment and progress of transfer students, especially in the lower grades.

7. Teachers who graduated from the local university that was once primarily a teachers' college appeared to be more effective than teachers who graduated from another college or university. Given this finding, school district policymakers should reexamine both their hiring and teacher assignment practices and procedures.

8. Students who received more minutes per day of reading and mathematics instruction were found to achieve more in reading and mathematics, respectively. This finding indicates to the administrators that it would be advantageous to examine time allocations and to implement changes as appropriate.

9. Third grade students who attended schools in which more money was spent on mathematics textbooks achieved less in mathematics. This finding should cause school administrators to reexamine the commonly held assumption that spending more money on textbooks and/or materials results in higher achievement.

10. Students who had teachers with more years of teaching experience were found to achieve more in both reading and mathematics. This finding has implications for school district hiring and teacher assignment practices and procedures.

11. Fifth grade students who attended schools that are described by their teachers as "structured" were found to achieve more in reading. Given this finding, school administrators should develop and implement ways to increase the "structuredness" of the schools.

12. Students who attend schools whose principals had higher Production scores on the Leader Behavior Description Questionnaire were found to achieve more in reading and mathematics. Therefore, it would be advantageous for school district administrators to devise ways to increase the "production" of the building principals.

13. Finally, the sex of the principal, the college from which the principal's master's degree was earned, and the administrative certificates held by the principal were found to have an impact on achievement in reading and mathematics. The achievement of students was higher in schools with female principals, in schools in which the principal's master's degree was earned from a branch of the University of Wisconsin, and in schools in which the principal held only an administrative certificate,

not additional certificates in reading or guidance. These findings have implications for school district practices and procedures for hiring and assigning principals.

Implications for Future Research

This research study demonstrated that through an input-output study local school district administrators can analyze available data on school resources to formulate judgments on how school resources are and should be combined and utilized to increase student achievement. Especially noteworthy in this study were the findings that student attitude, structuredness of the school, and sex and production level of the principal can make a difference in student achievement.

The limitations cited previously for this study could be starting points for future research efforts. Future input-output studies should utilize longitudinal data. Both inputs and outputs should be assessed at multiple points during the students' schooling so that causal effects of specific inputs can be inferred. Additional studies should include data from several school districts. This would allow the findings to be generalized more. Finally, future studies should include as much disaggregated data as possible. Since none of the school-related variables in this study yielded any findings, these variables, which were aggregated at the level of the school, might be eliminated from future studies.

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APPENDIX A

SCHOOL______ TEACHER______

STUDENT-RELATED INFORMATION

STUDENT	SEX	ETHNIC GROUP	BIRTH DATE	NO. OF CHILD. IN FAM.	BIRTH ORDER[1]	FREE LUNCH STATUS	STUDENT LIVES WITH	OCCUPATION OF PARENTS	ESTIMATED EDUCATION LEVEL OF PARENTS	RECEIVES TITLE I SERVICES	YEARS IN THIS SCHOOL	DAYS ABSENT THIS YR.[2]	INSTRUC. LEVEL[3]	AVE. REPORT CARD GRADES THIS YEAR	ITBS SCORES 1979[4]	ITBS SCORES 1981[4]
____	__	White __ Black __ Spanish __ Asiatic __ Other __	____	____	____	Rec. free lunch __ Rec. red. lunch __ Qual. but didn't apply __ Doesn't qual. __	M & F __ Mother __ Father __ Parent & steppar. __ Other (Pl. specify) ______	M F skilled worker __ __ general factory __ __ manager __ __ professional __ __ homemaker __ __ retail sales/ service __ __ food service __ __ clerical/office __ __ other (Please specify.) ______	M F some h.s. __ __ fin. h.s. __ __ some coll. __ __ fin. coll. __ __ fin. M.A. __ __ fin. Ph.D. __ __	Yes __ No __	____	____	MATH: ____ READ: ____	Read. __ Math __ Overall __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __
____	__	White __ Black __ Spanish __ Asiatic __ Other __	____	____	____	Rec. free lunch __ Rec. red. lunch __ Qual. but didn't apply __ Doesn't qual. __	M & F __ Mother __ Father __ Parent & steppar. __ Other (Pl. specify) ______	M F skilled worker __ __ general factory __ __ manager __ __ professional __ __ homemaker __ __ retail sales/ service __ __ food service __ __ clerical/office __ __ other (Please specify.) ______	M F some h.s. __ __ fin. h.s. __ __ some coll. __ __ fin. coll. __ __ fin. M.A. __ __ fin. Ph.D. __ __	Yes __ No __	____	____	MATH: ____ READ: ____	Read. __ Math __ Overall __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __
____	__	White __ Black __ Spanish __ Asiatic __ Other __	____	____	____	Rec. free lunch __ Rec. red. lunch __ Qual. but didn't apply __ Doesn't qual. __	M & F __ Mother __ Father __ Parent & steppar. __ Other (Pl. specify) ______	M F skilled worker __ __ general factory __ __ manager __ __ professional __ __ homemaker __ __ retail sales/ service __ __ food service __ __ clerical/office __ __ other (Please specify.) ______	M F some h.s. __ __ fin. h.s. __ __ some coll. __ __ fin. coll. __ __ fin. M.A. __ __ fin. Ph.D. __ __	Yes __ No __	____	____	MATH: ____ READ: ____	Read. __ Math __ Overall __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __
____	__	White __ Black __ Spanish __ Asiatic __ Other __	____	____	____	Rec. free lunch __ Rec. red. lunch __ Qual. but didn't apply __ Doesn't qual. __	M & F __ Mother __ Father __ Parent & steppar. __ Other (Pl. specify.) ______	M F skilled worker __ __ general factory __ __ manager __ __ professional __ __ homemaker __ __ retail sales/ service __ __ food service __ __ clerical/office __ __ other (Please specify.) ______	M F some h.s. __ __ fin. h.s. __ __ some coll. __ __ fin. coll. __ __ fin. M.A. __ __ fin. Ph.D. __ __	Yes __ No __	____	____	MATH: ____ READ: ____	Read. __ Math __ Overall __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __
____	__	White __ Black __ Spanish __ Asiatic __ Other __	____	____	____	Rec. free lunch __ Rec. red. lunch __ Qaul. but didn't apply __ Doesn't qual. __	M & F __ Mother __ Father __ Parent & steppar. __ Other (Pl. specify.) ______	M F skilled worker __ __ general factory __ __ manager __ __ professional __ __ homemaker __ __ retail sales/ service __ __ food service __ __ clerical/office/ __ __ other (Please specify.) ______	M F some h.s. __ __ fin. h.s. __ __ some coll. __ __ fin. coll. __ __ fin. M.A. __ __ fin. Ph.D. __ __	Yes __ No __	____	____	MATH: ____ READ: ____	Read. __ Math __ Overall __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __	R. Voc. __ R. Comp. __ Total R. __ M. Comp. __ M. Conc. __ Total M. __

[1] First born is 1, second born 2, etc.
[2] Up to and including May
[3] Identify as high, middle, or low
[4] Give national percentile.

APPENDIX B

ATTITUDE TOWARD SCHOOL INVENTORY

STRONGLY AGREE (A)	AGREE (B)	UNCERTAIN (C)	DISAGREE (D)	STRONGLY DISAGREE (E)

1. (Sample) I like to eat ice cream.
2. (Sample) I like to go fishing.
3. (Sample) I hate to watch T.V.
4. I am happy when the school day begins. G+
5. I tell my friends that I like school. G+
6. There is too much work in school. S-
7. I look forward to going to school. G+
8. Teachers are fair. T+
9. Most teachers here are friendly. T+
10. I see no use for what we study in school. S-
11. It is hard to pay attention in class. S-
12. School is fun most of the time. G+
13. I don't learn anything important in school. S-
14. Most teachers are hard to please. T-
15. I like most of my school subjects. S+
16. I would like more time to read in school. S+
17. I do not miss school in the summer. G-
18. I like my teachers. T+
19. I hate to read school books. S-
20. Most school work is dull and boring. S-
21. Most teachers do not like kids. T-
22. I am proud of my school. G+
23. I care about my schoolwork. S+
24. I like to work in school. S+
25. Teachers yell at kids too much. T-
26. I would like to have my teacher as a friend. T+
27. Going to school is a waste of time. G-
28. I often learn new things in school. S+
29. I wish I had a different teacher. T-
30. It is important to go to school. G+
31. Most teachers are mean. T-
32. The teachers here do not understand the children. T-
33. Schoolwork is interesting to me. S+
34. I like to do my math problems. S+
35. There should be no such thing as school. G-
36. If I had my choice, I would not go to school. G-
37. I feel good when my teacher is close by. T+

A "G" means that the statement refers to School in General. "S" refers to School Subjects and Learning. "T" refers to Teacher. "+" indicates that the statement is positively worded while "-" means negatively worded.

ATTITUDE TOWARD SCHOOL INVENTORY (Continued)

STRONGLY AGREE (A)	AGREE (B)	UNCERTAIN (C)	DISAGREE (D)	STRONGLY DISAGREE (E)

38. I will be glad when I do not have to go to school anymore. G-
39. I feel good in school. G+
40. I like the way my teachers teach their classes. T+
41. None of my teachers really listen to me. T-
42. I like most of the things we do in school. G+
43. School is awful. G-
44. Recess and lunch are the only things I like about school. G-
45. If I were a teacher, I would want to be just like the teacher I have. T+
46. I do not care about my schoolwork. S-
47. When I need help, I like my teacher to help me. T+
48. I feel happy in this school. G+

APPENDIX C

TEACHER QUESTIONNAIRE

1. How many minutes per day do you teach mathematics? _____

2. How many students are in your math class? _____

3. Are your math students grouped by ability? _____

4. Approximately how many worksheets do you duplicate per week per student for your math students? _____

5. Please list any new materials you received during the 1980-81 school year for teaching math. Please include materials for the adopted program and any supplementary materials you use. (e.g. 7 Scott, Foresman textbooks, 8 Texas Instrument hand-held calculators, 2 Laidlaw Spectrum workbooks, 6 rulers, etc.)

_____

_____

_____

_____

6. How many minutes per day do you teach reading? _____

7. How many students are in your reading class? _____

8. How many different reading levels are in your reading class? _____

9. Approximately how many worksheets do you duplicate per week per student for your reading students? _____

10. Please list any new materials you received during the 1980-81 school year for teaching reading. Please include materials for the adopted program and any supplementary materials you use. (e.g. 12 Harper Row textbooks, 1 SRA reading kit, 5 Harper Row workbooks, etc.)

_____

_____

_____

_____

THANK YOU !!!

APPENDIX D

DIMENSIONS OF SCHOOLING QUESTIONNAIRE

DIRECTIONS: The purpose of this questionnaire is to obtain a description of your class on a variety of dimensions. Before responding please note the following points carefully.

1. Respond to the items in terms of what actually happens in your school situation. Do not respond in terms of what you think should happen. <u>There are no right or wrong answers, and your responses will be treated anonymously</u>.
2. "Class" in this questionnaire is defined as the group of students assigned to you at this time.
3. For each question rank the responses in terms of how well they describe your class situation. Assign the highest rank (1) to the response which occurs most often or to the most students. Assign the second highest rank (2) to the response which happens the next most often . . . and so on down to the lowest ranked response.
4. Do not rank responses which are inappropriate to your situation. But do rank at least one response for each item.

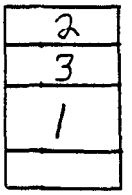
EXAMPLE. LIBRARY USAGE. This item is concerned with the students' opportunity to go to the school library.

a. Students go to the school library individually whenever they wish.

b. Students go to the school library individually with the teacher's permission.

c. Students go to the school library in groups with the teacher's or iibrarian's supervision.

d. Students go to the school library mainly outside regular school hours.



The response in the example describes a situation in which the most frequently occurring category is "C", so it is ranked number 1; the second most frequently occurring category is "A", so a "2" is placed in the box by category "A"; the third most frequently occurring category is "B", so a "3" is placed in the box by category "B" and "D" simply does not occur, so no mark is made in the box by "D".

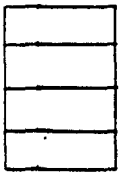
1. ASSIGNMENT OF STUDENTS TO TEACHERS. This item is concerned with who makes the decisions about student assignment to teachers.

a. Class assignments are decided upon by the students.

b. Class assignments are decided upon by the parents.

c. Class assignments are decided upon by teachers.

d. Class assignments are decided upon by principal or vice principal.

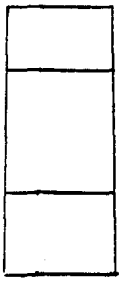


2. AGE RANGE. This item is concerned with the range of age of students assigned to a teacher.

a. Students assigned to a teacher are about the same age; age is the primary criterion for assigning a student to a class.

b. Students assigned to a teacher are in a two or three year age range; there is a semi-graded system which will allow, to some extent, that individual differences in physical, social and intellectual maturity will be considered in assigning students to a class or grade.

c. Students assigned to a teacher vary in age by more than three years; there is a multiage system which allows students with a wide variety of qualifications and ages to be in the same class.



3. TIME SCHEDULING. This item is concerned with the amount of time which is blocked into scheduled activities.

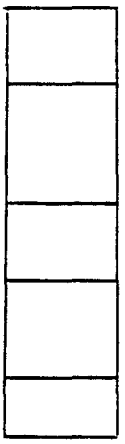
   a. Fully unscheduled: Activities (e.g. math or other subjects, outdoor play, work with art materials, etc.) are not scheduled but occur as students' and/or teachers' interests dictate.

   b. Mostly unscheduled: Activities are not scheduled for most of the day, but there are some activities (no more than ¼ of the day) that are held at specific times (e.g. a music class given by a teacher who comes from outside the school).

   c. Scheduled and unscheduled: Approximately ½ the day is unscheduled with the other ½ blocked into scheduled activities.

   d. Mostly scheduled: Activites are scheduled for most of the day (about 3/4) but the rest of the time is left unscheduled so that activities occur as students' and teachers' interests dictate.

   e. Fully scheduled: The full day is organizaed into activities that occur according to some pre-arranged time table.



4. FREE TIME. This item is concerned with the amount of time during which students are free to pursue their own interests. This is not the same as independent study time where students work on projects or assignments in a particular subject area.

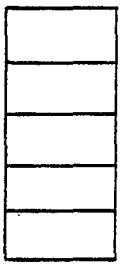
   a. The entire day is available for students to pursue their own interests (free time).

   b. At least half the day is available as free time.

   c. One to two hours of free time are available each day.

   d. Less than one hour of free time is available each day.

   e. There is no free time available.



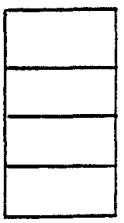
5. RULE MAKING. This item is concerned with determining who makes the rules which govern school behavior.

   a. Rules for student conduct are made by the administrative staff (principal, vice principal).

   b. Rules for student conduct are made by the teachers.

   c. Rules for student conduct are made by the parents.

   d. Rules for student conduct are made by the students.



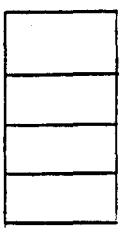
6. RULE ENFORCING. This item is concerned with determining who enforces the rules governing general school behavior.

   a. Rules for student conduct are enforced by the administrative staff (principal, vice principal).

   b. Rules for student conduct are enforced by the teachers.

   c. Rules for student conduct are enforced by the parents.

   d. Rules for student conduct are enforced by the students.



7. DEFINING GENERAL OBJECTIVES. This item is concerned with who determines the general objectives, (aims, goals, philosophy, expected outcomes) of schooling.

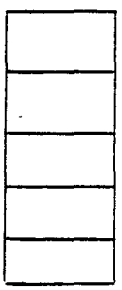
   a. General objectives are determined by the school board, and/or central administrative staff.

   b. General objectives are determined by the principal and/or vice principal.

   c. General objectives are determined by teachers.

   d. General objectives are determined by parents.

   e. General objectives are determined by students.



8. CONTENT ORGANIZATION. This item is concerned with the way that content is organized as part of the program.

a. Content is organized along traditional subject matter lines (e.g. math, science, social studies).

b. Content is combined into two or more groupings of subjects (e.g. environmental studies, communication arts).

c. Content is integrated; there is no attempt to organize content into subjects or groupings.

ADDITIONAL DIRECTIONS: Dimensions 1-8, just completed, were concerned with general school procedures as they affect your class program. The following items, 9-32, relate to specific program organization in the instructional area for each subject that you teach. Please respond as before by ranking categories in terms of how well they describe your class situation for READING and MATHEMATICS. This will require a column of ranks for both of these subjects.

9. DETERMINING INSTRUCTIONAL OBJECTIVES. This item is concerned with who determines the content and activities of the program.

a. Instructional objectives are determined by the school board, and/or central administrative staff.

b. Instructional objectives are determined by the principal and/or vice-principal.

c. Instructional objectives are determined by teachers.

d. Instructional objectives are determined by parents.

e. Instructional objectives are determined by students.

READ.	MATH

10. DEVELOPMENT OF MATERIALS. This item is concerned with the amount of personal involvement that students and teachers have in the development of materials for the classroom.

a. There is little involvement of teachers and/or students in developing materials; i.e. most materials in use are ready-to-use "packages" (e.g. reading series, sets of math texts, computer-assisted instruction).

b. There is some involvement of teachers and/or students in developing materials, i.e. most materials in use are things chosen by teachers, students, or others from a wide variety of sources in a ready-to-use form (e.g. books not in series, a calculator, a film, etc.).

c. There is a great deal of involvement of teachers and/or students in developing materials; i.e. most materials in use have been developed, created or adapted by students, teachers and others specifically for situations which arose in this classroom (e.g. collections of objects for use in working out math problems, student-made books, tape recordings of films made by students or teachers, equipment built by parents, etc.).

READ.	MATH

11. SELECTION OF MATERIALS. This item is concerned with the involvement students have in selecting materials with which to work.

a. Students choose for themselves from all the materials available and may bring in materials from outside the classroom.

b. Students choose from alternatives suggested by the teacher.

c. Students are assigned materials prescribed for them individually.

d. Student is assigned materials prescribed to members of his subgroup of the class. (Same materials for all students in the same subgroup; different materials for each subgroup.)

e. Student is assigned materials prescribed to all members of the class. (Same materials for all students in the same class.)

READ.	MATH

12. STUDENTS' MOBILITY. This item is concerned with the amount of freedom which students have to move around the school on a regular basis.

	READ.	MATH
a. Students do not need the permission of the teacher to leave the classroom, but freely move in and out of the room (or area) to use the library, resource center, etc.		
b. Students must ask the teacher's permission to move in and out of the classroom to use the library, resource center, etc. but permission is usually readily given.		
c. Students move in and out of the classroom to use the library, resource center, etc., only in special circumstances (i.e. with special permission) or as class groups.		

13. FLEXIBILITY OF ENVIRONMENT. This item is concerned with who makes the decisions about the arrangement and the setting of the learning area.

	READ.	MATH
a. The arrangement of furniture and equipment in the learning area is decided upon by the administrative staff.		
b. The arrangement of furniture and equipment in the learning area is decided upon and changed by the teachers.		
c. The arrangement of furniture and equipment in the learning area is decided upon and changed by the students.		

14. LEARNING ENVIRONMENT. This item concerns the size of the area used by students during the school day.

	READ.	MATH
a. Learning activities take place at the student's own desk or table.		
b. Learning activities take place in a number of different places (centers) within the classroom area.		
c. Learning activities take place in a number of different places (centers) within the school.		
d. Learning activities take place outside the school; the community and its institutions are incorporated into the learning environment.		

15. STUDENT PACING. This item is concerned with the pace at which the student works.

	READ.	MATH
a. The student is expected to work at a pace set for all members of the class.		
b. The student is expected to work at a pace set for the members of his subgroup of the class.		
c. The student works at a pace prescribed for him individually.		
d. The student sets his own pace.		

16. INDEPENDENT STUDY TIME. This item concerns the availability of independent study time; students work by themselves on projects of their choice but in keeping with the wide range objectives of the subject area (e.g. during a geography unit on the Middle East, a student might use his independent study time to create a paper mache relief map of the Sinai Peninsula).

	READ.	MATH
a. Independent study time is available for more than 3 hours per week.		
b. Independent study time is available from 1-3 hours per week.		
c. Independent study time is available less than 1 hour per week.		
d. Independent study time is not available.		

17. STUDENT INTERACTION. This item is concerned with the students' opportunities to interact through discussion with his peers.

	READ.	MATH
a. Interaction with peers through discussion is not encouraged; each student is expected to work independently without exchanging ideas with his peers.		
b. Interaction with peers through discussion is permitted at certain times, particularly after assignments have been completed.		
c. Interaction with peers through discussion is encouraged by the teacher and a regular part of the learning.		

18. FORMULATING APPROACHES TO LEARNING. This item is concerned with the extent to which teachers help students arrive at approaches to learning and problem solving.

	READ.	MATH
a. Students formulate their own methods of learning and solving problems (e.g. a student studying the metric system independently consults several people, looks in the card catalog at the library, and writes to the government for information).		
b. Students choose from alternative methods suggested by the teacher for learning and solving problems (e.g. a student studying the metric system asks the teacher for help. The teacher suggests two books, a filmstrip, and writing to the government).		
c. Students are assigned methods by the teacher for learning and solving problems (e.g. a student studying the metric system is assigned the tasks of writing a letter to the government, reading two books, and viewing a filmstrip).		

19. PEER GROUP ASSISTANCE. This item is concerned with the extent to which students work with other students on school work.

	READ.	MATH
a. Students independently seek assistance in their school work from peers or other students; this is accepted and encouraged as a valid way of seeking solutions or of exploration.		
b. There is student-to-student assistance on a teacher-initiated basis (e.g. the teacher assigns a good reader to help a poorer reader or arranges for a tutor.		
c. Assistance comes from the teacher.		

20. OTHER ADULT INVOLVEMENT. This item is concerned with the involvement of adults other than teachers in the classroom.

	READ.	MATH
a. All teaching is done by the regular classroom teacher and special subject teachers.		
b. Although most of the teaching is done by the classroom teacher and special teachers, occasionally there are visitors, parents, or volunteers who have special knowledge of a topic, or who help in a practical way in the classroom.		
c. Although much of the teaching is done by the classroom and special teachers, there are regularly involved parents, volunteers and frequent visitors who are welcome in the classroom and whose involvement is considered an important part of the learning experience.		

21. COOPERATIVE PLANNING. This item is concerned with the extent to which teachers plan their program together and share information about students.

	READ.	MATH
a. Teachers plan and teach independently of each other and share little or no information about students.		
b. Teachers plan and teach together but do not share information about students.		
c. Teachers plan and teach independently but do share information about students.		
d. Teachers plan and teach together and share information about students.		

22. MEDIA USAGE. This item concerns the selection and use of media as teaching aids in instruction.

	READ.	MATH
a. The teacher takes responsibility for selecting and using media.		
b. The teacher takes responsibility for selecting media which are used by the students.		
c. Students take responsibility for selecting and using media.		

23. TEACHER FOCUS. This item concerns the size of the student group addressed by the teacher at one time.

	READ.	MATH
a. The teacher directs attention to the class as a whole.		
b. The teacher directs attention to subgroups of the class.		
c. The teacher directs attention to individual students.		

24. TEACHER ROLE. This item is concerned with the role the teacher plays in the student's contact with what is being learned.

	READ.	MATH
a. The teacher provides guidance as a resource person to whom students come when in need of assistance.		
b. The students choose topics for study and the teacher organizes instructional activities.		
c. The teacher chooses topics for study and organizes instructional activites.		
d. The teacher provides instruction through a sequence of planned lessons.		

25. SUBGROUPING CRITERIA. This item is concerned with how subgroups within the class are developed.

	READ.	MATH
a. Students group themselves according to their own criteria (e.g. interests, friendships, etc.).		
b. Students are grouped by the teacher on the basis of information about students' interests, aptitude, achievement, or social maturity.		
c. Students are grouped by the teacher on the basis of random assignment (e.g. alphabetically, by sex, or age).		

26. SUBGROUPING STABILITY. This item is concerned with the establishment and change in the composition of subgroups within the class.

	READ.	MATH
a. Subgroups within the class are established for the duration of a specified period of time (e.g. for the school year or for a term).		
b. Subgroups within the class are established and/or reorganized when the teacher feels it is necessary and/or desirable (e.g. for a new activity or when students' interests change).		
c. Subgroups within the class are established and/or reorganized when students feel it is necessary and/or desirable (e.g. for a new activity or when students' interests change).		

27. PROMOTION TIMING. This item is concerned with the timing of student placement decisions.

	READ.	MATH
a. Promotion decisions are made at the end of the school year or term.		
b. Promotion decisions are made at the end of each unit of study.		
c. Promotion decisions are made whenever it seems appropriate for the individual student.		
d. Promotion does not occur. Rather, students remain in a class on intact for several years.		

28. EVALUATION FOCUS. This item is concerned with the size of the group being evaluated.

	READ.	MATH
a. Evaluation procedures are the same for all students in the school.		
b. Evaluation procedures are the same for all students in the class, but differ from class to class in the school.		
c. Evaluation procedures are the same for each student within a subgroup of the class, but differ from subgroup to subgroup.		
d. Evaluation procedures are different for each student in the class.		

29. TIMING OF EVALUATION. This item is concerned with time(s) at which evaluation takes place.

	READ.	MATH
a. Evaluation takes place at the end of each term.		
b. Evaluation takes place at the end of each unit.		
c. Evaluation takes place several times during the unit of work.		
d. Evaluation takes place every day.		

30. STUDENT ROLE IN EVALUATION. This item is concerned with the degree to which students plan and use evaluation information for self-evaluation purposes.

	READ.	MATH
a. Students plan evaluation and use results for self-evaluation purposes.		
b. Teachers plan evaluation and students use results for self-evaluation purposes.		
c. Teachers plan evaluation and do not provide information for student self-evaluation.		
d. The administration plans evaluation and does not provide information for student self-evaluation.		

31. EVALUATION PROCEDURES. This item concerns the types of tests and other evaluation instruments used in student evaluation.

	READ.	MATH
a. Evaluation is based on work samples and anecdotal records.		
b. Evaluation instruments used were developed in this classroom.		
c. Evaluation instruments used were developed within the school (by other teachers or in previous years).		
d. Standardized (commercial) instruments are used.		

32. STUDENTS' MOBILITY WITHIN THE CLASSROOM/INSTRUCTIONAL AREA. This item is concerned with the amount of freedom which students have to move around the class area on a regular basis.

	READ.	MATH
a. Students move freely about the class area without asking the teacher's permission (to sharpen pencils, wash hands, talk to another student, work in different learning centers, to get materials, etc.).		
b. Students must ask the teacher's permission to move about the classroom.		
c. Students do not move about the class area except after explicit directions from the teacher.		

THANK YOU !!!

APPENDIX E

LEADER BEHAVIOR DESCRIPTION QUESTIONNAIRE--FORM XII-S

Originated by staff members of
The Ohio State Leadership Studies
and revised by the
Bureau of Business Research

Purpose of the Questionnaire

On the following pages is a list of items that may be used to describe your leader behavior. Each item describes a specific kind of behavior, but does not ask you to judge whether the behavior is desirable or undesirable. Although some items may appear similar, they express differences that are important in the description of leadership. Each item should be considered as a separate description. This is not a test of ability or consistency in making answers. Its only purpose is to make it possible for you to describe, as accurately as you can, your behavior.

Note: The term, "group," as employed in the following items, refers to a department, division, or other unit of organization that is supervised by you.

The term "members," refers to all the people in the unit of organization that is supervised by you.

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The Ohio State University
Columbus, Ohio

DIRECTIONS:

a. READ each item carefully.

b. THINK about how frequently you engage in the behavior described by the item.

c. DECIDE whether you (A) always, (B) often, (C) occasionally, (D) seldom or (E) never act as described by the item.

d. DRAW A CIRCLE around one of the five letters (A B C D E) following the item to show the answer you have selected.

A = Always
B = Often
C = Occasionally
D = Seldom
E = Never

e. MARK your answers as shown in the examples below.

Example:	I often act as described.....	A	(B)	C	D	E
Example:	I never act as described.....	A	B	C	D	(E)
Example:	I occasionally act as described.....	A	B	(C)	D	E

1.	I act as the spokesman of the group.....	A	B	C	D	E
2.	I wait patiently for the results of a decision.....	A	B	C	D	E
3.	I make pep talks to stimulate the group.....	A	B	C	D	E
4.	I let group members know what is expected of them.....	A	B	C	D	E
5.	I allow the members complete freedom in their work.....	A	B	C	D	E
6.	I am hesitant about taking initiative in the group.....	A	B	C	D	E
7.	I am friendly and approachable.....	A	B	C	D	E
8.	I encourage overtime work.....	A	B	C	D	E
9.	I make accurate decisions.....	A	B	C	D	E
10.	I get along well with the people above me.....	A	B	C	D	E
11.	I publicize the activities of the group.....	A	B	C	D	E
12.	I become anxious when I cannot find out what is coming next.....	A	B	C	D	E
13.	My arguments are convincing.....	A	B	C	D	E
14.	I encourage the use of uniform procedures.....	A	B	C	D	E

A = Always
B = Often
C = Occasionally
D = Seldom
E = Never

15.	I permit the members to use their own judgment in solving problems.....	A	B	C	D	E
16.	I fail to take necessary action.....	A	B	C	D	E
17.	I do little things to make it pleasant to be a member of the group.....	A	B	C	D	E
18.	I stress being ahead of competing groups.....	A	B	C	D	E
19.	I keep the group working together as a team.....	A	B	C	D	E
20.	I keep the group in good standing with higher authority.....	A	B	C	D	E
21.	I speak as the representative of the group.....	A	B	C	D	E
22.	I accept defeat in stride.....	A	B	C	D	E
23.	I argue persuasively for my point of view.....	A	B	C	D	E
24.	I try out my ideas in the group.....	A	B	C	D	E
25.	I encourage initiative in the group members.....	A	B	C	D	E
26.	I let other persons take away my leadership in the group.....	A	B	C	D	E
27.	I put suggestions made by the group into operation.....	A	B	C	D	E
28.	I needle members for greater effort.....	A	B	C	D	E
29.	I seem able to predict what is coming next.....	A	B	C	D	E
30.	I am working hard for a promotion.....	A	B	C	D	E
31.	I speak for the group when visitors are present.....	A	B	C	D	E
32.	I accept delays without becoming upset.....	A	B	C	D	E
33.	I am a very persuasive talker.....	A	B	C	D	E
34.	I make my attitudes clear to the group.....	A	B	C	D	E
35.	I let the members do their work the way they think best..	A	B	C	D	E
36.	I let some members take advantage of me.....	A	B	C	D	E
37.	I treat all group members as my equals.....	A	B	C	D	E
38.	I keep the work moving at a rapid pace.....	A	B	C	D	E

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C = Occasionally
D = Seldom
E = Never

39.	I settle conflicts when they occur in the group.....	A	B	C	D	E
40.	My superiors act favorably on most of my suggestions.....	A	B	C	D	E
41.	I represent the group at outside meetings.....	A	B	C	D	E
42.	I become anxious when waiting for new developments.....	A	B	C	D	E
43.	I am very skillful in an argument.....	A	B	C	D	E
44.	I decide what shall be done and how it shall be done.....	A	B	C	D	E
45.	I assign a task, then let the members handle it.....	A	B	C	D	E
46.	I am the leader of the group in name only.....	A	B	C	D	E
47.	I give advance notice of changes.....	A	B	C	D	E
48.	I push for increased production.....	A	B	C	D	E
49.	Things usually turn out as I predict.....	A	B	C	D	E
50.	I enjoy the privileges of my position.....	A	B	C	D	E
51.	I handle complex problems efficiently.....	A	B	C	D	E
52.	I am able to tolerate postponement and uncertainty.....	A	B	C	D	E
53.	I am not a very convincing talker.....	A	B	C	D	E
54.	I assign group members to particular tasks.....	A	B	C	D	E
55.	I turn the members loose on a job, and let them go to it.....	A	B	C	D	E
56.	I back down when I ought to stand firm.....	A	B	C	D	E
57.	I keep to myself.....	A	B	C	D	E
58.	I ask the members to work harder.....	A	B	C	D	E
59.	I am accurate in predicting the trend of events.....	A	B	C	D	E
60.	I get my superiors to act for the welfare of the group members.....	A	B	C	D	E
61.	I get swamped by details.....	A	B	C	D	E
62.	I can wait just so long, then blow up.....	A	B	C	D	E

A = Always
B = Often
C = Occasionally
D = Seldom
E = Never

63.	I speak from a strong inner conviction.....	A	B	C	D	E
64.	I make sure that my part in the group is understood by the group members.....	A	B	C	D	E
65.	I am reluctant to allow the members any freedom of action.....	A	B	C	D	E
66.	I let some members have authority that I should keep.....	A	B	C	D	E
67.	I look out for the personal welfare of group members.....	A	B	C	D	E
68.	I permit the members to take it easy in their work.....	A	B	C	D	E
69.	I see to it that the work of the group is coordinated.....	A	B	C	D	E
70.	My word carries weight with my superiors.....	A	B	C	D	E
71.	I get things all tangled up.....	A	B	C	D	E
72.	I remain calm when uncertain about coming events.....	A	B	C	D	E
73.	I am an inspiring talker.....	A	B	C	D	E
74.	I schedule the work to be done.....	A	B	C	D	E
75.	I allow the group a high degree of initiative.....	A	B	C	D	E
76.	I take full charge when emergencies arise.....	A	B	C	D	E
77.	I am willing to make changes.....	A	B	C	D	E
78.	I drive hard when there is a job to be done.....	A	B	C	D	E
79.	I help group members settle their differences.....	A	B	C	D	E
80.	I get what I ask for from my superiors.....	A	B	C	D	E
81.	I can reduce a madhouse to system and order.....	A	B	C	D	E
82.	I am able to delay action until the proper time occurs.....	A	B	C	D	E
83.	I persuade others that my ideas are to their advantage.....	A	B	C	D	E
84.	I maintain definite standards of performance.....	A	B	C	D	E
85.	I trust the members to exercise good judgment.....	A	B	C	D	E

A = Always
B = Often
C = Occasionally
D = Seldom
E = Never

86.	I overcome attempts made to challenge my leadership.....	A	B	C	D	E
87.	I refuse to explain my actions.....	A	B	C	D	E
88.	I urge the group to beat its previous record.....	A	B	C	D	E
89.	I anticipate problems and plan for them.....	A	B	C	D	E
90.	I am working my way to the top.....	A	B	C	D	E
91.	I get confused when too many demands are made of me.....	A	B	C	D	E
92.	I worry about the outcome of any new procedure.....	A	B	C	D	E
93.	I can inspire enthusiasm for a project.....	A	B	C	D	E
94.	I ask that group members follow standard rules and regulations.....	A	B	C	D	E
95.	I permit the group to set its own pace.....	A	B	C	D	E
96.	I am easily recognized as the leader of the group.....	A	B	C	D	E
97.	I act without consulting the group.....	A	B	C	D	E
98.	I keep the group working up to capacity.....	A	B	C	D	E
99.	I maintain a closely knit group.....	A	B	C	D	E
100.	I maintain cordial relations with superiors.....	A	B	C	D	E

APPENDIX F

INDEPENDENT VARIABLES AND THEIR LABELS[1]

VARIABLE LABEL	VARIABLE
AGE	Age in months
ATTG	Attitude Toward School-general raw score
ATTS	Attitude Toward School-subject raw score
ATTT	Attitude Toward School-teacher raw score
BIRORDER	Birth order
DAYSAB	Days absent
EDFATH	Education of father
EDMOTH	Education of mother
ETHNGRP	Ethnic group
FLSTATUS	Family income
INSTRMAT	Instructional level in mathematics
INSTRREA	Instructional level in reading
NOCHILD	Number of children in family
OCCFATH	Occupation of father
OCCMOTH	Occupation of mother
RCGMATH	Report card grades in mathematics
RCGOVERA	Report card grades overall
RCGREAD	Report card grades in reading
SEX	Sex
STUDLIWI	Custodial parent
TITLEI	Title I services
YRPRSCHL	Years in present school
AGE1	Age
CLASSSIZ	Class size
DEGRPLCR	Degree plus credits earned
DISCC	Structuredness of classroom
DISCG	Structuredness of school
EXPMSUPP	Expenditures for mathematics supplies
EXPMTEXT	Expenditures for mathematics textbooks
EXPRSUPP	Expenditures for reading supplies
EXPRTEXT	Expenditures for reading textbooks
MINMINST	Minutes per day of mathematics instruction
MINRINST	Minutes per day of reading instruction
SALARY1	Salary
SEX1	Sex
SPLITNOT	Whether class consists of one or two grade levels
TCERTIF	Teaching certificates
UNDERGRA	Undergraduate college
YRBARECD	Year bachelor's degree received
YRSTEXP1	Years teaching experience

[1]The independent variables are presented in alphabetic order by category. The first group of variables is student-related; the second group is teacher-related; the third group is principal-related; and the fourth group is school-related.

INDEPENDENT VARIABLES AND THEIR LABELS (Continued)

VARIABLE LABEL	VARIABLE
ADCERTIF	Administrative certificates
AGE2	Age
COLLMA	College from which master's earned
CREDBEMA	Credits beyond master's
LBDQCONS	Leader Behavior Description Questionnaire consideration score
LBDQPROD	Leader Behavior Description Questionnaire production score
LBDQSTRU	Leader Behavior Description Questionnaire structure score
LBDQTOLF	Leader Behavior Description Questionnaire tolerance of freedom score
MAJORMAS	Major area of master's
SALARY2	Salary
SEX2	Sex
YREXPPR	Years experience as a principal
YREXPPRS	Years experience as a principal in present school
YRSTEXP2	Years teaching experience
ADDTOBUI	Additions to building
APEMT	Art, physical education, and music teachers
BAPPRAIS	Building appraisal
DATEBUI	Date building built
ENROLL	Enrollment
FLSTUD	Free lunch students
FTEMEDIA	Full-time equivalency media specialist
FTEPRINC	Full-time equivalency principal
FTEREDT	Full-time equivalency regular education teachers
NOCLASSES	Number of classes
NOCLRMS	Number of classrooms
NOLIBOOK	Number of library books
NOSPCLRM	Number of special classrooms
NOSPLIT	Number of classes with two grade levels
OAPPRAIS	Outside appraisal
PAPPRAIS	Property appraisal
PERBUSPT	Percent of building budget spent
RENTOBUI	Renovations to building
RLSTUD	Reduced lunch students
SPEDSTAF	Special education staff
SPEDSTUD	Special education students
SPEDTA	Special education teacher aides
STRATIO	Student-teacher ratio
SQFOOT	Square footage of school

INDEPENDENT VARIABLES AND THEIR LABELS (Continued)

VARIABLE LABEL	VARIABLE
TEACHAID	Teacher aides
TITLEIST	Title I students
TITLEIT	Title I teachers
TITLEITA	Title I teacher aides

APPENDIX G

CORRELATIONS BETWEEN TOTAL MATHEMATICS AND INDEPENDENT VARIABLES[1]

Variable	Correlation with Total Mathematics For Grade 3	Correlation with Total Mathematics For Grade 5
AGE	-.1827**	-.2958*
ATTG	.1040	.0800
ATTS	.2404	.0982
ATTT	.0893	.1383**
BIRORDER	.0304	-.1135
DAYSAB	-.0024	-.2403*
EDFATH	.2601*	.2584*
EDMOTH	.1431**	.2567*
FLSTATUS	.2602*	.3031*
INSTRMAT	.6539*	.7402*
INSTRREA	.5686*	.7152*
NOCHILD	.0320	-.1585**
OCCFATH	.2651*	.2086*
OCCMOTH	.0093	.0895
RCGMATH	.6189*	.6982*
RCGOVERA	.5807*	.7161*
RCGREAD	.4988*	.6866*
SEX	.0241	.0368
STUDLIWI	.0918	.0245
YRPRSCHL	-.0188	.1147
AGE1	-.0684	.2021*
CLASSSIZ	.0979	.0535
DEGRPLCR	.0035	-.0608
DISCC	-.0459	.0336
DISCG	-.2343*	.1176
EXPMSUPP	.0426	.0881
EXPMTEXT	.2046*	.0012
EXPRSUPP	.1319	-.1043
EXPRTEXT	-.0661	-.0183
MINMINST	.1446**	.0053
MINRINST	-.0433	.0754
SALARY1	-.0404	.0216
SEX1		.0522
SPLITNOT	-.0496	
TCERTIF	-.0874	.0974
UNDERGRA	-.2159*	-.0145
YRBARECD	.0252	-.1980*
YRSTEXP1	.0254	.1363

[1] The variables are presented by category. The first group of variables is student-related. The second group is teacher/classroom-related; the third group is principal-related; and the fourth group is school-related.

*Significant at .01 level. **Significant at .05 level.

CORRELATIONS BETWEEN TOTAL MATHEMATICS AND INDEPENDENT VARIABLES
(Continued)

Variable	Correlation with Total mathematics For Grade 3	Correlation with Total mathematics For Grade 5
ADCERTIF	-.0533	-.1687**
AGE2	.1571**	.1415**
COLLMA	.0158	.0069
CREDBEMA	-.0312	.0130
LBDQCONS	.1007	.0614
LBDQPROD	.1243	.0834
LBDQSTRU	.0749	.0592
LBDQTOLF	.0693	.0514
MAJORMAS	-.0394	-.1327
SALARY2	.1301	.0523
SEX2	.2357*	-.0114
YREXPPR	.1668**	.0858
YREXPPRS	.2289*	-.0625
YRSTEXP2	-.1051	-.0340
ADDTOBUI	-.1428**	.1386**
APEMT	.1938	-.0113
BAPPRAIS	.1881**	-.0558
DATEBUIL	.1055	.0524
ENROLL	.2498*	-.0217
FLSTUD	.0741	-.0127
FTEMEDIA	.1744**	.0843
FTEPRINC	.0531	-.0476
FTEREDT	.2378*	-.0161
NOCLASSE	.2559*	.0130
NOCLRMS	.1120	-.0782
NOLIBOOK	.2397*	-.0553
NOSPCLRM	.0885	-.1863*
NOSPLIT	-.1688*	.0106
OAPPRAIS	-.0448	-.0883
PAPPRAIS	.2173*	.0035
PERBUSPT	-.1262	-.0028
RENTOBUI	.0465	.0328
RLSTUD	-.1088	-.0720
SPEDSTAF	-.0700	-.0331
SPEDSTUD	-.0351	-.0296
SPEDTA	-.0432	.0208
STRATIO	.1994*	-.0461

*Significant at .01 level **Significant at .05 level

CORRELATIONS BETWEEN TOTAL MATHEMATICS AND INDEPENDENT VARIABLES
(Continued)

Variable	Correlation with Total mathematics For Grade 3	Correlation with Total mathematics For Grade 5
SQFOOT	.2172*	-.0419
TEACHAID	.2690*	-.0106
TITLEIST	-.1039	-.0073
TITLEIT	-.1435**	-.0215
TITLEITA	-.1366	-.0093

*Significant at .01 level **Significant at .05 level

APPENDIX H

CORRELATIONS BETWEEN TOTAL READING AND INDEPENDENT VARIABLES[1]

Variable	Correlation with Total Reading For Grade 3	Correlation with Total Reading For Grade 5
AGE	-.1596**	-.3134*
ATTG	.1347	.0645
ATTS	.2428*	.0723
ATTT	.1115	.0985
BIRORDER	-.0139	-.1914**
DAYSAB	.0271	-.2675*
EDFATH	.2078*	.2613*
EDMOTH	.2381*	.2664*
FLSTATUS	.2700*	.2443*
INSTRMAT	.5512*	.6293*
INSTRREA	.6548*	.6718*
NOCHILD	-.0420	-.2305*
OCCFATH	.3007*	.2670*
OCCMOTH	-.0041	.0355
RCGMATH	.4500*	.5848*
RCGOVERA	.6286*	.6687*
RCGREAD	.6245*	.6336*
SEX	.1104	-.0293
STUDLIWI	.1982*	.0918
YRPRSCHL	.1718*	.0788
AGE1	-.0161	.1869*
CLASSSIZ	.0210	-.0106
DEGRPLCR	.0205	-.1019
DISCC	.0470	.0801
DISCG	-.0734	.1638**
EXPMSUPP	-.0464	.0619
EXPMTEXT	-.1274	-.0341
EXPRSUPP	.0941	.0161
EXPRTEXT	.0335	-.1081
MINMINST	-.0089	-.0039
MINRINST	.0815	-.0062
SALARY1	-.0121	-.0142
SEX1		.0955
SPLITNOT	-.1009	.2308*
TCERTIF	-.1059	-.0027
UNDERGRA	-.1700**	.0825
YRBARECD	-.0152	-.1533**
YRSTEXP1	.0610	.1311

[1] The variables are presented by category. The first group of variables is student-related; the second group is teacher/classroom-related; the third group is principal-related; and the fourth group is school-related.
*Significant at .01 level **Significant at .05 level

CORRELATIONS BETWEEN TOTAL READING AND INDEPENDENT VARIABLES
(Continued)

Variable	Correlation with Total Reading For Grade 3	Correlation with Total Reading For Grade 5
ADCERTIF	.0295	-.0889
AGE2	-.0006	.0074
COLLMA	.1159	.0054
CREDBEMA	-.1573**	.0565
LBDQCONS	.0488	.0125
LBDQPROD	.1233	.0191
LBDQSTRU	.0214	.0687
LBDQTOLF	-.0261	-.0047
MAJORMAS	.0687	-.0529
SALARY2	-.0414	-.0600
SEX2	.1296	-.0704
YREXPPR	-.0470	.0204
YREXPPRS	.1096	-.0727
YRSTEXP2	-.0222	-.0607
ADDTOBUI	-.1650**	.0675
APEMT	.1162	-.0317
BAPPRAIS	.1358	-.1021
DATEBUIL	-.0740	.0272
ENROLL	.1413**	-.0523
FLSTUD	.0615	-.1330
FTEMEDIA	.0310	.0395
FTEPRINC	.0580	-.1027
FTEREDT	.1358	-.0276
NOCLASSE	.1420**	-.0286
NOCLRMS	.0929	-.0699
NOLIBOOK	.1472**	.0081
NOSPCLRM	.0152	-.0921
NOSPLIT	-.1912**	.0671
OAPPRAIS	.0041	.0501
PAPPRAIS	.0589	-.0221
PERBUSPT	-.0361	-.0057
RENTOBUI	-.0246	.0536
RLSTUD	-.0969	-.1808**
SPEDSTAF	.0169	-.0665
SPEDSTUD	.0338	-.0691
SPEDTA	.0070	-.0423

*Significant at .01 level **Significant at .05 level

CORRELATIONS BETWEEN TOTAL READING AND INDEPENDENT VARIABLES
(Continued)

Variable	Correlation with Total Reading For Grade 3	Correlation with Total Reading For Grade 5
STRATIO	.0414	-.1126
SQFOOT	.1112	-.0303
TEACHAID	.1494	.0120
TITLE1ST	-.0481	-.1118
TITLE1T	-.0849	-.1213
TITLE1TA	-.0651	-.0950

APPENDIX I

CORRELATIONS AMONG INDEPENDENT VARIABLES IN GRADE 3 SAMPLE[1]

Variable	Variables[2]
ATTG	ATTS, ATTT
ATTS	ATTG, ATTT
ATTT	ATTS, ATTG
BIRORDER	NOCHILD
EDFATH	OCCFATH, EDMOTH
EDMOTH	EDFATH
INSTRMAT	INSTRREA, RCGREAD, RCGMATH, RCGOVERA
INSTRREA	INSTRMAT, RCGOVERA, RCGREAD
NOCHILD	BIRORDER
OCCFATH	EDFATH
RCGMATH	INSTRMAT, RCGREAD, RCGOVERA
RCGOVERA	INSTRMAT, INSTRREA, RCGREAD, RCGMATH
RCGREAD	INSTRMAT, INSTRREA, RCGOVERA, RCGMATH
AGE1	YRSTEXP1, YRBARECD, SALARY1
DEGRPLCR	SALARY1
EXPRTEXT	YRSTEXP1
SALARY1	AGE1, YRSTEXP1, DEGRPLCR
YRBARECD	AGE1, YRSTEXP1
YRSTEXP1	AGE1, YRBARECD, SALARY1, EXPRTEXT
AGE2	YREXPPR, SALARY2
LBDQCONS	LBDQSTRU, LBDQTOLF, LBDQPROD
LBDQPROD	LBDQSTRU, LBDQCONS
LBDQSTRU	LBDQCONS, LBDQPROD
LBDQTOLF	SALARY2, LBDQCONS
MAJORMAS	ADCERTIF
SALARY2	YREXPPR, AGE2, LBDQTOLF
YREXPPR	SALARY2, AGE2
APEMT	ENROLL, FTEREDT, SPEDSTUD, FTEPRINC, FTEMEDIA, FLSTUD, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
BAPPRAIS	ENROLL, FTEREDT, SPEDSTUD, APEMT, FTEPRINC, FLSTUD, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, PAPPRAIS, NOCLRMS, NOSPCLRM

[1]The variables are presented by category. The first group of variables is student-related; the second group is teacher/classroom-related; the third group is principal-related; and the fourth group is school-related.

[2]Variables listed are those whose correlation $\geq .60$

CORRELATIONS AMONG INDEPENDENT VARIABLES IN GRADE 3 SAMPLE
(Continued)

Variable	Variables
DATEBUI	TITLE1ST, RENTOBUI
ENROLL	FTEREDT, APEMT, FTEPRINC, FTEMEDIA, FLSTUD, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS, NOSPCLRM
FLSTUD	ENROLL, TITLE1ST, TITLE1T, APEMT, RLSTUD, NOCLASSE, BAPPRAIS
FTEMEDIA	ENROLL, FTEREDT, APEMT, TEACHAID, NOCLASSE, SQFOOT, PAPPRAIS
FTEPRINC	ENROLL, FTEREDT, SPEDSTUD, SPEDSTAF, APEMT, NOCLASSE, SQFOOT, BAPPRAIS, NOCLRMS
FTEREDT	ENROLL, APEMT, FTEPRINC, FTEMEDIA, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
NOCLASSE	ENROLL, FTEREDT, APEMT, FTEPRINC, FTEMEDIA, FLSTUD, TEACHAID, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
NOCLRMS	ENROLL, FTEREDT, SPEDSTUD, SPEDSTAF, APEMT, FTEPRINC, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOSPCLRM
NOLIBOOK	ENROLL, FTEREDT, APEMT, TEACHAID, NOCLASSE, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
NOSPCLRM	ENROLL, SQFOOT, BAPPRAIS, NOCLRMS
PERBUSPT	TEACHAID
RENTOBUI	TITLE1ST, TITLE1T, TITLE1TA, DATEBUIL
RLSTUD	SPEDSTUD, SPEDSTAF, TITLE1ST, TITLE1T, FLSTUD
SPEDSTAF	SPEDSTUD, SPEDTA, FTEPRINC, RLSTUD, NOCLRMS
SPEDSTUD	SPEDSTAF, SPEDTA, APEMT, FTEPRINC, RLSTUD, BAPPRAIS, NOCLRMS
SPEDTA	SPEDSTUD, SPEDSTAF
SQFOOT	ENROLL, FTEREDT, APEMT, FTEPRINC, FTEMEDIA, TEACHAID, NOCLASSE, NOLIBOOK, BAPPRAIS, PAPPRAIS, NOCLRMS, NOSPCLRM
TEACHAID	ENROLL, FTEREDT, APEMT, FTEMEDIA, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, PERBUSPT
TITLE1ST	TITLE1T, TITLE1TA, FLSTUD, RLSTUD, DATEBUIL, RENTOBUI
TITLE1T	TITLE1ST, TITLE1TA, FLSTUD, RLSTUD, RENTOBUI
TITLE1TA	TITLE1ST, TITLE1T, RENTOBUI

APPENDIX J

CORRELATIONS AMONG INDEPENDENT VARIABLES IN GRADE 5 SAMPLE[1]

Variable	Variables[2]
ATTG	ATTS, ATTT
ATTS	ATTG, ATTT
ATTT	ATTG, ATTS
BIRORDER	NOCHILD
EDFATH	OCCFATH, EDMOTH
EDMOTH	EDFATH
INSTRMAT	INSTRREA, RCGREAD, RCGMATH, RCGOVERA
INSTRREA	INSTRMAT, RCGREAD, RCGMATH, RCGOVERA
NOCHILD	BIRORDER
OCCFATH	EDFATH
RCGMATH	INSTRMAT, INSTRREA, RCGREAD, RCGOVERA
RCGOVERA	INSTRMAT, INSTRREA, RCGREAD, RCGMATH
RCGREAD	INSTRMAT, INSTRREA, RCGMATH, RCGOVERA
AGE1	YRSTEXP1, YRBARECD, SALARY1
DEGRPLCR	SALARY1
SALARY1	AGE1, YRSTEXP1, DEGRPLCR
SEX1	DEGRPLCR
TCERTIF	UNDERGRA
UNDERGRA	TCERTIF
YRBARECD	AGE1, YRSTEXP1
YRSTEXP1	AGE1, YRBARECD, SALARY1
AGE2	YREXPPR, SALARY2
LBDQCONS	LBDQSTRU, LBDQTOLF, LBDQPROD
LBDQPROD	LBDQSTRU, LBDQTOLF, LBDQCONS
LBDQSTRU	LBDQCONS, LBDQPROD
LBDQTOLF	YREXPPR, SALARY2, LBDQCONS, LBDQPROD
YREXPPR	YREXPPRS, SALARY2, AGE2, LBDQTOLF
APEMT	ENROLL, FTEREDT, SPEDSTUD, FTEPRINC, FTEMEDIA, FLSTUD, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS

[1]The variables are presented by category. The first group of variables is student-related; the second group is teacher/classroom-related; the third group is principal-related; and the fourth group is school-related.

[2]Variables listed are those whose correlation $\geq$ .60.

CORRELATIONS AMONG INDEPENDENT VARIABLES IN GRADE 5 SAMPLE
(Continued)

Variable	Variables
BAPPRAIS	ENROLL, FTEREDT, APEMT, FLSTUD, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, PAPPRAIS, NOCLRMS, NOSPCLRM
DATEBUIL	TITLE1ST, TITLE1T, TITLE1TA, FTEMEDIA, RENTOBUI, BAPPRAIS
ENROLL	FTEREDT, APEMT, FTEPRINC, FTEMEDIA, TEACHAID, NOCLASSE, NOLIBOOK, ADDTOBUI, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
FLSTUD	TITLE1ST, TITLE1T, APEMT, RLSTUD, BAPPRAIS
FTEMEDIA	ENROLL, FTEREDT, APEMT, NOCLASSE, DATEBUIL, SQFOOT, PAPPRAIS
FTEPRINC	ENROLL, FTEREDT, SPEDSTUD, SPEDSTAF, APEMT, RLSTUD, NOCLASSE, NOCLRMS
FTEREDT	ENROLL, APEMT, FTEPRINC, FTEMEDIA, TEACHAID, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRIAS, PAPPRAIS, NOCLRMS
NOCLASSE	ENROLL, FTEREDT, APEMT, FTEPRINC, FTEMEDIA, TEACHAID, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, NOCLRMS
NOCLRMS	ENROLL, FTEREDT, SPEDSTUD, SPEDSTAF, APEMT, FTEPRINC, NOCLASSE, SQFOOT, BAPPRAIS, PAPPRAIS, NOSPCLRM
NOLIBOOK	ENROLL, FTEREDT, APEMT, TEACHAID, NOCLASSE, SQFOOT, BAPPRAIS, PAPPRAIS
NOSPCLRMS	SQFOOT, BAPPRAIS, NOCLRMS
PAPPRAIS	ENROLL, FTEREDT, APEMT, FTEMEDIA, TEACHAID, NOCLASSE, NOLIBOOK, DATEBUIL, SQFOOT, BAPPRAIS, NOCLRMS
PERBUSPT	TEACHAID
RLSTUD	SPEDSTUD, SPEDSTAF, TITLE1ST, TITLE1T, FLSTUD,
SPEDSTAF	SPEDSTUD, SPEDTA, FTEPRINC, RLSTUD, NOCLRMS
SPEDSTUD	SPEDSTAF, SPEDTA, APEMT, FTEPRINC, RLSTUD, NOCLRMS
SPEDTA	SPEDSTUD, SPEDSTAF
SQFOOT	ENROLL, BAPPRAIS, PAPPRAIS, NOCLRMS, NOSPCLRM
TEACHAID	ENROLL, FTEREDT, NOCLASSE, NOLIBOOK, SQFOOT, BAPPRAIS, PAPPRAIS, PERBUSPT
TITLE1ST	TITLE1T, TITLE1TA, FLSTUD, RLSTUD, DATEBUIL, RENTOBUI
TITLE1T	TITLE1ST, TITLE1TA, FLSTUD, RLSTUD, DATEBUIL, RENTOBUI
TITLE1TA	TITLE1ST, TITLE1T, DATEBUIL, RENTOBUI

APPROVAL SHEET

The dissertation submitted by Susan O'Brien has been read and approved by the following committee:

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

May 1, 1984
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