1-1-1982

The Relationship Between Selected Socioeconomic Variables and the Third Grade Academic Achievement of Pupils in West Virginia

Orman E. Hall Jr.
orman.hall@gmail.com

THE RELATIONSHIP BETWEEN SELECTED SOCIOECONOMIC VARIABLES AND THE THIRD GRADE ACADEMIC ACHIEVEMENT OF PUPILS IN WEST VIRGINIA

by

Orman E. Hall, Jr.

A Thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in the Department of Social Studies

Marshall University

December, 1982

MARSHALL UNIVERSITY

DEPARTMENT OF SOCIAL STUDIES

THIS THESIS WAS ACCEPTED ON November 23, 1982

AS MEETING THE RESEARCH REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE.

Katherine N. Simpkins

Thesis Advisor, Department of Curriculum and Foundations

William A. Pagnotti

Second Faculty Member, Department of Social Studies

Wallace C. Brown

Chairman, Department of Social Studies

Paul O. Stewart

Dean, Graduate School

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to the many persons who gave me help and encouragement in this investigation. To my fellow employees in the Consultation Education and Prevention Department at the Gallia, Jackson, Meigs Community Mental Health Center for their support and understanding and to James Gray for his numerous deliveries of draft materials to my typist and thesis advisor.

I am deeply indebted to Dr. Katherine Simpkins for her many hours of technical assistance and editorial advise. My academic advisor, Dr. Mahlon Brown, and Dr. William Paynter--each made significant contributions to the investigation. I am also indebted to Ms. June Jefferson for the preparation of this document.

I owe a debt of gratitude to my parents, Orman Sr. and Joyce Ann, sister Jeanne Ann and daughter, Tracy Lynn for their love, support and many weeks of forebearance.

Finally, I wish to thank my wife, Marilyn, for her loving encouragement and assistance in this endeavor.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

During the past two decades a substantial amount of educational research has focused on the relationship between socioeconomic status and school achievement. Many researchers believe that a strong correlation exists between these two factors while others present evidence to refute this hypothesis.

It appears that most of these investigations fall into one of three categories. Arthur Jensen, a well known advocate of genetic determinism, contended that eighty percent of the variance in intelligence could be accounted for by hereditary factors. This position supported a belief that children from families living in poverty from one generation to the next tended to perform poorly in school environments due to inherent genetic inferiority (Jensen, 69:1).

Others, such as Rick Heber (Whimbey, 1975:42-47) presented evidence which challenged the notion that intelligence and intellectual development are in any manner pre-determined by genetic factors. Experiments conducted by Heber and his associates indicated that long term structured intervention programs, including both parent and child, resulted in substantial increases in I. Q. and achievement scores.

Still another group proposed a synthesis of these two

positions. Supporters of this argument contended that intelligence is a product of both environmental and hereditary sources (Hunt, 1969:39). This position is in fact the most consistent with the main stream of contemporary social science research. Kurt Lewin (Thompson and Van Houton, 1979:30) stated this position in the following formula: B=f (P,E). Concisely this says that behavior--in this case educational achievement--is a function of the interaction between a person and the environment. A logical, and perhaps more applicable, extrapolation of this formula is CD=f (H,E), or cognitive development is a function of the interaction between heredity and environment. The degree to which each of these variables impacts upon intellectual functioning and which environmental factors play important roles in these regards, are both areas of considerable debate, however, a significant amount of research in the social sciences supports an hypothesis that the environment plays an important role in the development of a child's intelligence and academic achievement (Fotheringham and Creal, 1978:311; May, et al 1978:445; and Kohn and Rossman, 1973:277).

A major question stemming from this line of reasoning is, "what are the effects of poverty and environmental deprivation upon the development of cognitive abilities?" The lack of intellectual stimulation has been cited as a factor in the intellectual development of culturally disadvantaged children. Research conducted during the 1960's (Liddle, 1967:498-499; and Cegelka and Thomas,

1968:45-56) indicated that children from lower socioeconomic backgrounds receive considerably less intellectual stimulation than children from more advantaged homes.

This stimulation for children from higher status environments often comes in the form of more frequent conversations with adults, increased opportunities for reading experiences, and access to educational toys and travel. In support of this hypothesis, Horton and Hunt (1968:249) noted that the personality development of children, their goals, interests, and habits are effected by the kind of social world in which they live. The lower socioeconomic status family, according to these authors, is less stable. That is, they are more often interrupted by death, or family separation, than families from other social stratas. Lower class families also tend to be larger in size and yet occupy smaller, less adequate living quarters.

In addition to these conditions, middle class socialization practices afford the more well to do child tremendous advantages in the areas of academic achievement and general life success. For example, middle class child-rearing practices stress individual achievement. Withdrawal of affection is used systematically as a device to control behavior (in lieu of harsh physical punishment), the middle class emphasis on success encourages competition while discouraging direct aggression; and, finally, the middle class practices delay of gratification which enables its members to put immediate pleasures off for future rewards. Lower class child training,

on the other hand, tends to push the child into adult roles much sooner than their more advantaged peers; places less stress on individual achievement; accepts the idea that the child will probably retain the social status of the immediate family; and places little stress on language facility, literacy, or academic achievement.

The Problem

In spite of the overwhelming amount of literature within the social sciences which supports the above generalizations, many researchers believe that the relationship between socioeconomic status and intellectual development is not significant, emphasizing instead variables which directly measure the home environment (Marjoribanks, 1979: 246-251). Implicit in this position is the belief that parental values and other key factors influencing intellectual development are not related to socioeconomic status.

A partial explanation of this particular trend in educational research might well be the frustrating discrepancy which presently exists between theory and relationship studies regarding this subject. In a comprehensive study of correlational research involving socioeconomic status and educational achievement, Raymond (1977:5067 A) found that correlation coefficients ranged from .251 to .680 depending largely on the variables and/or statistical methodology used.

Bridge, Judd, and Moock (1979:22-27) identified two important reasons that may account for a portion of this

discrepancy. According to Bridge and his associates, correlational studies focusing on the relationship between socioeconomic status and academic achievement generally assume that linear relationships exist between predictor and criterion variables, subsequently overlooking the existence and importance of non-linear relationships. Another factor identified by these investigators was the problem of proxy measurement. The major contributing factors which have an impact upon educational achievement, as noted earlier, involve the socialization process. How indeed can we measure such variables as parental values and attitudes toward education through the U. S. Census? The answer is, one cannot. Investigators must in fact rely on the generalizations of previous research to select the most appropriate predictors; and because of this there is an ever present danger of using variables which do not measure what was intended to be measured.

In summary, much of the research concerning intelligence and achievement indicates that environment plays an important role in the cognitive development of young children. It appears, however, that studies using measures of socioeconomic status as predictors of school achievement have met with mixed success, (Raymond, 1977:5076-A) thus leading many researchers to conclude that measures of socioeconomic status are not valid predictors of educational achievement. Others, (Bridge, Judd, and Moock, 1979:22-27), however, described possible reasons which may account for much of the

discrepancy between theory and educational research regarding this topic and supported the validity of this type of research. Given the variance which exists in the literature, it is clear that more research needs to be conducted to determine the actual relationship between school achievement and socioeconomic variables.

Is there a significant relationship between socioeconomic data from the U. S. Census and educational outcomes for students in West Virginia? Is it possible to identify variables and develop an index of socioeconomic variables which will collectively predict academic achievement for school children?

The Research Plan

Purpose of the Study

The purpose of this study is to determine whether or not there is a statistically significant relationship between selected socioeconomic data from the U. S. Census and educational outcome in West Virginia. This will be accomplished through the examination of socioeconomic factors with achievement and the development of an index of socioeconomic variables. These will be compared on an individual basis, and as an aggregate, to the academic achievement of third grade West Virginia students (as measured by the Basic Skills mean score on the Comprehensive Test of Basic Skills administered through the West Virginia State-County Testing Program).

The following research questions have been postulated

for the purpose of this study to compare selected socio-economic factors with academic achievement of third grade students in West Virginia.

Research Questions:

1. What is the relationship between the socioeconomic factor of male headed households and the academic achievement of third grade pupils in West Virginia?

2. What is the relationship between the socioeconomic factor of poverty and the academic achievement of third grade pupils in West Virginia?

3. What is the relationship between the socioeconomic factor of school years completed by parents and the academic achievement of third grade pupils in West Virginia?

4. What is the relationship between the socioeconomic factor of occupational status and the academic achievement of third grade pupils in West Virginia?

5. What is the relationship between the socioeconomic factor of family income and the academic achievement of third grade pupils in West Virginia?

6. What is the relationship between the socioeconomic factor of children in private schools and the academic achievement of third grade pupils in West Virginia?

7. What is the relationship between the socioeconomic factor of intactness of the nuclear family and the academic achievement of third grade pupils in West Virginia?

8. What is the relationship between the socioeconomic factor of adolescents remaining in school and the academic achievement of third grade pupils in West Virginia?

9. What is the relationship between the socioeconomic factor of condition of housing and the academic achievement of third grade pupils in West Virginia?

10. What is the relationship between a selected aggregate of the above factors and the academic achievement of third grade pupils in West Virginia?

Research Design

The correlation among selected variables for one group (fifty-five West Virginia counties) constituted the design of this study. The first nine variables will be compared in a simple correlation design. The composite of variables--for testing Question 10,--will be determined in a separate design utilized to identify a viable aggregate of variables for predicting school achievement, using a stepwise regression procedure.

Limitations of the Study

This study is limited by the following factors:

1. County wide socioeconomic information gathered from the 1970 census was compared only to mean achievement data for third grade students.

2. The census, information and achievement data used in this study were from different years.

Delimitations of the Study

This study is delimited by the following factors:

1. Socioeconomic variables pertained to the fifty-five counties of West Virginia.

2. Census data was restricted to the 1970 census.

3. Total mean scores by county were obtained only on the Basic Skills portion of the Comprehensive Test of Basic Skills.

4. Achievement scores were restricted to the 1976 administration of the Comprehensive Test of Basic Skills.

Summary

This chapter has presented a summary of some of the factors involved in the relationship between academic achievement and socioeconomic status. It appears that studies using measures of socioeconomic status as predictors of achievement have met with mixed success. This has led many researchers to conclude that measures of socioeconomic status are not valid predictors of achievement, with others accepting the opposite viewpoint. In accordance with this controversy, research questions were developed, the design of the study was described, and the limitations and the delimitations of the study were stated.

Organization of the Remainder of the Study

Chapter II contains a review of related research. The procedures followed in the implementation of this

investigation are described in Chapter III. Chapter IV presents the statistical analyses and the results of the study. Chapter V includes a summary of the study, summary of results, implications of the investigation, and recommendations for further research.

CHAPTER II

REVIEW OF LITERATURE

The objective of the following literature review was to ascertain the validity of socioeconomic variables as predictors of academic achievement. Implied in this inquiry were the assumptions (1) that childhood intelligence is in part a malleable factor which is strongly influenced by environmental variables, and (2) that traditional socioeconomic conditions such as family income, parental educational attainment etc., are all valid indicators of those variables.

Twenty six abstracts and studies, published between 1973 and 1979, were examined with the following questions in mind:

1. Is there a relationship of practical significance between socioeconomic measures and school achievement? and
2. What socioeconomic measures are commonly used as predictors of achievement?

The Relationship between Socioeconomic Status and Achievement

As noted by Bridge, Judd and Moock, (1979:2), the majority of educational decisions are presently based on common sense hunches about what makes a difference in educational outcomes. There is however a growing body of sentiment, that in using this intuitive decision making approach schools

have failed to produce the quality of education desired by by the public. One cannot however hold schools responsible for failing to solve prevailing social problems, such as intergenerational poverty or the breakdown of the nuclear family. Clearly, some determinants of educational outcome, such as socioeconomic status, are outside the control of educators. Therefore, before we can say how well educators are doing, we must be able to ascertain what they should be able to produce given--among other things--the characteristics of their student bodies and respective communities.

During the past two decades a growing body of literature has addressed this problem with mixed findings. The results of this review--like the greater body of information--present findings which, in many respects, are contradictory.

May and his associates (1978:445-450) examined the relationship between seven background variables, four of which were socioeconomic in nature and achievement test performance (as measured by the Comprehensive Test of Basic Skills (CTBS) in a southeastern metropolitan community which was approximately sixty percent black. The author and his colleagues discovered that the highest correlates between individual variables and CTBS scores were the four socioeconomic measures employed in that study. Even the highest correlations obtained were low. Only two--number of persons per dwelling and status of airconditioning--exhibited coefficients as high as .30. A multiple R (.52) accounted for approximately twenty-seven percent of the systematic

variance between criterion and predictor variables.

In a study of two hundred and eighty-seven boys attending kindergarten in twenty-one New York schools, Kohn and Rossman (1973:277-294) found socioeconomic status and race to be significantly related to cognitive measures. Of the six background variables considered, only these two produced moderately high r's. Even those, however, were lower than coefficients reported in studies reviewed by them. Kohn and Rossman concluded, therefore, that the linear relationship between socioeconomic status and cognitive measures, while significant, was not impressive. These authors also noted that social-emotional variables measured by a survey instrument designed to ascertain students' tendencies toward social competence--participation vs. withdrawal, and compliance vs. defiance--accounted for a higher percentage of the variance than did measures of socioeconomic status. The results of these studies demonstrated that a relationship between socioeconomic status and achievement does in fact exist. The latter study suggested, however, that the strength of this relationship may be jeopardized by social-emotional variables which are not easily measured.

Fotheringham and Creal (1978:311-317) studied sixty-two third grade students selected from a population of nine hundred and seventy-one in Southern Ontario public and parochial schools to determine the effects of home, socioeconomic status, and process characteristics on high-, average-, and low-achieving third grade students. The

results of this study yielded a multiple R of .53 between socioeconomic status variables and achievement scores, which accounted for approximately twenty-eight percent of the systematic variance. When home and emotional variables were factored into the equation, the multiple R of .68 accounted for forty-six percent of the variance between the criterion and predictor variables. The authors noted that "being of low socioeconomic status frequently means having inadequate housing, health care, and/or schooling (Fotheringham and Creal, 1978:315), all of which probably contributed to poor academic achievement. The variance in achievement scores, as evidenced by the multiple R, before and after home and emotional variables were factored into the equation, demonstrated that socioeconomic status is not the only set of variables which may account for variance in achievement scores.

Marjoribanks (1979:246-251) studied one thousand English school children and demonstrated that socioeconomic status (as measured by an equally weighted composite of: father's occupation, family income, and father's education) had low to moderate concurrent validity with English and Math scores. In the senior cohort of this study, for example, the zero order r's are .29 and .30 for English and Math respectively, or only eight percent and nine percent of the systematic variances. Intelligence and family environment (as measured by parental aspirations for children, parental interest and support for schooling, initiative and

responsibility taken by parents toward education, literacy level of the home, parents' interest in helping with school work, and parents' knowledge of the school environment) had moderate to high concurrent validity when correlated with English and Math scores.

In a sample of one hundred and eight eleven year old boys, Walberg and Marjoribanks (1973:363-368) canonically correlated eight home-environmental processes, three socio-economic indicators, and three family structure measures with four mental abilities. The results of that investigation indicated that verbal and number abilities were the only mental abilities that correlated significantly with the socioeconomic measures at the .05 level of confidence.

Palamar (1978:3357-A) designed a study to describe and measure the achievement differences among 104 fifth and seventh grade students from working, middle, and upper middle classes, and found statistically significant differences among achievement scores of the three groups. However, when the variance due to I. Q. was controlled for, no significant differences were found. The results of the study, therefore, suggested that the relationship between intelligence measurement and achievement measurement were deeply intertwined.

Raymond (1976:5067-A) conducted an extensive review of literature to determine the validity of measures of socioeconomic status as predictors of academic achievement. To accomplish this purpose, the study was approached from two complimentary directions. The first consisted of a meta

analysis of one hundred sample studies, the second was a reanalysis of selected data from Project Talents' nationally representative sample of eleventh graders. The results of that investigation indicated that research studies employing socioeconomic status as the predictor of achievement are largely inconsistent, with some finding a strong relationship between achievement and socioeconomic measures and others finding almost none. According to Raymond, "the meta-analysis indicated that a definite relationship existed between socioeconomic status and academic achievement. The most likely correlation between typically used measures of socioeconomic status and achievement, however, yielded only an r=.251 with frequently obtained correlations ranging from .10 to .70," (Raymond, 1976:5067-A). When aggregated units of analysis such as school districts or geographic areas were the basis for analysis (as opposed to individuals) the median correlation climbed to .680, representing an increase in concurrent validity. Raymond's latter observation was explained by Bridge, Judd, and Moock, (1979) as "the effect of using group data instead of individual data to estimate a relationship is usually an increase of the r in the regression equation," (1979:90-91). The reason, given by the authors, was that when individuals are measured as a group, random errors within the groups tend to cancel one another out. As a result the group means tend to be less dispersed about the regression line than are the individual observations, and the r based on group data is larger as a consequence.

In summary, reviews concerning the relationship between socioeconomic status and school achievement indicated that there is a general consensus among investigators that a statistically significant correlation between achievement and socioeconomic status exists. However, investigators arriving at similar statistical results disagreed on the practical use of such data. Many of them pointed out that direct measurement of intelligence, family environment, and parental attitudes--among other factors--may account for a higher percentage of the variance than does the socioeconomic status. This seemed especially true when the records of individual students were examined. When school systems within geographic areas were the basic unit of analysis, however, the correlation between socioeconomic status and achievement was much higher.

Socioeconomic Variables

One of the most consistent results reported in the various studies and abstracts reviewed in this chapter has been that socioeconomic status does indeed make a significant difference in achievement outcomes. Of the twenty-six sources reviewed, twenty-two identified the socioeconomic variables employed in the respective studies.

The maximum number of variables used in a single study was twelve with a minimum of one. In order of descending frequency, the following variables were most often used to study achievement with the variable, number, and percentage of studies in which it was used indicated:

1. Educational Level (which included median educational level by school district as measured by the census, Fathers' educational level, and Mothers' educational level) was used most often, occuring in eleven of the twenty-two studies (50% of those reviewed).

2. Occupational Status--ten studies (45.4%).

3. Housing--seven studies (30.4%).

4. Income--six studies (27.3%).

5. Family stability (which included female head of families and percent of children under eighteen living with both parents)--six studies (27.3%).

6. Race--six studies (27.3%).

7. Family Possessions--five studies (22.7%).

8. Sex--five studies (22.7%).

9. Family Status--four studies (18.0%).

10. Welfare Status--two studies (9.0%).

11. Children Attending Private School or Kindergarten--two (9.0%).

A number of variables were used only once. This category included such things as reading material within the home, population density, headstart participation, and teacher estimate of socioeconomic status.

Of the twenty-six studies and abstracts reviewed for this investigation, twenty-two identified the individual predictor variables. Of an aggregate of one hundred and one variables, only the aforementioned eleven were mentioned with a frequency greater than two. The

total number of socioeconomic variables, included among the twenty-two studies reviewed, was fifty-three.

Summary

This chapter has presented a review of literature regarding: (1) the relationship between socioeconomic status and achievement, and (2) socioeconomic variables employed in studies focusing on the aforementioned relationship. Chapter III will present the definition of the research problem and the research hypothesis. A discussion of the dependent variable, the research design, and the statistical methods employed in this study will also be presented.

CHAPTER III

PROCEDURES EMPLOYED IN THE STUDY

This chapter presents a narrative account of the activities followed in this investigation to ascertain the relationship between socioeconomic status and academic achievement. The first section set forth a definition of the problem, and a statement of the research hypotheses to be tested. The second section described the process used to select the study's dependent variable. The final sections describe the subjects of the study, the design of the study, limitations of the study, delimitations of the study, and the statistical methods employed in the study.

Definition of the Problem and Formulation of Hypotheses

Several important trends over the past two decades have necessitated a change in the procedures presently used to allocate funds for schools and evaluate the effectiveness of educational programs. First, it appears that a number of educational innovations and compensatory education programs such as Headstart and/or Upward Bound, have been employed by educators with varying degrees of success. Secondly, severe economic problems throughout the country have effectively limited the amount of available school funds. It has therefore become important for planners and funding institutions

to make resource allocation decisions based on the effectiveness of educational programs and the financial needs of individual school systems. Such decisions are presently based on common sense hunches about what makes a difference in educational outcome (Bridge, Judd, and Moock, 1979:2). This procedure is coming under increasing criticism for its inability to meet the educational demands of a society which values literacy and educational attainment.

In all fairness to educators, however, we cannot hold schools responsible for failing to solve prevailing socioeconomic problems, many of which have profound effects on the educational process. Therefore, before we can say how well educators are doing, we must be able to ascertain what they should be able to do--given the characteristics of their student bodies and respective communities. Unfortunately, the literature regarding the relationship between socioeconomic status and school achievement is inconclusive, due in part to the wide range of variables studied.

Purpose of the Study

The purpose of this study is to ascertain the relationship between selected socioeconomic variables and academic achievement. Based on a review of literature, the availability of data, and local observations, nine variables were selected from the 1970 U. S. census, as follows: (1) percentage of male headed households; (2) percentage of families above the proverty level; (3) median school years completed; (4) percentage of white collar workers; (5) median

income; (6) percentage of elementary children in private schools; (7) percentage of eighteen year olds and under living with both parents; (8) percentage of persons fourteen to seventeen years old in school; and (9) percentage of housing lacking some or all plumbing. Academic achievement was determined for each county by the third grade Basic Skills Total mean score, on the Comprehensive Test of Basic Skills (hereinafter referred to as CTBS) administered to West Virginia students in 1976. Nine null hypotheses were formulated to determine the relationship between socioeconomic factors and achievement.

The general research hypothesis postulated for this study was that the relationship between certain selected socioeconomic variables and academic achievement is such that it will allow prediction of academic achievement by knowledge of a pattern of socioeconomic characteristics. The following null hypotheses, to be tested at the .05 confidence level, will be used in this study.

Hypothesis 1: There is no relationship between a county's percentage of male headed households, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 2: There is no relationship between a county's percentage of families above the poverty level, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured

by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 3: There is no relationship between a county's median school years completed, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 4: There is no relationship between a county's percentage of white collar workers, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 5: There is no relationship between a county's median income, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 6: There is no relationship between a county's percentage of elementary school children in private schools, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 7: There is no relationship between a county's percentage of eighteen year olds and under living

with both parents, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 8: There is no relationship between a county's percentage of persons fourteen to seventeen years old in school, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 9: There is no relationship between a county's percentage of housing lacking some or all plumbing, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Hypothesis 10: There is no relationship between a selected aggregate of the above nine factors--as determined by a Stepwise regression procedure--and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

Design of the Study

Selection of the Dependent Variable

During the last week of February, 1982, John McClure, Director of Research and Information Systems for the West

Virginia Department of Education, was contacted and the nature of the proposed investigation was explained to him. At that time a meeting was scheduled between McClure, this investigator, and Charles Duffy, Director of the Office of School Effectiveness. During this meeting McClure and Duffy briefly explained the procedures followed by the state to conduct standardized achievement testing. At that time it was noted that the state has relied on two standardized tests since 1976, the Comprehensive Test of Basic Skills (CTBS) and the Cognitive Abilities Test (CAT), both administered state wide in the third, sixth, ninth, and eleventh grades; the former in March and the latter in October.

The CAT includes information on nonverbal and verbal achievement areas including: reading--vocabulary, and comprehension; language--spelling, mechanics and expression; mathematics--computation, concepts, and applications and four additional subheadings--basic skills, reference skills, science, and social studies. Data from these instruments are collected and maintained by the West Virginia County Testing Program, with the mean scores by county for each of the categories noted above being accessible to the general public. After a brief discussion of the proposed project, the Basic Skills portion of the CTBS--which is a composite measure of the reading, language, and mathematics sections--was selected as the research tool to measure academic achievement. Consequently, the county mean Basic Skills score for the third grade from 1976 was chosen for analysis.

Achievement data for 1976 were selected due to the fact that 1980 census data was not completely available and the above mentioned testing date was the one most temporally compatible with 1970 census information.

Research Design

The correlation among selected variables for one group (fifty-five West Virginia Counties) was employed (1) to determine the relationship between third grade achievement data--as measured by the Basic Skills portion of the Comprehensive Test of Basic Skills (county mean) which was administered in 1976 to West Virginia students--and nine socioeconomic variables (selected from the 1970 U. S. Census); and (2) to determine which of these variables, used as a group, provide the best prediction of achievement.

Subjects

The fifty-five county wide school systems of West Virginia comprised the study sample of this investigation for the following reasons: first, all school systems in the state follow county determined boundaries, which makes educational data collected by the school system level geographically compatible with U. S. Census information, which is also reported at the county level. Second, standardized achievement testing in the third grade is coordinated throughout the state by the Department of Education. And finally, county achievement data is collected, maintained, and easily accessed through the West Virginia

State-County Testing Program (a service of the West Virginia Department of Education).

Limitations of the Study

This study is limited by two factors:

(1) County-wide socioeconomic information, gathered from the 1970 U. S. Census was compared to the Basic Skills portion of the Comprehensive Test of Basic Skills administered to third grade students. It would be desirable to compare these scores to only those families with third grade children.

(2) The census information and achievement data used in this study were not temporally identical. This is primarily the result of two circumstances. First, 1980 census information was not completely available when this study was initiated. Second, the Comprehensive Test of Basic Skills was first administered in West Virginia in 1976.

Delimitations of the Study

This study is delimited to the following factors:

(1) Socioeconomic variables for the fifty-five counties of West Virginia were selected as independent variables.

(2) The independent variables were selected from 1970 census data.

(3) Total mean scores by county on the Basic Skills portion of the Comprehensive Test of Basic Skills was selected as the dependent variable.

(4) Achievement scores were recorded as of the 1976 administration of the Comprehensive Test of Basic Skills.

Statistical Methods

Data for the fifty-five subjects were analyzed through the West Virginia Network which was accessed via the Marshall University terminal. Two library computer programs--SAS:CORR (Blair, et al, 1979:173-177); and SAS: STEPWISE (Blair, et al, 1979:391-396)--were used to analyze the data. A description of these programs follows:

The SAS:CORR procedure computes correlation coefficients between variables, including Pearson product momement and weighted product-moment correlations. Two nonparametric correlations, Spearsman rank order, and Kendall tau-b are also produced. SAS:CORR also computes univariate descriptive statistics (mean, standard deviation, median, minimum, and maximum).

For this investigation the Pearson option was specified. A correlation matrix of the ten variables--nine independent and one dependent--was computed, in addition to the descriptive statistics representing the nine hypothesis specified in the preceding pages. These were tested against the hypothesis that the population $\underline{r}$ equals zero (H_o:pij=0,i $\neq$j) with the alternate hypothesis that the population $\underline{r}$ is not equal to zero (H_1:pij$\neq$0,i$\neq$j).

SAS:STEPWISE (Multiple Stepwise Regression) was used to determine which combination of the nine socioeconomic

variables could best be used to predict achievement as measured by the Mean for West Virginia counties on CTBS Basic Skills Total scores. SAS:Stepwise, the computer program which was used, initiates the procedure by calculating regressions for each of the potential variables. For each regression equation, the F statistic is used to test whether or not the slope is zero (Neter and Wasserman; 1974:382). The independent variable with the largest F value becomes the candidate for first addition. Only those F values which exceed a predetermined level for the independent variable are added. If no F value exceeds the predetermined level, the program terminates.

Whenever the former situation exists the stepwise regression routine calculates all regressions with two independent variables. For each such regression, the F statistic $F_k \frac{MSR\ (Xk\ \ Xi}{MSE\ (Xi,Xk)}$ is obtained--i equals independent variable--(Neter and Wasserman; 1974:382-383). Of the remaining independent variables, the predictor with the largest F value is the candidate for addition at the second stage. If this F value exceeds the predetermined level, the second independent variable is added. If it fails to exceed the predetermined level, the program terminates. This procedure continues until the F value of all variables which meets the criterion at the predetermined level have been added. In the final stages of the program there are a number of F statistics for each of the variables in the model, besides the last one added. The variable for which the F

value is smallest is the predictor which is the candidate for deletion. If the F value falls below a predetermined limit, the variable is deleted; if not it is retained.

The stepwise regression routine then examines which independent variable is the next predictor to be added, and determines which variable is to be deleted. These calculations are continued until no further variables can be added or dropped (Neter and Wasserman; 1974:383). Finally, the F statistic is used to test the significance of the multiple R ($H_o: R=0; H_1: R>0$).

Summary

This chapter has presented the definition of the problem and the research hypotheses. Also introduced was a discussion of the dependent variable, the research design, and the statistical methods employed in this investigation. Chapter IV will present the results of the study and a discussion of the findings.

CHAPTER IV

ANALYSIS OF DATA

This chapter presents the analysis of data obtained in this study, and a comparison between and/or among county mean achievement data and nine socioeconomic measures from the U. S. Census of 1970. The results of a stepwise regression procedure conducted to ascertain which of the nine variables--as an aggregate--provide the best predictors of academic achievement are presented via a multiple correlation for those factors.

Results of the Study

Two library computer programs--SAS:CORR and SAS: STEPWISE--were used to carry out the product moment correlation coefficients and the multiple stepwise regression procedures employed in this study. These programs were conducted by the West Virginia Network Computer accessed via the Marshall University terminal. The Basic Skills Total mean score by county (representing academic achievement), taken from the Comprehensive Test of Basic Skills (CTBS), was administered in 1976 to third grade students in West Virginia and was the dependent variable in this study. The independent variables were the nine socioeconomic factors selected from the aggregate reported at the county level

from the 1970 census. These factors were: (1) percentage of male headed households; (2) percentage of families above poverty level; (3) median school years completed; (4) percentage of white collar workers; (5) median income; (6) percentage of children in private school; (7) percentage of eighteen year-olds and younger living with both parents; (8) percentage of persons fourteen to seventeen years-old in school; and (9) percentage of housing with all or some plumbing. The means and standard deviations for dependent and independent varibles are presented in Table I on page 33.

Hypotheses were formulated for testing research questions at the .05 level of confidence. The first nine dealt with the correlation between each of the selected socioeconomic factors and academic achievement. The tenth comparison dealt with a systematic selection--using the stepwise regression procedure--of the best composite of predictor variables, and its correlation to academic achievement.

Significance of the Zero-Order Correlations

The research hypotheses for the first nine questions--stated both in null and alternate forms--with the subsequent correlation coefficients obtained, are presented in the following paragraphs. The Correlation Coefficients for these hypotheses (H_o:pij=),i≠j; H_1pij≠0,i≠j) are summarized in Table II, page 34.

Table I

Means and Standard Deviations of Study Variables

Variable Number	Variable Name	Mean*	Standard Deviation*
1	Male Head of House	89.560	1.661
2	Families Above Poverty	77.680	8.639
3	Median School Years	9.852	1.203
4	White Collar Workers	34.774	6.515
5	Median Income	$6580.436	$1430.487
6	Children in Private School	2.274	4.405
7	Eighteen and Under with Both Parents	81.929	3.531
8	Fourteen to Seventeen Year Olds in School	87.540	4.936
9	Houses with all Plumbing	75.123	11.980
10	Total Basic Skills Scores	338.878	23.500

Table II

The Relationship Between Socioeconomic Variables and Academic Achievement (Third Grade Scores, CTBS)

HO#	Variable Name	Correlation Coefficient
1	Male Head of House	.431 *
2	Families Above Poverty	.569 *
3	Median School Years	.606 *
4	White Collar Workers	.498 *
5	Median Income	.527 *
6	Children in Private School	.270 *
7	Eighteen and Under with Both Parents	.336 *
8	Fourteen to Seventeen Year Olds in School	.132
9	Houses with all Plumbing	.525 *

*Correlation coefficients determined to be significant at the .05 level of significance by SAS CORP.

Hypothesis 1: "There is no relationship between a county's percentage of male headed households, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between the percentage of male headed households and academic achievement was $r = .431$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore, the null hypothesis (H_o:pij = 0,i≠j) was rejected and the alternate hypothesis (H_1:pij≠0,i≠j) was accepted.

As demonstrated by these data, the relationship between the percentage of male headed households within West Virginia (1970 Census) and the academic achievement of third grade West Virginia students as measured by the 1976 CTBS score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between presence of a father figure and academic achievement for the subjects of this study.

Hypothesis 2:

"There is no relationship between a county's percentage of families above the poverty level as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between the percentage of families above poverty level and academic achievement was $r = 0.569$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore the null hypothesis ($H_0: pij=1, i \neq j$) was rejected and the alternate hypothesis ($H_1: pij \neq 0, i \neq j$) was accepted.

As evidenced by these data, the relationship between the percentage of families above poverty level within West Virginia (1970 Census) and the achievement of third grade West Virginia students as measured by the 1976 CTBS total was significant and could not be totally accounted for by random error. Therefore; there was a relationship between income level and academic achievement for the subjects of this study.

Hypothesis 3:

"There is no relationship between a county's median school years completed, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between Median School Years Completed and academic achievement was $r = 0.606$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore the null hypothesis ($H_0: pij=0, i \neq j$) was rejected and the alternate hypothesis ($H_1: pij \neq 0, i \neq j$) was accepted.

As demonstrated by these data, the relationship

between median school years completed within West Virginia (1970 Census)and the achievement of third grade West Virginia students as measured by the 1976 CTBS was significant and could not be totally accounted for by random error. Therefore, there was a relationship between education level of parents and academic achievement for the subjects of this study.

Hypothesis 4:

"There is no relationship between a county's percentage of white collar workers, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between percentage of white collar workers and academic achievement was $r = 0.498$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore the null hypothesis (H_0:pij =0,i≠j) was rejected and the alternate hypothesis (H_1:pij ≠0,i≠j) was accepted.

As demonstrated by these data, the relationship between the percentage of white collar workers within West Virginia (1970 Census) and academic achievement of third grade West Virginia students as measured by the 1976 CTBS Basic Skills Total mean score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between the type of employment of parents and academic achievement for the subjects of this study.

Hypothesis 5:

"There is no relationship between a county's median income, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976.

The resulting correlation coefficient between a county's median income and academic ahcievement was $r = .527$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore, the null hypothesis ($H_0: pij=0, i \neq j$) was rejected and alternate hypothesis ($H_1: pij \neq 0, i \neq j$) was accepted.

As demonstrated by these data, the relationship between median income within West Virginia (1970 Census) and the achievement of third grade West Virginia students, as measured by the 1976 CTBS Basic Skills Total mean score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between average income level and academic achievement for the subjects of this study.

Hypothesis 6:

"There is no relationship between a county's percentage of elementary school children in private schools, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between a county's percentage of elementary school children in private school and academic achievement was $r = .270$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore, the null hypothesis (H_0:pij=0,i≠j) was rejected and alternate hypothesis (H_1:pij≠0,i≠j) was accepted.

As demonstrated by these data, the relationship between the percentage of elementary school children in private school in West Virginia (1970 Census) and academic achievement of third grade West Virginia Students as measured by the 1976 CTBS Basic Skills total score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between the type of school attended and academic achievement for the subjects of this study.

Hypothesis 7:

"There is no relationship between a county's percentage of eighteen year olds and under living with both parents, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between percentage of eighteen year olds and under living with both parents and academic achievement was $r = 0.336$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore, the null hypothesis (H_0:pij=0,i≠j) was accepted.

As evidenced by these data, the relationship between the percentage of eighteen year olds and under living with both parents as reported in the 1970 U. S. Census and the academic achievement of third grade West Virginia students as measured by the 1976 CTBS Basic Skills Total score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between the percentage of minor children living with both parents and academic achievement for the subjects of this study.

Hypothesis 8:

"There is no relationship between a county's percentage of persons fourteen to seventeen years old in school, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS as administered in 1976."

The resulting correlation coefficient between the percentage of persons fourteen to seventeen years old in school and academic achievement was $r = 0.132$. According to the SAS:CORR procedure this r failed to meet the .05 criterion level. Therefore, the null hypothesis (H_o:pij=0, $i \neq j$) was accepted.

As demonstrated by these data, the percentage of persons fourteen to seventeen years old in school within West Virginia (1970 Census) and the academic achievement of third grade West Virginia students as measured by the 1976 CTBS total Basic Skills score was not significant at the .05

level. Therefore, there was no relationship between the percentage of adolescents per family in school and academic achievement for the subjects of this study.

Hypothesis 9:

"There is no relationship between a county's percentage of housing lacking some or all plumbing, as reported in the U. S. Census 1970, and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting correlation coefficient between percentage of housing lacking some or all plumbing and academic achievement was $r = 0.525$. According to the SAS:CORR procedure this r met the .05 criterion level. Therefore, the null hypothesis ($H_0: pij=0, i \neq j$) was rejected and the alternate hypothesis ($H_1: pij \neq 0, i \neq j$) was accepted.

As evidenced by these data, the relationship between percentage of housing lacking some or all plumbing within West Virginia (1970 Census) and the achievement of third grade West Virginia students as measured by the 1976 CTBS Basic Skills Total mean score was significant and could not be totally accounted for by random error. Therefore, there was a relationship between the percentage of homes without running water and academic achievement for the subjects of this study.

Significance of the Multiple Correlation Coefficient

A stepwise regression procedure was conducted to ascertain which of the preceding variables, as an aggregate, provided the best predictor of academic achievement and to determine the multiple correlation coefficient (R) of those variables. The research hypothesis stated in null form and the subsequent multiple correlation coefficient are presented in the following paragraphs. The Regression Coefficients, Multiple Correlation, and R-Square of the final step in the regression procedure are presented in Table III, page 43. The results of the six steps in the procedure are described in Appendix Two, Tables IV - IX.

Hypothesis 10:

"There is no relationship between a selected aggregate of the above nine factors--as determined by a Stepwise regression procedure--and the academic achievement of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the CTBS administered in 1976."

The resulting multiple correlation coefficient between an aggregate composed of (1) percentage of male headed households, (2) percentage of families above poverty level, (4) percentage of white collar workers, and (5) median income, (which was the best aggregate of predictors according to SAS:STEPWISE) and academic achievement was R= 0.716. According to the SAS:STEPWISE procedure this R

Table III

Regression Coefficients, Multiple Correlation, and Coefficient of Determination for the Predictor Aggregate of Nine Socioeconomic Variables

HO#	Socioeconomic Variable	Regression Coefficient
1	Percentage of Male Headed Households	5.944
2	Percentage of Families Above Poverty	1.672
4	Percentage of White Collar Workers	1.780
5	Median Income	-0.008

Multiple Correlation (R) = .716

Coefficient of Determination (R^2) = .513

met the .05 criterion level. Therefore, the null hypothesis (H_0:R=0) was rejected and the alternate hypothesis (H_1:R≠0) was accepted.

As evidenced by these data, the relationship between the selected aggregate of four variables from the 1970 Census and the achievement of third grade West Virginia students, as measured by the 1976 CTBS Basic Skills Total mean score, was significant and could not be totally accounted for by random error. The relationship between the aggregate of variables selected by the stepwise procedure and academic achievement for the subjects of this study was high. Therefore, it was accepted that the aggregate of variables composed of (1) the percentage of male headed households, (2) the percentage of families above the poverty level, (4) the percentage of white collar workers, and (5) the median income provided the best combination of predictor variables for academic achievement, as measured by this study.

Discussion

Median school years completed by county residents was the single best predictor of academic achievement for the subjects of this study with an r= 0.606 which accounted for 37 percent of the systematic variance. This predictor was followed by percentage of families above the poverty level, r= 0.569 or 32 percent of the systematic variance; median income, r= 0.527 or 28 percent of the systematic variance, percentage of homes with plumbing; r= 0.525 or

27 percent of the systematic variance; percentage of white collar workers, r= 0.498 or 25 percent of the systematic variance; percentage of male headed households, r 0.431 or 19 percent of the systematic variance; percentage of children eighteen and under living with both parents, r= 0.336 or 11 percent of the systematic variance; percentage of elementary school children in private school, r= 0.270 or 7 percent of the systematic variance; and finally percentage of fourteen to seventeen year-olds in school, r= 0.132 or only 2 percent of the systematic variance. All of the above mentioned variables, except for the last one, were significant at the .05 level.

The interpretation of correlation coefficients, in many respects, is a subjective process with the validity of the r depending largely upon the circumstances of the investigation.

According to Downie and Heath (1974), in general, an r of .8 and above is usually required for a coefficient to be considered high, with an r of .5 considered to be moderate, and an r of .3 and below considered to be low (Downie and Heath, 1974:97). Based on this criteria none of the individual correlation coefficients exhibited a high relationship. Six exhibited a moderate relationship, two demonstrated a low relationship and one variable did not meet the criterion of .05 selected for significance in the investigation.

The multiple correlation coefficient produced by the stepwise regression procedure was R= 0.716 or approximately

51 percent of the variance between the obtained aggregate of socioeconomic variables and academic achievement. Therefore it was concluded that the selected aggregate of socioeconomic variables (percentage of male headed households, percentage of families above poverty, percentage of white collar workers, and median income) obtained by the regression procedure exhibited a moderate degree of predictive validity with academic achievement as measured in this study.

Summary

This chapter has presented the results of ten research hypotheses formulated for this investigation. Also presented in the discussion of this chapter was an interpretation of the correlation coefficients and multiple correlation coefficient conducted to test the research hypotheses. Chapter V will present a summary of the procedures and results of the study, implications of the investigation, and recommendations for further research.

CHAPTER V

SUMMARY AND IMPLICATIONS

This chapter presents a summary of the procedures, limitations, and conclusions of this study. The final section is a narrative account of the implications of this investigation, and recommendations for further research.

Summary

Procedures of the Study

The fifty-five county school systems of West Virginia comprised the study sample of this investigation. The dependent variable was the academic achievement score of third grade students in West Virginia, as measured by the Basic Skills Total mean score by county on the Comprehensive Test of Basic Skills, administered in 1976. The independent variables included nine socioeconomic factors from the 1970 U. S. Census which were: percentage of male headed households; percentage of families above poverty level; median school years completed; percentage of white collar workers; median income; percentage of children in private school; percentage of eighteen year-olds and younger living with both parents; percentage of persons fourteen to seventeen years old in school; and percentage of housing with all plumbing.

The purpose of this study was to determine whether or not there was a statistically significant relationship between selected socioeconomic data from the U. S. Census and educational outcome in West Virginia. This was accomplished through an analysis of data with two library computer programs: SAS:CORR and SAS:STEPWISE. The former program computed a matrix of one hundred correlation coefficients for the ten variables. Nine of these r's represented hypotheses developed for this study.

The results of the nine individual correlation coefficients between achievement and the socioeconomic variables arranged in order, from high to low, were: (1) median school years completed, r= 0.606; (2) percentage of families above poverty, r= 0.569; (3) median income r= 0.527; (4) percentage of homes with plumbing, r= 0.525; (5) percentage of white collar workers, r= 0.498; (6) percentage of male headed households, r= 0.431; (7) percentage of children eighteen and under living with both parents, r= 0.336; (8) percentage of elementary school children in private schools, r= 0.270; and (9) percentage of fourteen to seventeen year olds in school, r= 0.132.

Eight of the nine correlations were significant at the .05 level. The first six of these r's exhibited a moderate relationship with the achievement of variables, while variables seven and eight exhibited a low relationship. The final correlation failed to meet the .05 criterion level.

The latter program (SAS:STEPWISE) was used to form a multiple regression equation for the purpose of identifying the best aggregate of achievement predictors. Coefficients of determination (R^2) were calculated for each of six steps in this procedure. An F ratio was employed by the stepwise program to add or delete variables and to test the significance of the R^2.

The aforementioned program identified--as the best aggregate of predictors for this study--the percentage of male headed households, the percentage of families above poverty, the percentage of white collar workers, and median income. The multiple correlation of (R) between these variables and achievement was R= 0.716. This R was significant at the .0001 level and therefore met the .05 confidence level set for this investigation.

Limitations of the Study

This study was possibly limited by two factors: first, county wide socioeconomic information gathered from the 1970 U. S. Census was compared to the Basic Skills portion of the Comprehensive Test of Basic Skills administered to third grade students. It would have been desirable to compare these scores to only those families with third grade children; unfortunately, such a break down was not readily available. Also, the census information and achievement data used in this study were not temporally identical (1970 census information was compared to 1976 achievement data).

Therefore, conclusions based on the analysis of data must be applied with caution to subjects beyond the sample of this study.

Conclusions of the Study

In accordance with the preceding data and limitations the following conclusions were drawn:

1. The relationship between the percentage of male headed households and academic achievement for the subjects of this study was significant at the .05 level.

2. The relationship between the percentage of families above poverty and academic achievement for the subjects of this study was significant at the .05 level.

3. The relationship between median school years completed by residents and academic achievement for the subjects of this study was significant at the .05 level.

4. The relationship between the percentage of white collar workers and academic achievement for the subjects of this study was significant at the .05 level.

5. The relationship between the median income of residents and academic achievement for the subjects of this study was significant at the .05 level.

6. The relationship between the percentage of children in private school and academic achievement for the subjects of this study was significant at the .05 level.

7. The relationship between the percentage of children eighteen and under with both parents and academic

achievement for the subjects of this study was significant at the .05 level.

8. The relationship between the percentage of children fourteen to seventeen in school and academic achievement for the subjects of this study was not significant at the .05 criterion level selected for this study.

9. The relationship between the percentage of children eighteen and under with both parents and academic achievement for the subjects of this study was significant at the .05 level.

10. The relationship between the selected aggregate of socioeconomic variables, (the percentage of male headed households, the percentage of families above poverty, the percentage of white collar workers, and median income) and academic achievement for the subjects of this study was significant at the .05 level selected for testing this hypothesis criterion.

Implications for Further Research

The results of this study, as well as the review of related literature, have indicated that further research may be needed to explain more fully the relationships among socioeconomic status and academic achievement. It is unclear whether the correlations exhibited in this study are casual in nature or indicate the measurement of underlying variables not represented in this investigation.

Further research is suggested to test the predictive

validity of these variables with academic achievement. This could be accomplished for the subjects of this study by predicting individual county scores at other grade levels, using the regression coefficients to determine the variance between predicted and actual CTBS scores.

Further research is suggested to determine whether the relationship between socioeconomic status and academic achievement remains constant, increases, or decreases as children grow older. This might be accomplished for the subjects of this study through a comparison of the census variables used in this study with the mean CTBS scores by county for the sixth, ninth, and/or eleventh grades.

Further research is suggested to determine the actual relationship between census information and achievement data that are more temporally compatible. This could be implemented for the subjects of this study through comparison of the 1980 CTBS information with the 1980 census information (when the latter is completely available).

Further research is recommended to test the formula (developed in this study) in other applications. This might be accomplished by testing the model identified in this study with 1980 census and achievement data to determine the similarity between test data for 1976 and 1980. Similarity of results might be interpreted to indicate that the composites of variables identified as significant in this study may also be valid in other similar situations.

Given the fact that the multiple stepwise regression model presumes that there is a "best" set of independent variables and the fact that there is often no unique "best" set of predictors, this investigator recommends that the "all possible regression routine" (Neter and Wasserman, 1974: 325-328) be run with the data base of this study to determine whether any additional set, or sets, of independent variables might be identified in addition to the set identified in this investigation.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. PRIMARY SOURCES

1. Journals

Cegelka, W. J., and P. A. Thomas. "The culturally disadvantaged: an analysis of the roles of the environment, the child, and the school." Training School Bulletin 65 (1968): 16-56.

Fotheringham, John B., and Dorothy Creal. "Family Socio-economic and Educational-Emotional Characteristics of School Achievement." The Journal of Educational Research (June 22, 1978): 311-317.

Hunt, J. McV. "Has compensatory education failed? Has it been attempted?" Harvard Educational Review 39 (1969): 278-300.

Jensen, A. R. "How much can we boost IQ and scholastic achievement?" Harvard Educational Review 39 (1969): 1-123.

Kohn, Martin, and Beatrice L. Rossman. "Cognitive Functioning in Five Year-Old Boys as Related to Social-Emotional and Background Demographic Variables." Developmental Psychology (March 1973): 277-294.

Marjoribanks, Kevin. "Intelligence, Social Environment and Academic Achievement: A Surface Regression Analysis." The Journal of Experimental Education (Summer 1979): 246 251.

May, Robert J., Jr., Douglas G. Alexander, and Bill M. Holcombe. "The Validity of Seven Easily Obtainable Economic and Demographic Predictors of Achievement Test Performance." Educational and Psychological Measurement 37 (Summer 1978): 1005-16.

Messe, Lawrence A., William D. Crano, Susan R. Messe and William Rice. "Evaluation of the Predictive Validity of Tests of Mental Ability for Classroom Performance in Elementary Grades." The Journal of Educational Psychology 71 (April 1979): 233-41.

Walberg, Herbert J. and Kevin Marjoribanks. "Differential Mental Abilities and Home Environment: A Canonical Analysis." Developmental Psychology 9 (November 1973): 365-368.

2. Books

Blair, William H., and others. SAS User's Guide 1979 Edition. Cary, North Carolina: SAS Institute Inc., 1979.

Bridge, R. Gary, Charles M. Judd, and Peter R. Moock. The Determination of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Downie, N. M., and R. W. Heath. Basic Statistical Methods Fourth Edition. New York: Harper and Row Publishers, 1974.

Ferguson, George A. Statistical Analysis in Psychology and Education Fourth Edition. New York: McGraw-Hill Book Company, 1976.

Horton, P. B. and C. Hunt. Sociology. New York: McGraw-Hill, 1968.

Levine, Mark S. Canonical Analysis and Factor Comparison. Bevery Hills, California: Sage Publications, 1977.

Liddle, G. P. "The School psychologist's role with the culturally handicapped." School Psychological Services in Theory and Practice: a Handbook. Englewood Cliffs, New Jersey: Prentice Hall, 1967.

Montebell, Thomas, G., and Doris White. Thirteenth Report State-County Testing Program. Charleston, West Virginia: West Virginia Department of Education, 1981.

Neter, John, and William Wasserman. Applied Linear Statistical Models. London: Richard D. Irwin, Inc., 1974.

Thompson, James P., and Donald R. VanHouten. The Behavioral Sciences: An Interpretation. Reading, Massachusetts: Addison-Wesley Publishing Company, 1970.

Whimbey, Arthur. Intelligence Can Be Taught. New York: E. P. DuHon and Company, 1975.

B. SECONDARY SOURCES

1. Abstracts

Bidwell, Charles E., and John D. Kasarda. "School District Organization and Student Achievement." American Sociological Review 40 (1975): 55-70, abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Bowles, Samuel S. "Towards an Educational Production Function", in W. L. Hansen, Ed., Education, Income and Human Capital (New York: Columbia University Press, 1970), abstracted by Bridge, R. Gary; Charles M. Judd, and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Bowles, Samuel S. "Educational Production Function: Final Report." Washington, D. C.: U. S. Department of Health, Education, and Welfare, Office of Education, 1969, abstracted by Bridge; R. Gary, Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge: Ballinger Publishing Company, 1979.

Burkhead, Jesse, Thomas G. Fox and John W. Holland. Input and Output in Large City Schools. (Syracuse, New York: Syracuse University Press, 1967), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Cohn, Elchanan, and S. D. Millman, Input-Output Analysis in Public Education. (Cambridge, Massachusetts: Ballinger Publishing Company, 1975), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Cohn, Elchanan. "Economics of Scale in Iowa High School Operations." Journal of Human Resources. 3 (1968): 422-434, abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Hanushek, Eric A. Education and Race: An Analysis of the Educational Production Process. (Lexington, Massachusetts: Lexington Books, 1972), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Katzman, Martin T. The Political Economy of Urban Schools, (Cambridge, Massachusetts: Harvard University Press, 1971), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Kiesling, Herbert J. A Study of Cost and Quality of New York School Districts. (Washington, D. C.: U. S. Office of Education, 1979), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Kiesling, Herbert J. The Relationship of School Inputs to Public School Performance in New York State. (Santa Monica, California: The Rand Corporation, 1969), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Levin, Henry M. "A New Model of School Effectiveness", in Do Teachers Make a Difference? (Washington, D. C.: United States Department of Health, Education, and Welfare. Office of Education, 1970), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Michelson, Stephen. "The Association of Teacher Resourceness with Children's Characteristics", in Do Teachers Make a Difference? (Washington, D. C.: United States Department of Health, Education, and Welfare, Office of Education, 1970), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Murngne, Richard J. The Impact of School Resources on the Learning of Inner City Children. (Cambridge, Massachusetts: Ballinger Publishing Company, 1975), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Perl, Lewis J. Family Background, Secondary School Expenditures, and Student Ability," Journal of Human Resources, 8 (1973): 156-180, abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Summers, Anita, A., and Barbara L. Wolfe, "Do Schools Make a Difference?" American Economic Review, 67 (1977): 639-652, abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Wiley, David E. "Another Hour, Another Day. Quantity of Schooling, a Potent Path for Policy," in W. H. Sewell, R. M. Hauser, and D. L. Featherman, Eds., Schooling and Achievement in American Society (New York: Academic Press, 1976), abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

Winkler, Donald R. "Education Achievement and School Peer Group Composition." Journal of Human Resources 10 (1975): 189-205, abstracted by Bridge, R. Gary; Charles M. Judd; and Peter R. Moock. The Determinants of Educational Outcomes. Cambridge, Massachusetts: Ballinger Publishing Company, 1979.

2. Dissertation Abstracts

Palamar, Mary Coyle. "The Relationship of Socioeconomic Status to Receptive and Expressive Language, Listening and Reading Comprehension Abilities of Intermediate Grade Children." Ed.D. Dissertation, University of Rochester, 1977. Dissertation Abstracts International, (1978): 3347-A.

Raymond, Karl. "The Relationship Between Socioeconomic Status and Academic Achievement." Ph.D. Dissertation, University of Colorado, 1976. Dissertation Abstracts International, (1977): 5067-A.

APPENDIX A

STATISTICAL METHODS

APPENDIX A

Statistical Methods

An essential feature of the majority of the studies reviewed for this investigation was the use of statistical concepts to study correlation and prediction, which according to Ferguson (1976:101), are closely related statistical tools. Succinctly put, correlation is concerned with the description of relationships between variables, while prediction is concerned with the estimation of one variable from knowledge of another.

Ferguson further noted that the existence of a correlation between two or more variables implies that if we know something about one variable we also know something about the other, and can therefore make a measured prediction regarding the behavioral characteristics of the second variable (Ferguson, 1976:101).

It is important to note that a variety of statistical methods are grounded in these fundamental concepts. The following is a description of the more widely used statistical methodologies employed in the studies reviewed in this study to predict achievement from socioeconomic measures.

1. Multiple linear regression, or least-squares regression as it is sometimes called, was used in eight (30.8%) of the studies and abstracts reviewed (Bowles, 1979:297-298, Coh, 1979:301-303; Levin 1979:315-317; Michelson, 1979:317-320; Murnane, 1979:320-322; Perl, 1979:326-327; Summers and Wolfe, 1979:328-330; and Winkler, 1979:332-334).

As described by Bridge et al, multiple linear regression is "a general statistical method that enables one to examine the impact of a particular input on a dependent variable while controlling statistically for other inputs into the process," (1979:145). Data obtained from this method included; (1) the partial regression coefficients, which indicate the amount of predicted change in the dependent variable associated with a one-unit change in an independent variable; (2) beta coefficients, which indicate anticipated change in the dependent variable associated with a one standard deviation change in the independent variable; and (3) the coefficient of determination (R^2), which estimates the proportion of variance within the dependent variable explained by all of the independent variables in the equation. The square root of this latter statistic yields also the multiple correlation coefficient (R).

2. Factor analysis and canonical correlation analysis were employed by four (15.4%) of the studies reviewed (Kiesling, 1979:311-313; Kiesling, 1979:313-315, Kohn and Rossman, Walberg and Marjoribanks, 1973:367-368) and are,

according to Mark Levine, "related techniques that allow a researcher to examine patterns of interrelationships between sets of variables," (1977:5). In a majority of data analyses carried out in the social sciences, Levine noted that the value of a single dependent variable is predicted on the basis of a set of independent variables (Levine, 1979). As stated previously, least squares regression facilitates this type of analysis. The advantage of factor and canonical analysis is that they extend a basic relationship to an entire set of dependent variables allowing an examination of a wide variety of possible interrelationships.

3. Multiplicative regression was employed in three (11.0%) of the studies reviewed (Cohn, 1979:301-303; Hanushek, 1979:305-307; Katzman, 1979:309); and is a non-linear extension of the regression analysis equation (Bridge, Judd and Moock, 1979:113). This model is used primarily when the investigator suspects that the effect of a given independent variable on the dependent variable is a function of the level of another variable. The multiplicative model (also called the Cobb-Douglas Model) exhibits curvilinearity between the dependent and any independent variable as well as the interaction between any one independent variable and any other independent variable.

4. Stepwise multiple regression was employed by three (11.5%) of the studies reviewed (Burkhead, 1979:298-300; Fotheringham and Creal, 1978:311-317; May et al, 1978:

445-450). This is also an extension of multiple regression analysis which seeks to select the best set of independent variables from a group of potential predictors (Neter and Wasserman, 1974:371-385). According to Neter and Wasserman, this search method computes a sequence of regression equations, at each step adding or deleting an independent variable (Neter and Wasserman, 1974:382-383). There are two major limitations of this model. First, it presumes that there is a single best set of independent variables. As noted by many authors, there is often no single best set of predictors, thus many statisticians advise that the "all possible regression models: (Neter and Wasserman, 1974:325-328) with the same number of independent variables as the stepwise routine should be run to study whether some other sets of variables might in fact be better. Second, the stepwise routine sometimes arrives at an unreasonable "best" set of variables when the independent variables are highly intercorrelated.

Other statistical methods employed by studies evaluated for this review included: (1) analysis of covariance used in two investigations (7.7% of total studies) (Hanushek, 1979:307-308; and Wiley 1979:331-332); (2) correlation analysis in an investigation (4% of total studies) by Messe, et al, 1979:233-241; (3) Descriptive Statistics in one investigation (4% of total studies) (Palamar, 1978:3347-A); (4) Hierarchical Regression, one study (4% of total studies) (Bidwell and Kasarda, 1979:293-295); and (5) linear additive

regression, one study (4% of total studies) (Bowles, 1979: 295-297).

In summary, the methodology sections of twenty-six abstracts and studies were reviewed with the following resultant conclusions: (1) all but one of the studies employed the concepts of correlation and prediction to some extent; (2) nine distinct statistical methods were identified among the twenty-six studies with least squares regression, factor analysis/canonical correlation, multiplicative regression, and stepwise regression comprising the most frequently used models, each with advantages and specialized applications; and (3) the single methodology reviewed with the capability of selecting a best set of independent variables from a group of potential predictors was stepwise regression.

APPENDIX B

STEPWISE REGRESSION TABLES

TABLE IV

Step One: Stepwise Regression
for Median School Years

R Square = 0.36794169 C(P) = 11.04851960

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	1	10973.468	10973.468	30.85	0.0001
ERROR	53	18850.465	355.669		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	222.161				
3	11.846	2.132	10973.468	30.85	0.0001

TABLE V

Step Two: Stepwise Regression
for Male Head of House

R Square = 0.40488290 C(P) = 9.42203892

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	2	12075.200	6037.600	17.69	0.0001
ERROR	52	17748.732	341.321		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	-29.467				
1	3.003	1.671	1101.732	3.23	0.0782
3	10.083	2.308	6515.021	19.09	0.0001

TABLE VI

Step Three: Stepwise Regression
for White Collar Workers

R Square = 0.48164407 C(P) = 3.88647355

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	3	14364.520	4788.173	15.80	0.0001
ERROR	51	15459.413	303.125		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	-219.616				
1	5.242	1.773	2648.066	8.74	0.0047
3	3.986	3.107	499.012	1.65	0.2053
4	1.430	0.520	2289.319	7.55	0.0083

TABLE VII

Step Four: Stepwise Regression
(for Removal of) Median School

R Square = 0.46491213 C(P) = 3.52903031

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	2	13865.508	6932.754	22.59	0.0001
ERROR	52	15958.425	306.892		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	-317.263				
1	6.589	1.437	6445.627	21.00	0.0001
4	1.907	0.366	8305.328	27.06	0.0001

TABLE VIII

Step Five: Stepwise Regression
for Families Above Poverty

R Square = 0.48667155 C(P) = 3.39293061

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	3	14514.460	4838.153	16.12	0.0001
ERROR	51	15309.473	300.185		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	-202.943				
1	4.952	1.806	2255.950	7.52	0.0084
2	0.556	0.378	648.951	2.16	0.1476
4	1.584	0.423	4194.935	13.97	0.0005

TABLE IX

Step Six: Stepwise Regression
for Median Income

R Square = 0.51312985 C(P) = 2.79554594

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB F
REGRESSION	4	15303.550	3825.887	13.17	0.0001
ERROR	50	14520.383	290.407		
TOTAL	54	29823.933			

	B VALUE	STD ERROR	TYPE II SS	F	PROB F
INTERCEPT	-331.212				
1	5.944	1.876	2916.041	10.04	0.0026
2	1.672	0.772	1360.606	4.69	0.0352
4	1.780	0.433	4898.618	16.87	0.0001
5	-0.008	0.004	789.090	2.72	0.1055

No other variables met the 0.1500 significance level for entry into the model.

APPENDIX C

STATE-COUNTY TESTING PROGRAM

THIRTEENTH REPORT
STATE-COUNTY TESTING PROGRAM

By

Thomas G. Montebell, Coordinator
Assessment and Testing

Doris White, Testing Technician

Division of Evaluation and Information Systems

Roy Truby
State Superintendent of Schools
West Virginia Department of Education

HISTORICAL PERSPECTIVE

Since 1962, the West Virginia Legislature has funded a program to measure student achievement and progress within public and non-public West Virginia schools. This program, referred to as the State-County Testing Program (SCTP), is operated by the West Virginia Department of Education, Bureau of Learning Systems, Division of Evaluation and Information Systems. The Coordinator of Assessment and Testing is charged with administering the SCTP at the State level and works closely with the Testing Technician and designated County Test Coordinators to assure the fluid operation of the program.

Historically, the SCTP has assessed the scholastic aptitude and achievement of all 3rd, 6th, 9th and 11th grade students in West Virginia schools, except in 1962-63 when only 6th and 12th graders were assessed. Since its inception in 1962-63, a number of different tests have been utilized by the SCTP to identify the academic performance of students.

In 1962-63, sixth graders were administered the Lorge-Thorndike Intelligence Test and the Stanford Achievement Test, Form H, while twelfth graders completed the School and College Ability Tests and the Sequential Tests of Educational Progress. When the program was expanded to include 3rd, 9th and 11th graders while dropping the 12th grade students in 1963-64, the 3rd and 6th grade students were administered the Otis Mental Ability Test and the Stanford Achievement Test while the 9th and 11th grade students were assessed with the School and College Ability Test and the Sequential Tests of Educational Progress.

Another change was made in the 1965-66 testing season with the replacement of the Stanford Achievement Test, Form H, to a newer version, the Stanford Achievement Test, Form W. To allow comparison between the

different forms, the publisher provided conversion tables for use by the counties.

Changes were again made during the 1967-68 school year. The Otis Mental Ability Test for grades 3 and 6 was replaced by the Otis-Lennon Mental Ability Test. A more dramatic change, however, was the purchase of an optical scanner for the 11th grade answer sheets. This mechanization allowed for the Department's Data Processing Division to play an increasingly active role in the scoring and reporting of test results, and the 1968-69 program scored and reported both the 9th and 11th grades.

Further modifications to the SCTP were initiated for the 1970-71 school year. First of all, a new test, the Scholastic Testing Service's Educational Development Series of tests, was administered in the 3rd, 6th, 9th and 11th grade. This was the first year that all students took the same form of the same test, the only difference being the level of test completed by an individual grade. Secondly, all four grades were scored and reported by the Data Processing Division within the State Department of Education.

The 1970-71 modifications resulted in a more efficient testing program. The adoption of a single test form enabled student progress to be charted and compared from one grade of testing to another. The expansion of the scoring and reporting services allowed for an in-house program to be established with only the test booklets, answer sheets and report forms purchased by the Department. The changes also allowed for the incorporation and utilization of the spawning computer technology not readily available to every school and county within the State.

The last major change to this point in time has been the adoption of different assessment instruments to measure both student aptitude and achievement at the various grade levels. In 1976-77, the Cognitive Abilities Test (CAT), then published by Houghton/Mifflin Corporation, and

the Comprehensive Tests of Basic Skills, Form S, (CTBS/S), published by CTB/McGraw-Hill, were adopted by the SCTP. Since that time, students have taken these tests in each of the previous four school years, 1976-77, 1977-78, 1978-79 and 1979-80. This 13th State-County Testing Program Report focuses on the results of these four years of testing and draws conclusions about the educational achievement and progress of those students who have participated in the SCTP.

Changes in the SCTP other than the types of assessment instruments utilized by the program have also had impact upon the organization and administration of the program. Reorganization of the Department has placed the operation of the program in various divisions within the Department structure. Originally, the SCTP was housed within the Division of Guidance, Counseling and Testing Services. In 1974, the SCTP became a component of the Division of Special Education and Student Support Services. In 1979, SCTP responsibilities transferred to the Division of Evaluation and Information Systems. Currently, the SCTP remains within this Division.

There have been personnel changes within the SCTP. The persons responsible for a program in many ways determine the effectiveness of a program. The SCTP is no different in this regard. As the testing of students has increased, so too, has the role of the SCTP increased in providing accurate, objective data from which to draw conclusions about the State's educational performance. The Coordinator of Assessment and Testing position has expanded from an administrative role to that of an active contributor to instructional evaluation processes and the subsequent modifications of instruction based upon the evaluation data.

By working closely with curriculum specialists at the State level, county test coordinators, county curriculum personnel, teachers, principals and other local educational personnel, the Coordinator of Assessment and

Testing has increased the utilization of SCTP services. The results of the annual assessments provide the State and local personnel with information about the curriculum; with information for making detailed appraisal of the school program; with information for identifying instructional needs warranting additional emphasis; and with information regarding the development of inservice and continuing education programs. The Coordinator of Assessment and Testing furnishes the technical assistance necessary for the variety of educational personnel to derive the full benefits of the SCTP.

The structure of the SCTP enables school administrators to make comparisons of the performance of students in their respective counties to that of students within the State and throughout the nation. The various reports delineating student results are used in a variety of ways, with specific reports better suited for some evaluative tasks than others. The generated reports relate to the performance of individual students; groups of students within a class in a school; groups of students within the schools; and, finally, groups of students enrolled in a particular grade at the county and State level.

This report is structured so that the reader gains a better understanding of the SCTP. There are six sections comprising this document, each of which is related to expanding reader awareness. Together, these six sections discuss the SCTP since its inception to the most recent student data collected and analyzed for the 1979-80 school year. This section is the introductory section; the remainder of the sections are briefly described in the following paragraphs.

The second section is a discussion of the West Virginia Student Questionnaire, the Cognitive Abilities Test and the Comprehensive Tests of Basic Skills, Form S. The various portions of these components of the SCTP are identified and explained rather extensively. This section will enable

the reader to grasp more fully the purpose and function of the SCTP since these materials were adopted for the 1976-77 school year.

The third section identifies and explains the various reports generated by the SCTP in relation to the data collected about student plans and interests, scholastic ability and academic achievement. Examples of the reports are appended and a brief description of their utilization is provided. At the end of Section III are the definitions of the testing terms used in this report.

The fourth and fifth sections of the report present the results of the SCTP for the school years 1976-77, 1977-78, 1978-79 and 1979-80. The data are organized by grade level within a particular testing year. Section IV summarizes the student plans and interests material. Section V addresses the achievement test results. The various aspects of the collected information are included and explained. All information relates specifically to the State as a whole and no attempt is made to present or discuss individual county results.

The final section is a discussion of longitudinal performance for a grade level of students. This section is not an exhaustive presentation about the test score projections for the same groups of students, but serves only as a summary of student educational growth and as an indication of expected student educational performance and future progress in West Virginia schools.

This background information of the SCTP traces the program from its origin and highlights some of the major changes. These changes were initiated so that the program might continue to improve and be of greater benefit to those persons involved with the West Virginia educational system. Likewise, change has continued through the present, and techniques

begun in the early seventies have been reviewed and refined so that a better SCTP continuously evolves.

There is no doubt that the SCTP is imperfect. Not every related educational question can be answered through analysis of the test results. However, if one is aware of and recognizes the limitations of the program, the vast quantity of data available to school personnel at all levels of public education can assist them with their decision making. As in the past, the SCTP strives to provide the best possible service to the State and the counties and to enhance its reputation as a quality testing program.

COMPOSITION OF THE STATE-COUNTY TESTING PROGRAM ASSESSMENT BATTERY

The SCTP collects information about individual students in three distinct areas. These areas include the West Virginia Student Questionnaire, the Cognitive Abilities Test (CAT), and the Comprehensive Tests of Basic Skills, Form S, (CTBS/S). In order to better understand the SCTP, one should have a basic knowledge of the composition of these three components.

Description of West Virginia Student Questionnaire

The West Virginia Student Questionnaire was developed to provide a systematic record of each student's interests and plans. The questionnaire is constructed such that the interests ratings and plans are reported as expressed rather than measured interests and plans. The instrument is divided into the following three areas which are felt to be important in the educational experience of students: (1) School Subjects, (2) Educational Plans, and (3) Career Plans. Only the "School Subjects" part of the questionnaire is administered at grade three while all three parts of the questionnaire are administered at grades six, nine and eleven.

On the "School Subjects" section, students are asked to rate on a scale of 1 to 5 (1-dislike very much; 5-like very much) how well they like, or think they would like, each of ten different school subjects.

In the "Educational Plans" section, students are to indicate how far they plan to go in school. The students have six options from which to choose. The options range from "to quit school" to "...complete four years of college and then take additional college training."

The "Career Plans" section of the student questionnaire asks students to select "1st" and "2nd" choices of job areas which they would most like to enter. Students have nineteen "Job Areas" from which to choose. These areas are primarily taken from the AREAS OF WORK contained in the Dictionary of Occupational Titles.

Through reacting to the questionnaire, students have an opportunity to express how they feel about different school subjects and indicate some of their present plans. Information from the reports can provide greater knowledge and understanding of students' motivations, plans and achievement. Information from the reports also provide a unique opportunity to do a consistency check for each student. These reports can be used to compare the student's educational and career plans with his/her scholastic abilities and achievements; to compare the student's educational plans with his/her career plans; and to compare the student's likes and dislikes of school subjects with his/her scholastic achievements.

Description of Cognitive Abilities Test

The Cognitive Abilities Test is the West Virginia State-County Testing Program's measure of scholastic ability, that is, one's ability to learn school related material in a typical classroom setting. The test measures the verbal and nonverbal abilities of a student at this particular point in time and makes no attempt nor should be interpreted as an attempt to measure inherent abilities that a student might possess. The test does provide information about a student's ability to use words and symbols, and the verbal scores are related to the word knowledge and skill level a student developed both in and outside the school. This test does not predict a student's expected performance on the achievement test administered by the SCTP.

The Cognitive Abilities Test has evolved from the well-accepted Lorge-Thorndike Intelligence Tests series. Some of the item types of the older series have been retained. At the same time, the new series has incorporated many refinements and new developments. All of the items included in the new series were especially constructed for it, and a new subtest, Figure Synthesis, was added. In all, seven subtests are assembled

into two separate batteries - Verbal and Nonverbal - each homogeneous in the function that is measured.

The Cognitive Abilities Test provides a set of measures of the individual's ability to use and manipulate abstract and symbolic relationships. Three main types of symbols play substantial roles in the thinking of students and adults: symbols representing words, symbols representing quantities, and symbols representing spatial, geometric or figural patterns. In this test, separate batteries have been provided to assess competence in working with two of the three types of symbols. The set of two scores derived from the batteries provide a profile showing the level and pattern of each student's abilities. Knowledge of areas of relative strength and weakness help the individual, his/her parents, and the school to use strengths most effectively or to compensate for areas of weakness.

Verbal Battery. The Verbal Battery is made up of the following four subtests: Vocabulary, Sentence Completion, Verbal Classification and Verbal Analogies. Although an individual's performance obviously does depend upon his/her store of verbal concepts, the items included in each subtest have been written to make demands primarily upon the individual's flexibility in using his/her concepts. The test battery is designed to appraise relational thinking when the relationships are formulated in verbal terms.

Since the bulk of education is presented through verbal symbolism, the relevance of a verbal test for educational prognosis and diagnosis is clear. Tests of verbal reasoning have always been among the best predictors of educational progress.

Nonverbal Battery. The Nonverbal Battery consists of the following three subtests: Figure Classification, Figure Analogies, and Figure Synthesis. The items in the subtests of this battery involve neither words nor numbers, and the geometric or figural elements have little direc-

relationship to formal school instruction. The subtests emphasize discovery of, and flexibility in, manipulating relationships expressed in figural symbols or patterns.

The Nonverbal Battery measures more nearly what has been called "fluid intelligence," that is, ability that is not bound by formal school instruction. Where performance on this battery runs ahead of performance on the Verbal Battery, it may suggest potential that is not fully expressed in performance on school-related tasks.

Description of Comprehensive Tests of Basic Skills, Form S

The Comprehensive Tests of Basic Skills, Form S, serves as the West Virginia State-County Testing Program's measure of academic achievement, and measures what one has learned in specific instructional areas. The CTBS/S does not measure only those skills taught in the grade at which the test is administered, but measures skills learned throughout one's educational as well as life experiences. Therefore, a student's performance on the test is dependent upon what has transpired in a student's formal and informal educational experiences prior to the administration of the test.

Rationale. The Comprehensive Tests of Basic Skills, Form S is a series of batteries for kindergarten through grade 12. A carefully formulated rationale formed the basis for each step in the development of the CTBS/S for levels 1 through 4. This rationale required that the tests measure systematically those skills prerequisite to studying and learning in subject-matter courses. CTBS/S is not intended to measure achievement in specific course content as reflected in textbooks for various grade levels. The tests are intended for use throughout the nation by students who have been taught according to various approaches. Test items should be answered as readily by students taught according to a traditional approach as by those who are taught according to any of the newer approaches. However,

performance on those tests necessarily depends on the possession of relevant knowledge and is affected by the grade level at which a skill is first introduced. It is assumed that all curricula are formulated to increase, through the grade levels, a student's competence in dealing with content of increasing difficulty. Those tests aim to measure, therefore, those skills common to all curricula.

The Process/Content Classification System. The objectives of the tests are classified under five broad intellectual processes: Recognition, Translation, Interpretation, Application, and Analysis. The emphasis in the process dimension is on the measurement of comprehension and application of concepts and principles rather than on the measurement of knowledge per se. Within each broad classification are categories expressed in terms of specific intellectual activities; e.g., in Test 2, Reading Comprehension, under "Interpretation," one specific category is "identification of the main idea." Every item in each test is classified in this manner. In addition, the items are classified according to the content, or setting, in which the specific intellectual activity is measured. The student may need to "identify the main idea" of a sentence, paragraph, article, or poem. The items in each of the six skills areas of the CTBS/S measure the following: (1) the ability to recognize or recall information, (2) the ability to translate or convert concepts from one kind of language (verbal or symbolic) to another, (3) the ability to comprehend concepts and their interrelationships, (4) the ability to apply techniques, including performing fundamental operations, and (5) the ability to extend interpretation beyond stated information. See the CTBS, Expanded Edition, Test Coordinator's Handbook for the complete rationale and the classification of each item in all batteries.

Development of CTBS/S. For each level of CTBS/S, test items were written by teachers of the appropriate grades in cooperation with curriculum and testing specialists. Reading passages were written or selected by the item writers. Additional items for the expanded edition were written by curriculum specialists and CTB/McGraw-Hill staff. This process helped ensure that the items were well constructed in the language of the students and appropriate in complexity to the grade levels for which the tests were designed. All levels of the test were reviewed by content specialists who provided both overall and item-by-item reviews.

It is recognized that some items in each level measure skills that have not been taught in the lowest grade within that level. Standardized testing presents a different situation from classroom testing. Students are expected to be able to answer all items correctly on a classroom test, but this cannot be true for a standardized test covering broad content areas and intended for use in several grades. Norms provide for the differences in expectations for different grades. The overlapping of batteries at grades 4, 6 and 8 in Levels 1 through 4 means that maximum discrimination is necessary only over two grades for any one group of students. For example, slower students might take Level 1 at Grade 4 and Level 2 at Grade 6, while more able students would take Level 2 at Grade 4 and Level 3 at Grade 6.

Description of the Tests. The complete battery book contains tests in six basic skills areas: Reading, Language, Mathematics, Reference Skills, Science and Social Studies. The six areas are divided into ten separately timed tests.

1. Test 1 - Reading Vocabulary. Test 1 contains 40 items, each of which consists of a stem phrase and four discrete words for alternatives. The selection of words of appropriate difficulty was based on A Revised Core Vocabulary: A Basic Vocabulary for Grades 1-8; An Advanced Vocabulary for

Grades 9-12, by Stanford E. Taylor, Helen Frackenpohl, and Catherine E. White (Huntington, NY: Educational Development Laboratories, 1969). The student's task is to choose the synonym for the underlined word in the phrase.

Use of a stem word in a phrase parallels the way in which a learner is exposed to new vocabulary and, more broadly, the way language "works." The use of a phrase as context provides a mental image for the student and helps him/her to recognize the stem word as familiar. However, even though the stem word is placed in the context of a phrase, the vocabulary test is a measure of the student's knowledge of the denotative meaning, or dictionary definition, of the word.

The skill of defining a word in the context of a phrase is quite different from the skill of actually determining word meanings through context. To demonstrate the skill of determining word meaning from context, the student must be able to use context clues; specifically, direct definition, restatement, example, explanation, and comparison or contrast. The context of a whole sentence, sometimes even a paragraph, must be used to determine the meaning of an unknown word. Thus, the item that measures ability to determine word meaning through context must be a whole sentence and one that expresses a complete thought. Such items are included in Test 5, Language Expression.

2. Test 2 - Reading Comprehension. Test 2 contains 45 items based on seven reading selections. Some reading passages portray feelings and situations universally experienced by young people; other passages present enriching informative materials. The test items measure specific skills in both literal and critical comprehension. More than one-half of the items in this test measure skills in critical comprehension.

3. Test 3 - Spelling. Each word that the student is required to consider is placed in the context of a sentence. The rationale for this format is threefold: (1) Spelling words are taught in a meaningful context, (2) Recognition of a spelling error is a skill that students would apply to proofreading their own written material (i.e., a context), and (3) Homonyms and other easily confused words represent important content in a spelling program, but can be tested only in the context of a sentence.

All misspellings in Test 3 are common among students. Furthermore, each alternative in an item measures a specific spelling rule. From the student's wrong responses, the teacher can ascertain which rules the student needs to master.

The words included in each level of Test 3 were carefully selected to represent spelling rules widely taught at that level. Basic Goals in Spelling, by W. Kottmeyer and A. Klaus, a text series used by over half the school children in the nation, was used at each level of the CTBS/S. Basic Spelling Skills: A Program for Self-Instruction, by Learning Technology Incorporated, was also used as a guide in word selection at some levels. A Revised Core Vocabulary, by EDL/McGraw-Hill, was used in choosing words appropriate in difficulty for each level.

4. Test 4 - Language Mechanics. Test 4 contains 20 items, of which 10 measure punctuation skills and 10 measure capitalization skills. The skills are tested with discrete sentences instead of a reading passage for two reasons: (1) Testing knowledge of punctuation and capitalization rules through the use of a passage would only complicate the task; and (2) a writer decides which capitalization or punctuation rule applies, sentence by sentence, except for comparatively rare uses of the semicolon and colon. Discrete sentences minimize the effect that difficulty in reading comprehension might have on a student's performance on a test of mechanics.

If a student's performance on this test of language mechanics is unsatisfactory, it might be an indication that he/she needs to learn not only the rule of mechanics per se, but also the principles of English sentence structure and what constitutes an idea phrase within a sentence.

5. Test 5 - Language Expression. Test 5 contains sets of items that measure various aspects of effective expression: standard English usage; diction; English syntax (grade 3); economy and clarity of expression (grades 6, 9, and 11); and skill in organization.

Organizational skills are measured in two ways. For some items the student must read a brief paragraph to determine which of four transition, or connecting, words reflects the relationship in thought between two sentences. Transition words are important in writing, for they reflect one's ability to organize one's thoughts effectively. Other items require the student to examine several four-sentence paragraphs, in which the sentences are not in proper sequence, to determine their correct order.

6. Test 6 - Mathematics Computation. Test 6 consists of 48 items in addition, subtraction, multiplication, and division. These four fundamental mathematics operations are measured by 12 items each. Within each section, the 12 items are ordered according to increasing difficulty. No separate scores are reported for the four sections; only the total score for Test 6 is normed.

7. Test 7 - Mathematics Concepts and Applications. The 50 items in Test 7 measure the student's ability to recognize concepts, choose appropriate problem-solving operations, and carry out such operations.

The 25 concepts items measure the student's ability to convert concepts expressed in one numerical, verbal, or graphic form to another form, and to comprehend numerical concepts and their interrelationships.

The 25 application items measure the student's ability to select and carry out problem-solving operations.

Separate scores are reported for each section.

8. Test 8 - Reference Skills. Test 8 consists of 20 items which measure the ability to use reference materials and to follow library procedures.

This test assumes that the student has had a library available and has received instruction in its use. Because not all schools have library facilities, the score of this test is not included in the Total Basic Skills score.

9. Test 9 - Science. Test 9 is comprised of items which assess the student's ability to investigate problems in science and, to a lesser degree, to recall scientific facts and concepts. Investigative skills measured are the abilities to classify objects or phenomena, to measure or quantify data, to recognize a trend in data, to predict the outcome of a trend in data, to recognize a valid hypothesis drawn from data presented, and to analyze an experimental design. The student demonstrates these skills by interacting with data presented in charts, diagrams, drawings, graphs, and written passages. The items are distributed across the various content areas of the physical and life sciences.

10. Test 10 - Social Studies. The items in Test 10 measure the student's grasp of concepts, generalizations, and inquiry skills necessary for effective problem solving in social studies. These skills are tested in settings drawn from the four content areas of physical environment, social environment, political/economic environment, and history. The student is required to recall specific information, to read maps and other graphic materials, to interpret verbal material, to select and evaluate research designs, to distinguish fact from opinion, and to employ formal logic in problem solving.

The following terms are presented and defined so that the reader may better understand the information contained within this report. The definitions of the terms are consistent throughout this document.

DEFINITIONS

1. Ability: The measurement of one's ability to learn school-related material in a typical classroom setting at this particular point in time.
2. Achievement: The measurement of what one has learned in specific instructional areas throughout one's educational experience.
3. Expanded Standard Scale Score: An equal interval scale score with no intrinsic meaning. This score cannot be compared between different subtest and subject areas. Items used for estimating the growth of a class over time. (See Section VI for further discussion of this term.)
4. Frequency Distribution: A tabulation of scores from high to low, or low to high, showing the number of individuals that obtain each score or fall in each score interval.
5. Mean: The sum of a set of scores divided by the number of scores; the average.
6. Median: The middle score in a distribution; the 50th percentile; the point that divides the group into two equal parts. Half of the scores fall below the median and half above it.
7. N Count: The number of cases in a distribution, study, etc.
8. Norm: The standard to which students' results are compared and from which percentile rank and stanines are determined.
9. Percentile: A point (score) in a distribution below which falls the percent of cases indicated by the given percentile. Thus, the 15th percentile denotes the score or point below which 15% of the scores fall. "Percentile" says nothing about the percent of correct answers an examinee has on a test.

10. Projected Score: A score expressed in Expanded Standard Scale Score units which represents an estimate of the expected achievement level of the same group of students from one testing period to another.

11. Raw Score: The total number of correct answers obtained by a student on a subtest. This information appears only on the Roster Report.

12. Standard Deviation: A measure of the variability or dispersion of a set of scores about the mean. The more the scores cluster around the mean, the smaller the standard deviation.

13. Stanine: A standard score scale of nine units with a mean of 5 and a standard deviation of 2. This score appears on the Student Label, the Student Test Record and the Roster Report.