THE UNIVERSITY OF OKLAHOMA

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THE EFFECT OF INTELLIGENCE ON THE SCHOLASTIC ACHIEVEMENT

OF SIXTH-GRADE CHILDREN OF COMPARABLE

SOCIO-ECONOMIC STATUS

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THE EFFECT OF INTELLIGENCE ON SCHOLASTIC ACHIEVEMENT

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CHAPTER I

THE PROBLEM: ITS BACKGROUND AND SCOPE

Introduction

Today, as never before, there is a tremendous need
for a better understanding, on the part of educators, parents
and interested laymen, of factors which influence the scho-
lastic achievement level attained by elementary school
children. As our society becomes more complex, this need
increases in disproportionate amounts. If we are to sustain
our American culture, we must explore every channel possible
in an effort to obtain information which will contribute to
the optimum development of each individual.

Numerous studies have been conducted with various age
groups which indicate that, with intelligence held constant,
socio-economic factors do make a significant difference in
scholastic achievement and future success. However, no valid
studies have been conducted in recent years on the scholastic
achievement level attained by different groups of subjects

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differing in intelligence but matched on socio-economic

factors at upper-, middle-, and lower-status levels.[1]

McClelland states that:

> since probably no other single assumption is so widely
> held among both scientists and laymen as that intelli-
> gence, as such, regardless of background, is linearly
> associated with success both in school and in life,
> the importance of clarifying the whole issue is
> crucial.[2]

This study is an attempt to clarify at least a seg-

ment of this problem. Because of the scope of the entire

problem it has been limited to the sixth-grade level. The

clarification of this problem will provide for a better

understanding in regard to factors influencing the scholastic

achievement of children.

Statement of the Problem

This study is concerned with the problem, What is

the effect of intelligence on the scholastic achievement of

sixth-grade children of comparable socio-economic status?

The purpose of this study is to determine whether or

not there are significant differences in achievement between

groups matched on the basis of socio-economic status but

differing in intellectual ability. A general hypothesis is

established: that in the upper-, middle-, and low-socio-

economic status groups there are no significant differences

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[1]David C. McClelland et al., Talent and Society
(Princeton: D. Van Nostrand Company, Inc., 1958), p. 14.

[2]Ibid.

between the high- and medium-, high- and low-, and medium-
and low-intellectual ability groups in reading, arithmetic,
language, and total achievement. The general hypothesis
includes thirty-six specific hypotheses. The experiment
involves the testing of the following specific hypotheses.

1. There is no significant difference in reading
achievement between the high- and the medium-intellectual
ability groups on the upper-socio-economic status level.

2. There is no significant difference in reading
achievement between the high- and the low-intellectual
ability groups on the upper-socio-economic status level.

3. There is no significant difference in reading
achievement between the medium- and the low-intellectual
ability groups on the upper-socio-economic status level.

4. There is no significant difference in arithmetic
achievement between the high- and the medium-intellectual
ability groups on the upper-socio-economic status level.

5. There is no significant difference in arithmetic
achievement between the high- and the low-intellectual
ability groups on the upper-socio-economic status level.

6. There is no significant difference in arithmetic
achievement between the medium- and the low-intellectual
ability groups on the upper-socio-economic status level.

7. There is no significant difference in language
achievement between the high- and the medium-intellectual
ability groups on the upper-socio-economic status level.

8. There is no significant difference in language achievement between the high- and the low-intellectual ability groups on the upper-socio-economic status level.

9. There is no significant difference in language achievement between the medium- and the low-intellectual ability groups on the upper-socio-economic status level.

10. There is no significant difference in total achievement between the high- and the medium-intellectual ability groups on the upper-socio-economic status level.

11. There is no significant difference in total achievement between the high- and the low-intellectual ability groups on the upper-socio-economic status level.

12. There is no significant difference in total achievement between the medium- and the low-intellectual ability groups on the upper-socio-economic status level.

13. There is no significant difference in reading achievement between the high- and the medium-intellectual ability groups on the middle-socio-economic status level.

14. There is no significant difference in reading achievement between the high- and the low-intellectual ability groups on the middle-socio-economic status level.

15. There is no significant difference in reading achievement between the medium- and the low-intellectual ability groups on the middle-socio-economic status level.

16. There is no significant difference in arithmetic achievement between the high- and the medium-intellectual

ability groups on the middle-socio-economic status level.

17. There is no significant difference in arithmetic achievement between the high- and the low-intellectual ability groups on the middle-socio-economic status level.

18. There is no significant difference in arithmetic achievement between the medium- and the low-intellectual ability groups on the middle-socio-economic status level.

19. There is no significant difference in language achievement between the high- and the medium-intellectual ability groups on the middle-socio-economic status level.

20. There is no significant difference in language achievement between the high- and the low-intellectual ability groups on the middle-socio-economic status level.

21. There is no significant difference in language achievement between the medium- and the low-intellectual ability groups on the middle-socio-economic status level.

22. There is no significant difference in total achievement between the high- and the medium-intellectual ability groups on the middle-socio-economic status level.

23. There is no significant difference in total achievement between the high- and the low-intellectual ability groups on the middle-socio-economic status level.

24. There is no significant difference in total achievement between the medium- and the low-intellectual ability groups on the middle-socio-economic status level.

25. There is no significant difference in reading achievement between the high- and the medium-intellectual ability groups on the low-socio-economic status level.

26. There is no significant difference in reading achievement between the high- and the low-intellectual ability groups on the low-socio-economic status level.

27. There is no significant difference in reading achievement between the medium- and the low-intellectual ability groups on the low-socio-economic status level.

28. There is no significant difference in arithmetic achievement between the high- and the medium-intellectual ability groups on the low-socio-economic status level.

29. There is no significant difference in arithmetic achievement between the high- and the low-intellectual ability groups on the low-socio-economic status level.

30. There is no significant difference in arithmetic achievement between the medium- and the low-intellectual ability groups on the low-socio-economic status level.

31. There is no significant difference in language achievement between the high- and the medium-intellectual ability groups on the low-socio-economic status level.

32. There is no significant difference in language achievement between the high- and the low-intellectual ability groups on the low-socio-economic status level.

33. There is no significant difference in language achievement between the medium- and low-intellectual ability

groups on the low-socio-economic status level.

34. There is no significant difference in total achievement between the high- and medium-intellectual ability groups on the low-socio-economic status level.

35. There is no significant difference in total achievement between the high- and low-intellectual ability groups on the low-socio-economic status level.

36. There is no significant difference in total achievement between the medium- and low-intellectual ability groups on the low-socio-economic status level.

Operational Definitions

1. Intelligence is considered as those factors measured by the California Test of Mental Maturity, upon results of which subjects can be divided into three intellectual ability groups defined in the following manner.

   a. The high-intellectual ability group consists of those subjects whose IQ scores are 116 and above.

   b. The medium-intellectual ability group consists of those subjects whose IQ scores are within the 94-107 range.

   c. The low-intellectual ability group consists of those subjects whose IQ scores are 85 and below.

The California Test of Mental Maturity is being used in this study because of its widespread use in the Oklahoma City Public School System, and elsewhere. In addition, the

coefficient of reliability for the <u>California Test of Mental Maturity</u>, Elementary Form, is .95. The validity of the test is given in terms of its correlation with other intelligence tests since there are no purely objective criteria for establishing the validity of an intelligence test, and this is an accepted method for determining validity of such a test. According to Belden, the correlation between the <u>Stanford-Binet Intelligence Test</u> and the <u>California Test of Mental Maturity</u> is .84. Topetzes indicates a correlation of .85 between the <u>Wechsler-Bellevue Intelligence Test</u> and the <u>California Test of Mental Maturity</u>. These correlations indicate the high degree of validity of the <u>California Test of Mental Maturity</u> since individual tests such as the <u>Stanford-Binet</u> and the <u>Wechsler-Bellevue</u> are the most reliable and valid measures of intelligence yet developed.[1]

Personnel administering the tests to the subjects used in this study are counselors and principals approved by the Director of Testing, Department of Pupil Services, in the Oklahoma City Public School System. Tests are scored by machine.

2. Scholastic achievement is represented by the raw scores in reading, arithmetic, language, and the total achievement scores obtained by use of the <u>California</u>

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[1]California Test Bureau, Division of Professional Services, <u>Summary of Investigations on the California Test of Mental Maturity</u> (Los Angeles: California Test Bureau, 1956), pp. 6-10.

Achievement Test.

      3. Socio-economic status refers to the position occupied by the subjects when the social and economic factors are considered in reference to the prevailing average standards. The three socio-economic status groups are the low, middle, and high.

<h2 style="text-align:center">Limitations of the Study</h2>

      No attempt is being made to evaluate attitudinal factors of the home, differences in outside activities of the subjects, differences in school environment or effectiveness of teaching experienced by the different subjects included in the study. In addition, no attempt is being made to determine whether or not differences exist between different ethnic groups and different religious groups. Also, the findings of the present study are reliable only to the extent that:

      1. Teaching methods and teacher effectiveness are uniform enough so as to not be responsible factors for any significant differences in achievement.

      2. The modified form of the Questionnaire By Which Socio-Economic Information Was Secured From Parents is an appropriate instrument to use to obtain information for determining the socio-economic status of the subjects.

      3. The entire procedure for determining socio-economic status is appropriate and effective.

CHAPTER II

REVIEW OF EIGHT SELECTED RESEARCH STUDIES

A review of studies related to the problem indicated that there was a large number of studies related to the problem of achievement on all grade levels and which took into consideration a multitude of factors which have an influence on the achievement level attained by children in the public schools. However, most of the studies which compared achievement considered either the socio-economic status or the intellectual ability of the subjects. In general, no effort was made to hold constant the socio-economic status and test for significance of difference in achievement between different intellectual ability groups. Because of the multitudinous number of studies on achievement it would be impractical to review all of them in this study. Eight of the most directly related studies have been selected for review.

Line and Glen made a study in 1932 with 524 children in Grades III to VII at Regal Road Public School, Toronto, Canada. The study dealt with the relationship between intelligence and achievement in the public schools. The

National Intelligence Test was administered to determine the intellectual ability of the children and the examination grades for the months of October and December were averaged for use as the achievement level attained by the pupils. Coefficients of correlation were calculated between the scores of the intelligence tests and the school marks by grades. The following values were obtained:

Grade	No. of Pupils	r
VII	124	.47
VI	91	.15
V	119	.39
IV	129	.46
III	61	.57

The correlations indicated a positive relationship between intelligence and school marks of the children. In addition, Line and Glen checked records of behavioral problems to determine whether or not there was a relationship between this and achievement. In general, it was found that the lower the correlation between intelligence and achievement, the greater the number of behavioral problems. This was interpreted to reflect the disinterest in school work as a lack of motivation. The conclusion was that more should be done to provide adequate motivation as the period of puberty approaches.[1]

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[1]W. Line and J. S. Glen, "Some Relationships between Intelligence and Achievement in the Public Schools," Journal of Educational Research, XXXIII (April, 1935), 582-87.

In 1935 Collins and Douglass made a study with 146 pupils of superior ability in the Northeast Junior High School in Kansas City, Kansas. Each of the superior pupils had an intelligence quotient of 110 or higher. The students were divided into three groups on the basis of their school marks. Twenty-seven of them were placed in the failure group because they were failing in at least one major subject or were receiving school marks that averaged no higher than the lowest passing mark. Twenty-seven were placed in the success group because they were receiving school marks which were considered superior. The average group consisted of ninety-two students who were receiving average school marks. The socio-economic status of each of the subjects was determined by the Sims Score Card. Of the failure group only 37.0 per cent of them came from homes of above average socio-economic status. Of the average group 50.0 per cent came from homes of above average socio-economic status. And 81.4 per cent of those in the success group came from homes of above average socio-economic status. The results indicate that a marked relationship exists between the socio-economic status of the subjects and their success in school. The more superior the home conditions the greater the success in school.[1]

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[1]Joseph H. Collins and Harl R. Douglass, "The Socio-Economic Status of the Home as a Factor in Success in the Junior High School," Elementary School Journal, XXXVIII (October, 1937), 107-13.

In 1939 Allen conducted a study on 327 subjects in Grade IV from ten elementary schools in New Rochelle, New York. The purpose was to determine the relationship between the Kuhlmann-Anderson Intelligence Test, fourth-grade battery, and educational achievement as measured by the New Stanford Achievement Test, Form W. Numerous coefficients of correlation were computed between the subtests of both the Kuhlmann-Anderson Intelligence Test and the New Stanford Achievement Test. However, the correlations of significance to this study are those which exist between the IQ score derived from the intelligence test and the scores on the subtests of the achievement test. These correlations are as follows:[1]

Stanford Achievement Test	Kuhlmann-Anderson Test r
Paragraph Meaning	.68
Word Meaning	.61
Reading Average	.68
Arithmetic Reasoning	.65
Arithmetic Computation	.53
Arithmetic Average	.66
Spelling	.62
Total Achievement Score	.74

The results of the comparisons indicated a positive relationship between the intelligence of a fourth-grade pupil and the level of academic achievement. The greater the intellectual ability the greater the achievement.

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[1]Mildred M. Allen, "Relationship between Kuhlmann-Anderson Intelligence Test and Academic Achievement in Grade IV," Journal of Educational Psychology, XXXV (April, 1944), 229-39.

Coleman conducted a study in 1940 on 18,000 subjects from 43 states. The subjects were 7th, 8th, and 9th grade students. The purpose was to analyze the relationships, if any, between socio-economic status and the factors of chronological age, intelligence, school achievement, and personality and interest manifestations of junior high school pupils. IQ's were determined by the <u>Kuhlmann-Anderson Tests</u>, and the achievement scores by the <u>Unit Scales of Attainment</u> battery. Personality adjustment scores were obtained from the <u>B.P.C. Personal Inventory</u>. Teachers secured the data for extracurricular activities and hobbies. Subjects were divided into the high-, normative-, and low-socio-economic status groups by use of the <u>Sims Socio-Economic Score Card</u>. Critical ratios were computed between these groups on intelligence, reading, geography, and history. Results indicated that significant differences exist between all of the groups. Results were consistently in favor of the group highest in socio-economic status. In addition, children from the higher socio-economic group were consistently younger, higher in problem-solving ability, less maladjusted, involved in a greater number of hobbies, and participated to a greater extent in extracurricular activities. These results indicate a reasonable basis for anticipating differences in intelligence and achievement when

groups are radically different in socio-economic status.[1]

Bryan's study in 1941 was conducted on 169 subjects in the intermediate grades in one elementary school in a city of about fifty-thousand inhabitants. The socio-economic status of the subjects was determined by use of the Sims Score Card. The mental ability of the subjects was determined by use of the Otis Self-administering Test of Mental Ability. The Metropolitan Achievement Test was administered to determine the level of achievement attained by the subjects. In addition, the grades of the subjects were averaged for purposes of comparison. The results of the study indicated that the subjects who were highest in socio-economic status were also the highest in IQ, achievement, and school marks, and as the socio-economic status of the subjects decreased from high to low there was a marked decrease in IQ, achievement, and school marks. Correlations were also computed between the results of the various measures. Correlations found were:[2]

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[1]Hubert A. Coleman, "The Relationship of Socio-Economic Status to the Performance of Junior High School Students," Journal of Experimental Education, IX (September, 1940), 61-63.

[2]Ruth Bryan, "A Study of the Relationship between Socio-economic Status and Scholastic Achievement," Unpublished Master's thesis, University of Iowa, 1941, pp. 97-104.

Sims Score and:	r
School marks	.56
Otis IQ	.49
Metropolitan EQ	.59
School marks with IQ held constant	.35
Otis IQ and school marks	.68
Otis MA and Metropolitan Scores	.70

In 1941 Shaw also conducted a study to determine the relationship of socio-economic status to scholastic achievement. Shaw's study used 280 pupils in the 4th, 5th, 6th, 7th, and 8th grades of the public schools in Sheldon, Iowa. Shaw found correlations between measuring instruments as follows:

	r
Sims Scores and EQ	.41
Sims Scores and Stanford Achievement Scores	.39
Sims Scores and Average School Marks	.38
Sims Scores and Grade Placement Quotients	.37
Sims Scores and IQ	.32
Sims Scores and EQ (Intelligence test scores partialed out)	.27
EQ and Intelligence Test Scores	.80

Shaw also found that:

when the total group was divided into fourths and ranked from high to low according to socio-economic status, the mean educational achievements of the sub-groups ranked in the same order as the socio-economic status.[1]

Gough conducted a study based on 127 sixth-grade students in three of the six elementary schools in St. Cloud, Minnesota. The variables considered were:

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[1]Duane C. Shaw, "The Relation of Socio-Economic Status to Educational Achievement in Grades Four to Eight," Journal of Educational Research, XXXVII (November, 1942), 197-201.

(1) socio-economic status, as measured by the <u>American Home Scale</u>; (2) age in months; (3) Intelligence, as indicated by the <u>Haggerty Delta II Intelligence Test</u>; (4) vocabulary, as determined by the <u>O'Rourke Survey Test of Vocabulary</u>; (5) arithmetic achievement, as measured by the <u>Stanford Achievement Test</u>, Intermediate Arithmetic; (6) reading ability, as indicated by the <u>Iowa Silent Reading Test</u>; (7) language ability, as given by the <u>Language Essentials Test</u>; (8) health information, as determined by the <u>Orleans-Sealy Health Information Test</u>; and (9) personality adjustment, as measured by the <u>Brown Personality Inventory for Children</u>.[1]

The three schools selected for special comparison were the highest, lowest, and the median school on the socio-economic status continuum. Comparison of the high status school with the low status one revealed a difference, significant at the .01 level, in favor of the high status school on vocabulary. The differences in intelligence, age, and reading between these two schools were all significant at the .05 level, in favor of the high status school. Other differences between the two schools were not significant. The only significant difference between the high and average status schools was in status and vocabulary which was significant at the .01 level. The significant differences between the average and the low status schools were in status and reading which were significant at the .05 level.[2]

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[1]Harrison G. Gough, "The Relationship of Socio-Economic Status to Personality Inventory and Achievement Test Scores," <u>Journal of Educational Psychology</u>, XXXVII (1946), 533.

[2]<u>Ibid.</u>, pp. 533-37.

The study which was the most closely related to the present study was the one made by Garrison with subjects in the first grade. It consisted of pairing thirty-eight subjects with respect to mental age, chronological age, and sex, but with a significant differential score for each pair on the socio-cultural scale. The results of the <u>Sangren Information Test for Young Children</u> indicated that the higher socio-economic group made an average score of 141.1 as compared to an average score of 118.4 for the lower-socio-economic status group. Then Garrison compared thirty-three pairs of subjects matched on the basis of socio-economic status, chronological age, and sex, but with a significant differential score for each member of each pair in mental age. The results of this grouping indicated that the group with the higher mental age had an average achievement score of 134.7 as compared with an average achievement score of 124.1 for the lower mental age group.

The average difference on the information test between groups differentiated on the basis of socio-economic status was 22.7 points, and the average difference between groups differentiated on the basis of mental age was 10.6 points.

Garrison commented that:

one cannot generalize from this study made with first-grade children that more mature subjects would give the same results. Certainly such factors as specialized training, maturity, social institutions, customs, and traditions would each have its influence in

affecting the relationships thus found.[1]

The results of the studies cited here indicate that a very definite relationship exists between socio-economic status, intelligence, and scholastic achievement. In general, it was found in these studies that the higher the socio-economic status level of the subjects the greater the achievement. And as the socio-economic status decreased from high to low the achievement level showed the same decrease.

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[1]K. C. Garrison, "The Relative Influence of Intelligence and Socio-cultural Status upon the Information Possessed by First-Grade Children," _Journal of Social Psychology_, III (1932), 362-67.

CHAPTER III

PROCEDURE OF THE STUDY

The Population

The study is designed to investigate differences in
achievement between groups matched on the socio-economic
basis and differing in intellectual ability. Because of
the magnitude of the problem it is limited to sixth-grade
children in the Oklahoma City Public School System during
the 1958-59 school year. There are 79 elementary schools in
the Oklahoma City Public School System with an approximate
enrollment of 5,300 sixth-grade students. Thirty-three
elementary schools (see Appendix B for a list of partici-
pating schools), with a total enrollment of 2,623 sixth-
grade students, serve as a cross section of the school dis-
trict. It is anticipated that these thirty-three schools
are enough to provide an ample supply of subjects for each
of the established categories. The elementary schools
selected represent all levels of students in terms of socio-
economic status, ranging from the "socially elite" to the
"socially deprived."

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Selection of Subjects

In selecting the subjects the first step was to
determine the socio-economic status of each of the 2,623
subjects. The socio-economic status of each of the subjects
was determined with respect to four characteristics:
(1) Occupation, (2) Education, (3) House type, and (4) Dwell-
ing area. A questionnaire (see sample in Appendix A) was
used to obtain information for making the ratings on the
occupational and educational characteristics. The question-
naire utilized was a modified form of the Questionnaire By
Which Socio-economic Information Was Secured From Parents
prepared by Eells and others.[1] Ratings were made on the
house type and dwelling area characteristics by a personal
observation of the house in which each subject resided and
the section of the city in which the dwelling was located.
Each of the four characteristics were rated on a seven-point
scale which ranges from "1"--very high status value, to "7"
--very low status value. The ratings on the four character-
istics were then combined into a single numerical index. A
total score within the range of 4 to 12 was used to desig-
nate the upper-socio-economic status subjects. A total
score within the range of 13 to 20 designated the middle-
socio-economic status subjects. Those with a total score

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[1]Kenneth Eells et al., Intelligence and Cultural
Differences (Chicago: The University of Chicago Press,
1951), p. 363.

within the range of 21 to 28 were classified as low-socio-
economic status subjects.[1] This method is an adaptation of
a more comprehensive method for determining socio-economic
status described by Warner, Meeker, and Eells.[2]

To obtain the information desired on the question-
naires, principals of the participating elementary schools
sent the questionnaires home with the students for comple-
tion by the parents. In some instances the information was
obtained from the students while at school. Of the 2,623
questionnaires sent out 2,071, or 79 per cent, were returned.

In order to hold constant some variables which have
been found to have an effect on scholastic achievement the
following additional criteria were employed in the selection
of eligible subjects:

1. Only subjects of the Caucasian race were se-
lected;

2. Only subjects who had no school record of
serious emotional maladjustment were selected. This was
determined by an investigation of the records of the De-
partment of Pupil Services;

3. Only subjects who had attended the same elemen-
tary school the previous year were selected;

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[1]Ibid., pp. 90-101.

[2]Lloyd W. Warner, Marchia Meeker, and Kenneth
Eells, Social Class in America (Chicago: Science Research
Associates, 1949), pp. 121-75.

4. Only subjects whose parents were not foreign born were selected; and

5. Only subjects for whom test data were complete were selected.

Table 1 shows a complete analysis of the number eliminated and the bases for elimination.

TABLE 1

SUBJECTS INELIGIBLE FOR SELECTION

Reason for Elimination	Eliminated	
	Number*	Per cent
Other than Caucasian	58	2.8
Serious emotional maladjustment	2	0.1
Did not attend same school previous year	295	14.2
Foreign-born parents	36	1.7
Incomplete data on subjects	268	12.9

*Number eliminated not additive because some subjects were eliminated for not meeting more than one requirement.

In addition to these criteria for selection, the subjects had to meet one additional criterion. This additional criterion was that their IQ score had to fall in the range designated for one of the intellectual ability groups. The high-intellectual ability group consisted of

those with IQ's of 116 and above. The medium-intellectual

ability group consisted of those with IQ's between 94-107.

The low-intellectual ability group consisted of those with

IQ's of 85 and below. This provided a range of 8 points

between the intellectual ability groups. This range of 8

points between the intellectual ability groups was provided

in order to take into consideration the standard error of

measurement of the test. The standard error of measurement

for the total mental factors is 3.5 points.[1]

After all of these factors were taken into account,

there were 1,066 subjects who met all requirements to be

eligible for selection. A distribution on the bases of

intellectual ability and socio-economic status of all sub-

jects eligible for selection is given in Table 2.

From the 1,066 eligible subjects an attempt was made

to select a maximum of fifty subjects for each of the nine

established groups. Each group was to have an equal number

of boys and girls. The final selection of subjects was made

by use of a table of random numbers. Because of the limited

number of eligible subjects in some of the groups, it was

impossible to have the desired number in each group.

Table 3 provides a final distribution of the sub-

jects selected for use in the study.

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[1]Elizabeth T. Sullivan, Willis W. Clark, and Ernest
W. Tiegs, Manual for California Short-form Test of Mental
Maturity, Elementary, 1950 S-Form (Los Angeles: California
Test Bureau, 1950), p. 4.

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TABLE 2

DISTRIBUTION ON THE BASES OF INTELLECTUAL ABILITY AND SOCIO-
ECONOMIC STATUS OF SUBJECTS ELIGIBLE FOR SELECTION

| Intellectual Ability (IQ) | Socio-economic Status | | | | | | Totals |
| | Upper | | Middle | | Low | | |
	N	%	N	%	N	%	
High 116 and above	316	54	241	42	23	4	580
Medium 94 - 107	94	24	229	58	69	18	392
Low 85 and below	15	16	42	45	37	39	94
Totals	425	40	512	48	129	12	1066

TABLE 3

DISTRIBUTION OF SUBJECTS SELECTED FOR PURPOSES
OF COMPARISON OF ACHIEVEMENT

| Intellectual Ability (IQ) | Socio-economic Status | | | Totals |
	Upper	Middle	Low	
High 116 and above	50	50	22	122
Medium 94-107	50	50	50	150
Low 85 and below	14	40	34	88
Totals	114	140	106	360

Instruments of Measure

Various measuring instruments were utilized to determine intellectual ability, scholastic achievement, and socio-economic status. Instruments used were:

1. The <u>California Short-Form Test of Mental Maturity</u>, Elementary, 1950 S-Form, was used to determine the intellectual ability on the basis of the IQ score. This test was administered in April, 1959 by personnel of the Oklahoma City Public School System and the results were made available by the Department of Pupil Services.

2. The <u>California Achievement Test</u>, Elementary, Forms AA and BB, was used to determine the scholastic achievement of the subjects. This test was administered in October, 1958, by personnel of the Oklahoma City Public School System and the raw score data (see Appendix C for raw score data) were obtained from students' test profile sheets retained by each of the elementary schools.

3. The modified form of the <u>Questionnaire By Which Socio-economic Information Was Secured From Parents</u> which was used to determine the socio-economic status of the students has previously been discussed.

Treatment of the Data

The data for each of the subjects consisted of the raw scores in the areas of reading, arithmetic, language, and total achievement. In order to test the thirty-six

hypotheses, "t" tests were computed to determine whether or not there were significant differences in the means of the groups being compared in each hypothesis.

Prior to the computation of the "t" tests, Guilford points out the need for making F tests to determine if the variances of the two samples are homogeneous.[1] The application of F tests for homogeneity of variances and the results are presented in Appendix D. Several F ratios are significant which indicates that the variances for the groups compared are heterogeneous. This does not invalidate the application of the "t" test, for Edwards points out that where the variances are heterogeneous "t" tests can still be used by computing the variance of each mean separately instead of pooling the sums of squares from the two samples and the corresponding degrees of freedom.[2] Formulas used for computing the "t" tests are listed in Appendix E.

Where appropriate the value of "t" required for significance was derived from the table with the corresponding number of degrees of freedom.[3] However, there are two exceptions to the use of the table for determining the value

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[1]J. P. Guilford, Fundamental Statistics in Psychology and Education (2d ed.; New York: McGraw-Hill Book Company, Inc., 1956), p. 221.

[2]Allen L. Edwards, Experimental Design in Psychological Research (New York: Rinehart and Company, Inc., 1950), pp. 167-68.

[3]Guilford, op. cit., pp. 538-39.

of "t" required for significance. These exceptions are:

1. When there are marked differences in the N's of
the samples being tested for significant difference of
means.[1]

2. When the obtained "t" value is close to the
borderline of significance when compared to the table value
of "t."[2]

When either of the above conditions exists it is
necessary to calculate a "t" value required for significance
which is a little more conservative than that obtained from
the table. The formula used to obtain this required value
of "t" when the above conditions exist is given in Formula 5,
Appendix E.[3]

[1]Edwards, op. cit., pp. 168-69.

[2]William G. Cochran and Gertrude M. Cox, Experimental Designs (New York: John Wiley and Sons, Inc., 1950), p. 92.

[3]Edwards, op. cit., pp. 168-69.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This study is concerned primarily with determining
if there are significant differences in achievement in the
areas of reading, arithmetic, language, and total achieve-
ment, between groups differing in intellectual ability but
matched on the basis of socio-economic factors. To accom-
plish this thirty-six hypotheses were established to be
tested. Hypotheses 1-12 are related to the upper-socio-
economic status group, hypotheses 13-24 are related to the
middle-socio-economic status group, and hypotheses 25-36
are related to the low-socio-economic status group. For
purposes of this study the required level of statistical
significance was set at the .05 level.

Upper-socio-economic Status Group

Hypothesis 1 is that there is no significant differ-
ence between the high- and medium-intellectual ability
groups in reading achievement. The obtained "t" value was
7.89 and the required value for significance was 1.98. This
is a statistically significant difference in favor of the
high-intellectual ability group. The hypothesis was rejected

and the difference in reading achievement was considered to
have occurred as a result of differences in the intellectual
ability of the two groups. The "t" ratios for the upper-
socio-economic group are presented in Table 5.

Hypothesis 2 is that there is no significant dif-
ference between the high- and low-intellectual ability
groups in reading achievement. The obtained "t" value was
6.63 and the required value for significance was 2.15. This
is a statistically significant difference in favor of the
high-intellectual ability group. The hypothesis was re-
jected and the difference in reading achievement was con-
sidered to have occurred as a result of differences in the
intellectual ability of the two groups.

Hypothesis 3 is that there is no significant dif-
ference between the medium- and the low-intellectual ability
groups in reading achievement. The obtained "t" value was
3.23 and the required value for significance was 2.14. This
is a statistically significant difference in favor of the
medium-intellectual ability group. The hypothesis was re-
jected and the difference in reading achievement was consid-
ered to have occurred as a result of differences in the
intellectual ability of the two groups.

Hypothesis 4 is that there is no significant dif-
ference between the high- and the medium-intellectual
ability groups in arithmetic achievement. The obtained "t"
value was 7.71 and the required value for significance was

TABLE 4

ANALYSIS OF DATA FOR THE UPPER-SOCIO-ECONOMIC STATUS GROUP

Area	Intellectual Ability Groups			Mean Diff.	SE$_{Diff.}$	"t"*
	High (N=50)	Medium (N=50)	Low (N=14)			
	Means					
Reading	118.1	100.1		18.0	2.28	7.89
	118.1		82.1	36.0	5.43	6.63
		100.1	82.1	18.0	5.58	3.23
Arithmetic	82.6	66.4		16.2	2.10	7.71
	82.6		48.1	34.5	1.84	18.75
		66.4	48.1	18.3	3.11	5.88
Language	61.3	51.8		9.5	1.31	7.23
	61.3		42.4	18.9	2.87	6.58
		51.8	42.4	9.4	2.93	3.21
Total	262.0	218.3		43.7	4.58	9.54
	262.0		172.7	89.3	9.96	8.97
		218.3	172.7	45.6	10.13	4.50

*All are significant at the .05 level.

1.98. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to differences in the intellectual ability of the two groups.

Hypothesis 5 is that there is no significant difference between the high- and the low-intellectual ability groups in arithmetic achievement. The obtained "t" value was 18.75 and the required value for significance was 2.14. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the differences in the intellectual ability of the two groups.

Hypothesis 6 is that there is no significant difference between the medium- and the low-intellectual ability groups in arithmetic achievement. The obtained "t" value was 5.88 and the required value for significance was 2.14. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to differences in the intellectual ability of the two groups.

Hypothesis 7 is that there is no significant difference between the high- and the medium-intellectual ability groups in language achievement. The obtained "t"

value was 7.23 and the required value for significance was
1.98. This is a statistically significant difference in
favor of the high-intellectual ability group. The hypothesis
was rejected and the difference in language achievement was
attributed to differences in the intellectual ability of the
two groups.

Hypothesis 8 is that there is no significant dif-
ference between the high- and the low-intellectual ability
groups in language achievement. The obtained "t" value was
6.58 and the required value for significance was 2.15. This
is a statistically significant difference in favor of the
high-intellectual ability group. The hypothesis was rejected
and the difference in language achievement was attributed to
differences in the intellectual ability of the two groups.

Hypothesis 9 is that there is no significant dif-
ference between the medium- and the low-intellectual ability
groups in language achievement. The obtained "t" value was
3.21 and the required value for significance was 2.14. This
is a statistically significant difference in favor of the
medium-intellectual ability group. The hypothesis was re-
jected and the difference in language achievement was at-
tributed to differences in the intellectual ability of the
two groups.

Hypothesis 10 is that there is no significant dif-
ference between the high- and the medium-intellectual
ability groups in total achievement. The obtained "t"

value was 9.54 and the required value for significance was 1.98. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the differences in the intellectual ability of the two groups.

Hypothesis 11 is that there is no significant difference between the high- and the low-intellectual ability groups in total achievement. The obtained "t" value was 8.97 and the required value for significance was 2.15. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the differences in the intellectual ability of the two groups.

Hypothesis 12 is that there is no significant difference between the medium- and the low-intellectual ability groups in total achievement. The obtained "t" value was 4.50 and the required value for significance was 2.14. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the differences in the intellectual ability of the two groups.

Middle-socio-economic Status Group

Hypothesis 13 is that there is no significant dif-
ference between the high- and the medium-intellectual
ability groups in reading achievement. The obtained "t"
value was 6.08 and the required value for significance was
1.98. This is a statistically significant difference in
favor of the high-intellectual ability group. The hypothe-
sis was rejected and the difference in reading achievement
was attributed to the difference in the intellectual ability
of the two groups. The "t" ratios for the middle-socio-
economic status group are given in Table 5.

Hypothesis 14 is that there is no significant dif-
ference between the high- and low-intellectual ability
groups in reading achievement. The obtained "t" value was
18.23 and the required value for significance was 2.02.
This is a statistically significant difference in favor of
the high-intellectual ability group. The hypothesis was
rejected and the difference in reading achievement was at-
tributed to the difference in the intellectual ability of
the two groups.

Hypothesis 15 is that there is no significant dif-
ference between the medium- and low-intellectual ability
groups in reading achievement. The obtained "t" value was
10.56 and the required value for significance was 2.02.
This is a statistically significant difference in favor of
the medium-intellectual ability group. The hypothesis was

TABLE 5

ANALYSIS OF DATA FOR THE MIDDLE-SOCIO-ECONOMIC STATUS GROUP

Area	Intellectual Ability Groups			Mean Diff.	SE Diff.	"t"
	High (N=50)	Medium (N=50)	Low (N=40)			
	Means					
Reading	116.2	99.0		17.2	2.83	6.08*
	116.2		58.2	58.0	3.18	18.23*
		99.0	58.2	40.8	3.86	10.56*
Arithmetic	77.7	66.3		11.4	5.70	2.00
	77.7		41.7	36.0	2.59	13.92*
		66.3	41.7	24.6	5.82	4.23*
Language	59.3	51.9		7.4	1.75	4.23*
	59.3		33.0	26.3	1.94	13.56*
		51.9	33.0	18.9	2.08	9.09*
Total	253.1	217.2		35.9	5.87	6.12*
	253.1		132.8	120.3	6.67	18.04*
		217.2	132.8	84.4	7.43	11.36*

*Denotes significance at the .05 level.

rejected and the difference in reading achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 16 is that there is no significant difference between the high- and medium-intellectual ability groups in arithmetic achievement. The obtained "t" value was 2.00 and the required value for significance, according to the "t" table, was 1.98. Because the obtained "t" value was so close to the borderline of significance the required value for significance was calculated by Formula 5, Appendix E. The value obtained by this method was 2.01. Since the obtained value of "t" does not exceed the criterion value of "t," the hypothesis of no difference in arithmetic achievement is accepted.

Hypothesis 17 is that there is no significant difference between the high- and low-intellectual ability groups in arithmetic achievement. The obtained "t" value was 13.92 and the required value for significance was 2.02. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 18 is that there is no significant difference between the medium- and low-intellectual ability groups in arithmetic achievement. The obtained "t" value

was 4.23 and the required value for significance was 2.01. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 19 is that there is no significant difference between the high- and medium-intellectual ability groups in language achievement. The obtained "t" value was 4.23 and the required value for significance was 1.98. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in language achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 20 is that there is no significant difference between the high- and low-intellectual ability groups in language achievement. The obtained "t" value was 13.56 and the required value for significance was 2.09. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in language achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 21 is that there is no significant difference between the medium- and low-intellectual ability

groups in language achievement. The obtained "t" value was 9.09 and the required value for significance was 2.02. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in language achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 22 is that there is no significant difference between the high- and medium-intellectual ability groups in total achievement. The obtained "t" value was 6.12 and the required value for significance was 1.98. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 23 is that there is no significant difference between the high- and low-intellectual ability groups in total achievement. The obtained "t" value was 18.04 and the required value for significance was 2.02. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 24 is that there is no significant difference between the medium- and low-intellectual ability groups in total achievement. The obtained "t" value was 11.36 and the required value for significance was 2.02. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in total achievement was attributed to the difference in the intellectual ability of the two groups.

Low-socio-economic Status Group

Hypothesis 25 is that there is no significant difference between the high- and medium-intellectual ability groups in reading achievement. The obtained "t" value was 6.31 and the required value for significance was 2.04. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in reading achievement was attributed to the difference in the intellectual ability of the two groups. The "t" ratios for the low-socio-economic status group are presented in Table 6.

Hypothesis 26 is that there is no significant difference between the high- and low-intellectual ability groups in reading achievement. The obtained "t" value was 13.50 and the required value for significance was 2.06. This is a statistically significant difference in favor of

TABLE 6

ANALYSIS OF DATA FOR THE LOW-SOCIO-ECONOMIC STATUS GROUP

Area	Intellectual Ability Groups			Mean Diff.	SE$_{Diff.}$	"t"*
	High (N=22)	Medium (N=50)	Low (N=34)			
	Means					
Reading	114.9	96.8		18.1	2.87	6.31
	114.9		70.2	44.7	3.31	13.50
		96.8	70.2	26.6	3.42	7.78
Arithmetic	79.8	63.1		16.7	2.74	6.09
	79.8		46.6	33.2	3.36	9.88
		63.1	46.6	16.5	2.56	6.45
Language	59.7	47.1		12.6	2.22	5.68
	59.7		36.2	23.5	2.15	10.93
		47.1	36.2	10.9	1.99	5.48
Total	254.4	207.0		47.4	5.71	8.30
	254.4		153.1	101.3	6.50	15.57
		207.0	153.1	53.9	6.31	8.54

*All are significant at the .05 level.

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the high-intellectual ability group. The hypothesis was rejected and the difference in reading achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 27 is that there is no significant difference between the medium- and low-intellectual ability groups in reading achievement. The obtained "t" value was 7.78 and the required value for significance was 2.03. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in reading achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 28 is that there is no significant difference between the high- and medium-intellectual ability groups in arithmetic achievement. The obtained "t" value was 6.09 and the required value for significance was 2.06. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 29 is that there is no significant difference between the high- and low-intellectual ability groups in arithmetic achievement. The obtained "t" value was 9.88 and the required value for significance was 2.07.

This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 30 is that there is no significant difference between the medium- and low-intellectual ability groups in arithmetic achievement. The obtained "t" value was 6.45 and the required value for significance was 2.04. This is a statistically significant difference in favor of the medium-intellectual ability group. The hypothesis was rejected and the difference in arithmetic achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 31 is that there is no significant difference between the high- and the medium-intellectual ability groups in language achievement. The obtained "t" value was 5.68 and the required value for significance was 2.05. This is a statistically significant difference in favor of the high-intellectual ability group. The hypothesis was rejected and the difference in language achievement was attributed to the difference in the intellectual ability of the two groups.

Hypothesis 32 is that there is no significant difference between the high- and low-intellectual ability groups in language achievement. The obtained "t" value

was 10.93 and the required value was 2.06. This is a
statistically significant difference in favor of the high-
intellectual ability group. The hypothesis was rejected
and the difference in language achievement was attributed
to the difference in the intellectual ability of the two
groups.

Hypothesis 33 is that there is no significant dif-
ference between the medium- and low-intellectual ability
groups in language achievement. The obtained "t" value
was 5.48 and the required value for significance was 2.03.
This is a statistically significant difference in favor of
the medium-intellectual ability group. The hypothesis was
rejected and the difference in language achievement was
attributed to the difference in the intellectual ability
of the two groups.

Hypothesis 34 is that there is no significant dif-
ference between the high- and medium-intellectual ability
groups in total achievement. The obtained "t" value was
8.30 and the required value for significance was 2.05.
This is a statistically significant difference in favor of
the high-intellectual ability group. The hypothesis was
rejected and the difference in total achievement was
attributed to the difference in the intellectual ability
of the two groups.

Hypothesis 35 is that there is no significant dif-
ference between the high- and low-intellectual ability

groups in total achievement. The obtained "t" value was
15.57 and the required value for significance was 2.06.
This is a statistically significant difference in favor
of the high-intellectual ability group. The hypothesis
was rejected and the difference in total achievement was
attributed to the difference in the intellectual ability
of the two groups.

Hypothesis 36 is that there is no significant dif-
ference between the medium- and low-intellectual ability
groups in total achievement. The obtained "t" value was
8.54 and the required value for significance was 2.03.
This is a statistically significant difference in favor
of the medium-intellectual ability group. The hypothesis
was rejected and the difference in total achievement was
attributed to the difference in the intellectual ability
of the two groups.

Summary

On the basis of the analysis of these data, thirty-
five of the thirty-six hypotheses were rejected. All twelve
of the hypotheses related to the upper-socio-economic status
group were rejected which indicates that in the upper-socio-
economic class, intelligence is a responsible factor for
greater achievement in the areas of reading, arithmetic, and
language. In the middle-socio-economic status group eleven
of the twelve hypotheses were rejected. The exception was

between the high- and medium-intellectual ability groups

in arithmetic. With respect to intelligence, the medium

group achieved as well as the high group. However, in all

other areas compared in the middle-socio-economic status

group intelligence is apparently a responsible factor for

greater achievement. In the low-socio-economic status

group all twelve of the hypotheses were rejected, and as

a result intelligence is considered a responsible factor

for greater achievement in the areas of reading, arithmetic,

and language. In summary it can be concluded that in the

majority of instances intellectual ability is a factor

which is responsible for greater achievement regardless

of the socio-economic status group to which the subject

belongs.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study is designed to determine whether the achievement of groups of sixth-grade children differing in intellectual ability differs significantly when the groups are of comparable socio-economic status. Areas compared were: reading, arithmetic, language, and total achievement.

The socio-economic status of the subjects was determined and they were assigned to one of three status groups, (1) upper, (2) middle, and (3) low. The subjects in the status groups were assigned to subdivisions on the basis of intellectual ability, that is, (1) upper (IQ's of 116 and above), (2) medium (IQ's in the 94-107 range), and (3) low (IQ's 85 and below).

The design of the study required the testing of a general hypothesis: that in the upper-, middle-, and low-socio-economic status groups there are no significant differences between the high- and medium-, high- and low-, and medium- and low-intellectual ability groups in reading, arithmetic, language, and total achievement. The general

hypothesis was divided into thirty-six specific hypotheses.

The population included 2,623 sixth-grade students enrolled in thirty-three elementary schools in the Oklahoma City Public School System during the 1958-59 school year. Of this group 1,066 met the general requirements for selection. For all practical purposes 360 subjects were selected at random by use of a table of random numbers.

A modified form of the <u>Questionnaire By Which Socio-Economic Information Was Secured From Parents</u> was used as the instrument to gain information for determining socio-economic status of the subjects. The results obtained by use of the <u>California Test of Mental Maturity</u>, Elementary, 1950 S-Form, were used to categorize the subjects on the basis of intellectual ability. The raw scores obtained from the <u>California Achievement Test</u> (Forms AA and BB) were used in comparing the mean scores to determine the significance of differences between the various groups.

In the "t" tests which were computed, thirty-five of the thirty-six indicated significant differences in achievement at the .05 level. The one which indicated no significant difference in achievement at the .05 level was in the middle-socio-economic status group between the high- and medium-intellectual ability groups in the area of arithmetic.

Conclusions

From the results of this investigation the following conclusions were made:

1. That intellectual ability has an effect upon the scholastic achievement of sixth-grade students of the upper-socio-economic class, in reading, arithmetic, language, and total achievement. The greater one's intellectual ability is, the greater the scholastic achievement is apt to be in these areas of learning.

2. That intellectual ability has an effect upon the scholastic achievement of sixth-grade students of the middle-socio-economic class, in reading, language, and total achievement. The greater one's intellectual ability is, the greater the scholastic achievement is apt to be in these areas of learning.

3. That intellectual ability is not a determiner of the scholastic achievement of sixth-grade students of the middle-socio-economic class in arithmetic. Children with medium-intellectual ability achieve as well as those with high-intellectual ability. However, those with medium-intellectual ability achieve greater than those with low-intellectual ability.

4. That intellectual ability has an effect upon the scholastic achievement of sixth-grade students of the low-socio-economic class, in reading, arithmetic, language, and total achievement. The greater one's intellectual

ability is, the greater the scholastic achievement is apt
to be in these areas of learning.

Recommendations

Numerous aspects were not included within the scope
of this study. Other studies might be concerned with:

1. Determining whether intellectual ability affects
achievement in other areas of instruction when groups are
of comparable socio-economic status.

2. Determining the effect of intellectual ability
on scholastic achievement of groups of comparable socio-
economic status with other grade levels.

3. A longitudinal study to determine whether or
not the effect of intellectual ability on scholastic
achievement is constant throughout a student's academic
career.

4. Determining whether socio-economic status or
intellectual ability has the greater effect on scholastic
achievement.

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APPENDICES

APPENDIX A

QUESTIONNAIRE FOR DETERMINING SOCIO-ECONOMIC STATUS

To the Parent:

The information requested on this form is needed as part of a research study which is being conducted on 360 boys and girls in the sixth-grade classes of the Oklahoma City Public School System. The purpose of the study is to determine the relationship between ability, status and achievement. Your cooperation in completing and returning this form, as soon as possible, will be greatly appreciated.

Pupil's name:_____Birthday_____
              (First)(Middle)(Last)   (Month)(Day)(Yr.)

Pupil's school_____Did you attend here last year?___

Pupil's address:_____

What is the pupil's race? Check one: White___Negro____
Indian___Mexican___Other___.

Father's name:_____

What kind of work does the pupil's father, or guardian, do?
_____(If father, or guardian, works in a
factory, or store, or office, tell what kinds of jobs he
does there)_____

If he has a title, like watchman, foreman, clerk, manager,
president, owner, etc., write it here_____

What other kind of work has the father ever done?_____

How often is the father paid? Check one: Every week____
Once every two weeks___Once a month___By the day____
In business for himself___.

What kind of work does the pupil's mother do?_____
What other kind of work has she ever done?_____

Grade, or year of school completed by the pupil's <u>father</u>.
Circle one:

Grade School	High School	College
1 2 3 4 5 6 7 8	1 2 3 4	1 2 3 4 5 6 7 8

Grade, or year of school completed by the pupil's <u>mother</u>.
Circle one:

Grade School	High School	College
1 2 3 4 5 6 7 8	1 2 3 4	1 2 3 4 5 6 7 8

Was the father born in the United States?____
Was the mother?____

What type of dwelling do you live in? Check one:
Apartment house____Duplex____Single-family dwelling____.
How many rooms are there in the dwelling in which you live?

____

APPENDIX B

ELEMENTARY SCHOOLS IN THE OKLAHOMA CITY PUBLIC
SCHOOL SYSTEM PARTICIPATING IN THE STUDY

Name	Address
Belle Isle	NW 57 and Villa
Britton	NW 95 and Military
Buchanan	4126 NW 18
Burbank	NW 65 and Independence
Cleveland	2725 NW 23
Columbus	2402 South Pennsylvania
Coolidge	SW 52 and Villa
Edgemere	3200 North Walker
Emerson	715 North Walker
Fillmore	SW 52 and Blackwelder
Gatewood	1821 NW 21
Horace Mann	1105 NW 45
Johnson	Hasley Drive and Sheffield Road
Kaiser	NW 30 and Lyon Boulevard
Linwood	3416 NW 17
Madison	NW 30 and Independence
Mark Twain	2451 West Main
Mayfair	3200 NW 48
Monroe	NW 48 and Lion
Nichols Hills	1301 Wilshire Boulevard
Putnam Heights	1601 NW 36
Riverside	421 SW 11
Rockwood	3101 SW 24
Ross	SE 41 and Hattie
Shidler	1415 South Byers
Shields Heights	301 SE 38
Walnut Grove	500 South Durland
Washington	315 South Walker
West Nichols Hills	Greystone and Coventry
Westwood	1701 Exchange Avenue
Wheeler	501 SE 25
Willard	1400 SW 3
Wilson	2215 North Walker

APPENDIX C

TABLE 7

RAW SCORE DATA FOR THE UPPER-SOCIO-ECONOMIC STATUS HIGH-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	123	129	103	66	298
2	130	119	86	58	263
3	125	113	76	58	247
4	121	117	73	55	245
5	121	118	68	58	244
6	129	127	87	60	274
7	124	86	65	45	196
8	134	108	95	66	269
9	127	122	75	64	261
10	144	130	108	74	312
11	128	120	91	61	272
12	118	111	74	52	237
13	142	112	89	62	263
14	135	128	99	64	291
15	121	116	82	60	258
16	117	126	78	60	264
17	128	92	91	65	248
18	129	113	87	55	255
19	127	126	93	68	287
20	124	117	93	47	257
21	118	115	87	61	263
22	133	103	73	58	234
23	119	118	87	64	269
24	121	117	78	56	251
25	130	129	116	65	310

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TABLE 7 (<u>Continued</u>)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	126	110	89	56	255
27	141	128	87	68	283
28	127	126	87	67	280
29	118	110	55	59	224
30	123	114	74	65	253
31	121	101	80	57	238
32	130	125	86	66	277
33	129	128	87	63	278
34	133	129	72	51	252
35	125	122	74	61	257
36	130	118	78	66	262
37	125	121	87	55	263
38	122	121	87	63	271
39	140	128	83	68	279
40	131	126	80	63	269
41	141	114	85	66	265
42	124	109	67	70	246
43	133	111	68	58	237
44	119	123	74	55	252
45	139	125	97	70	292
46	123	110	66	60	236
47	126	125	78	62	265
48	129	121	78	61	260
49	129	125	72	67	264
50	122	124	85	65	274
Mean		118.12	82.6	61.28	262.0
Standard Deviation		9.46	11.43	5.84	20.99

APPENDIX C

TABLE 8

RAW SCORE DATA FOR THE UPPER-SOCIO-ECONOMIC STATUS MEDIUM-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	101	107	71	49	227
2	105	99	75	56	230
3	99	91	80	50	221
4	107	114	76	46	236
5	104	101	78	62	241
6	103	99	67	43	209
7	102	96	68	42	206
8	101	96	61	41	198
9	104	102	61	54	217
10	106	101	65	34	200
11	106	107	65	41	213
12	105	98	81	53	232
13	103	91	68	45	204
14	95	98	53	46	197
15	105	108	66	63	237
16	97	91	48	46	185
17	105	98	59	56	213
18	106	101	64	55	220
19	101	108	64	55	227
20	106	108	61	45	214
21	101	101	66	51	218
22	104	57	44	42	143
23	106	100	70	52	222
24	99	98	66	43	207
25	107	90	64	45	199

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TABLE 8 (<u>Continued</u>)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	99	109	68	59	236
27	106	124	78	61	263
28	98	59	40	37	136
29	98	105	59	52	216
30	98	112	85	62	259
31	94	102	80	58	240
32	95	87	61	53	201
33	102	105	73	49	227
34	104	100	65	54	219
35	106	76	57	54	187
36	102	98	66	59	223
37	106	119	73	62	254
38	97	113	62	52	227
39	107	111	78	61	250
40	99	76	62	52	190
41	101	98	73	50	221
42	100	125	74	54	253
43	104	106	67	57	230
44	106	105	71	56	232
45	105	109	73	61	243
46	95	94	69	50	213
47	106	90	45	59	194
48	104	99	73	45	217
49	101	109	61	56	226
50	107	114	65	62	241
Mean		100.1	66.38	51.8	218.28
Standard Deviation		13.12	9.51	7.23	24.65

APPENDIX C

TABLE 9

RAW SCORE DATA FOR THE UPPER-SOCIO-ECONOMIC STATUS LOW-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	81	42	29	33	104
2	78	53	47	34	134
3	85	74	68	29	171
4	84	89	44	47	180
5	81	68	35	45	148
6	79	108	71	49	228
7	71	67	32	25	124
8	82	99	46	49	194
9	79	103	48	51	202
10	85	84	40	42	166
11	85	93	59	57	209
12	84	92	42	30	164
13	57	102	52	54	208
14	76	76	61	49	186
Mean		82.14	48.14	42.43	172.71
Standard Deviation		19.69	12.84	10.29	35.61

APPENDIX C

TABLE 10

RAW SCORE DATA FOR THE MIDDLE-SOCIO-ECONOMIC STATUS HIGH-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	131	130	91	69	290
2	119	101	61	56	218
3	123	112	93	50	255
4	117	96	80	53	229
5	127	117	73	57	247
6	125	110	73	61	244
7	118	117	83	59	259
8	116	105	66	44	215
9	117	113	83	49	245
10	128	113	73	60	246
11	128	120	86	66	272
12	120	103	63	58	224
13	132	123	89	62	274
14	117	108	70	61	239
15	129	120	83	64	267
16	128	122	76	55	253
17	125	125	66	62	253
18	120	108	68	41	217
19	124	110	66	35	211
20	147	123	98	59	280
21	138	124	101	68	293
22	129	111	51	49	211
23	116	115	70	55	240
24	133	124	98	68	290
25	126	124	91	63	278

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TABLE 10 (<u>Continued</u>)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	123	122	76	63	261
27	119	125	87	53	265
28	126	98	59	62	219
29	121	102	66	61	229
30	125	126	89	73	288
31	130	129	103	70	302
32	120	103	71	51	225
33	121	116	70	60	246
34	118	122	68	55	245
35	129	126	81	70	277
36	125	120	73	60	253
37	119	117	83	60	260
38	119	120	89	66	275
39	125	120	73	62	255
40	124	122	91	72	285
41	132	127	87	70	284
42	128	124	79	57	260
43	137	125	80	56	261
44	117	103	63	63	229
45	116	123	73	59	255
46	126	116	85	62	263
47	116	111	71	63	245
48	130	111	68	57	236
49	137	122	78	67	267
50	120	105	68	49	222
Mean		116.18	77.66	59.3	253.14
Standard Deviation		8.80	11.68	7.85	23.95

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TABLE 11

RAW SCORE DATA FOR THE MIDDLE-SOCIO-ECONOMIC STATUS MEDIUM-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	104	78	68	57	203
2	107	101	53	51	205
3	102	108	71	59	238
4	102	75	56	47	178
5	105	117	78	54	249
6	94	109	67	37	213
7	104	100	67	53	220
8	99	109	78	52	239
9	103	126	76	62	264
10	98	69	51	36	156
11	104	121	101	67	289
12	104	117	63	57	237
13	101	72	51	40	163
14	102	111	64	51	226
15	106	90	54	44	188
16	106	55	53	50	158
17	107	113	75	59	247
18	102	96	57	49	202
19	95	85	65	45	195
20	107	114	61	49	224
21	104	105	53	24	182
22	107	110	83	58	251
23	97	66	61	32	159
24	101	108	76	60	244
25	102	109	71	51	231

TABLE 11 (Continued)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	94	92	57	64	213
27	103	109	78	67	254
28	101	96	68	46	210
29	106	103	80	51	234
30	98	63	57	32	152
31	107	114	71	61	246
32	105	99	61	53	213
33	98	76	53	47	176
34	94	104	69	57	230
35	101	108	61	57	226
36	95	94	53	55	202
37	107	113	59	60	232
38	101	82	43	36	161
39	99	81	64	46	191
40	99	111	83	53	247
41	107	124	73	68	265
42	107	116	83	65	264
43	97	55	51	44	150
44	99	96	71	54	221
45	101	101	76	56	233
46	100	106	58	54	218
47	105	114	79	55	248
48	104	112	73	56	241
49	105	111	67	57	235
50	101	105	73	59	237
Mean		98.98	66.28	51.94	217.2
Standard Deviation		17.96	38.55	9.57	33.94

TABLE 12

RAW SCORE DATA FOR THE MIDDLE-SOCIO-ECONOMIC STATUS LOW-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	79	67	41	39	147
2	70	55	40	22	117
3	67	33	22	18	73
4	79	60	40	22	122
5	82	38	28	25	91
6	81	31	25	22	78
7	83	87	60	38	185
8	77	57	41	44	142
9	84	51	39	27	117
10	75	54	45	30	129
11	85	90	56	48	194
12	78	61	53	28	142
13	80	65	38	26	129
14	84	78	36	44	158
15	69	36	26	13	75
16	79	89	44	38	171
17	80	63	36	28	127
18	72	38	24	20	82
19	74	29	39	42	110
20	70	42	48	30	120
21	81	53	17	37	107
22	82	65	61	32	158
23	81	63	64	40	167
24	74	60	52	31	143
25	81	48	39	19	106

TABLE 12 (<u>Continued</u>)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	67	50	53	41	144
27	80	65	59	34	158
28	82	51	45	32	128
29	84	76	40	56	172
30	80	46	33	37	116
31	81	105	71	54	230
32	75	67	48	38	153
33	85	43	38	22	103
34	76	40	22	30	92
35	84	48	36	26	110
36	66	57	38	32	127
37	74	36	33	29	98
38	79	65	30	43	138
39	85	101	64	51	216
40	84	63	44	31	138
Mean		58.15	41.7	32.98	132.83
Standard Deviation		18.52	12.82	10.10	36.37

TABLE 13

RAW SCORE DATA FOR THE LOW-SOCIO-ECONOMIC STATUS HIGH-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	127	120	68	60	248
2	122	112	80	56	248
3	128	105	94	47	246
4	120	120	87	67	274
5	126	123	115	63	306
6	136	119	82	68	269
7	116	111	71	50	232
8	120	97	81	48	226
9	121	107	77	56	240
10	124	121	71	57	249
11	120	110	75	57	242
12	126	117	75	59	251
13	116	120	81	49	250
14	124	125	97	64	286
15	128	109	81	64	254
16	121	107	72	63	242
17	121	94	69	59	222
18	116	129	59	61	249
19	144	123	72	69	264
20	118	119	86	59	264
21	117	120	84	68	272
22	127	120	78	65	263
Mean		114.91	79.77	59.73	254.41
Standard Deviation		8.99	11.70	6.81	19.45

TABLE 14

RAW SCORE DATA FOR THE LOW-SOCIO-ECONOMIC STATUS MEDIUM-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	106	105	68	55	228
2	107	98	62	41	201
3	95	88	46	45	179
4	97	74	54	43	171
5	99	90	71	53	214
6	104	85	64	44	193
7	96	96	53	49	198
8	94	105	53	35	193
9	101	72	56	38	166
10	96	67	51	37	155
11	99	99	53	61	213
12	97	80	51	38	169
13	102	89	63	50	202
14	102	98	57	55	210
15	97	98	69	59	226
16	96	89	69	43	201
17	101	112	70	28	210
18	99	107	72	48	227
19	107	105	71	59	235
20	101	107	56	47	210
21	103	111	85	51	247
22	102	111	68	42	221
23	97	69	57	44	170
24	95	76	70	38	184
25	94	96	53	49	198

TABLE 14 (Continued)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	100	61	67	46	174
27	96	108	71	58	237
28	102	105	57	46	208
29	105	80	61	32	173
30	107	119	85	65	269
31	99	110	78	57	245
32	107	107	68	42	217
33	97	96	51	56	203
34	104	107	70	54	231
35	107	127	86	67	280
36	103	94	46	55	195
37	105	106	57	42	205
38	104	105	63	51	219
39	107	105	66	36	207
40	96	107	63	56	226
41	101	115	57	61	233
42	107	96	54	47	197
43	106	115	68	50	233
44	103	117	76	59	252
45	95	103	68	44	215
46	97	71	55	34	160
47	103	80	63	36	179
48	98	91	66	40	197
49	99	106	66	36	208
50	97	83	50	32	165
Mean		96.82	63.08	47.08	206.98
Standard Deviation		15.11	9.73	9.39	27.80

TABLE 15

RAW SCORE DATA FOR THE LOW-SOCIO-ECONOMIC STATUS LOW-INTELLECTUAL ABILITY GROUP

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
1	68	67	32	21	120
2	79	46	17	36	99
3	85	65	26	39	130
4	77	55	59	21	135
5	72	68	33	37	138
6	76	93	45	46	184
7	75	67	51	37	155
8	83	43	61	28	132
9	85	81	47	37	165
10	83	71	71	41	183
11	79	41	32	29	102
12	81	82	54	51	187
13	72	71	50	35	156
14	85	67	38	28	133
15	75	75	56	35	166
16	79	78	53	28	159
17	80	67	61	35	163
18	72	35	38	20	93
19	82	59	39	36	134
20	83	61	28	34	123
21	73	74	44	38	156
22	80	77	41	40	158
23	74	94	32	34	160
24	79	71	53	49	173
25	77	63	57	34	154

TABLE 15 (Continued)

Subjects	IQ Scores	California Achievement Test--Totals			
		Reading	Arithmetic	Language	Total
26	84	101	61	41	203
27	79	61	48	25	134
28	73	105	59	55	219
29	75	69	36	34	139
30	78	85	54	44	183
31	77	69	47	37	153
32	81	76	66	46	188
33	85	65	41	35	141
34	80	85	56	46	187
Mean		70.21	46.65	36.24	153.09
Standard Deviation		15.78	12.64	8.33	29.23

APPENDIX D

TABLE 16

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE
FOR UPPER-SOCIO-ECONOMIC STATUS GROUP

Areas	Variances for Intellectual Ability Groups			F
	High (N=50)	Medium (N=50)	Low (N=14)	
Reading	89.45	172.09		*1.92
	89.45		387.82	*4.33
		172.09	387.82	*2.25
Arithmetic	130.57	90.37		1.44
	130.57		164.75	1.26
		90.37	164.75	1.82
Language	34.12	52.20		1.53
	34.12		105.80	*3.10
		52.20	105.80	*2.03
Total	440.69	607.51		1.38
	440.69		1,268.20	*2.88
		607.51	1,268.20	*2.09

*Denotes significance at the .10 level.

APPENDIX D

TABLE 17

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE
FOR MIDDLE-SOCIO-ECONOMIC STATUS GROUP

Areas	Variances for Intellectual Ability Groups			F
	High (N=50)	Medium (N=50)	Low (N=40)	
Reading	77.49	322.46		*4.16
	77.49		343.16	*4.43
		322.46	343.16	1.06
Arithmetic	136.51	1,485.72		*10.88
	136.51		164.32	1.20
		1,485.72	164.32	*9.04
Language	61.60	91.65		1.49
	61.60		101.92	*1.65
		91.65	101.92	1.11
Total	573.43	1,151.59		*2.01
	573.43		1,322.81	*2.31
		1,151.59	1,322.81	1.15

*Denotes significance at the .10 level.

APPENDIX D

TABLE 18

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE
FOR LOW-SOCIO-ECONOMIC STATUS GROUP

Areas	Variances for Intellectual Ability Groups			F
	High (N=22)	Medium (N=50)	Low (N=34)	
Reading	80.94	228.40		*2.82
	80.94		249.02	*3.08
		228.40	249.02	1.09
Arithmetic	136.95	94.69		1.45
	136.95		159.75	1.17
		94.69	159.75	*1.39
Language	46.40	88.20		1.90
	46.40		69.34	1.49
		88.20	69.34	1.27
Total	378.19	772.63		*2.04
	378.19		854.14	*2.26
		772.63	854.14	1.11

*Denotes significance at the .10 level.

APPENDIX E

FORMULAS USED IN COMPUTING TESTS OF SIGNIFICANCE

Formula 1 (F test for homogeneity of variance):

$$F = \frac{\text{larger variance}}{\text{smaller variance}}$$

Formula 2 ("t" test used when variances are homogeneous and number of cases in the two samples are equal):

$$t = \frac{M_1 - M_2}{\sqrt{\dfrac{\Sigma x^2_1 + \Sigma x^2_2}{N_i(N_i - 1)}}}$$

where:

M_1 and M_2 = means of the two samples

Σx^2_1 and Σx^2_2 = sums of squares of the two samples

N_i = size of either sample

Formula 3 ("t" test used when variances are homogeneous and number of cases in the two samples are unequal):

$$t = \frac{M_1 - M_2}{\sqrt{\left(\dfrac{\Sigma x^2_1 + \Sigma x^2_2}{N_1 + N_2 - 2}\right)\left(\dfrac{N_1 + N_2}{N_1 N_2}\right)}}$$

where:

M_1 and M_2 = means of the two samples

Σx^2_1 and Σx^2_2 = sums of squares of the two samples

N_1 and N_2 = numbers of cases in the two samples

Formula 4 ("t" test used when variances are heterogeneous):

$$t = \frac{M_1 - M_2}{\sqrt{\dfrac{s^2_1}{N_1} + \dfrac{s^2_2}{N_2}}}$$

where:

M_1 and M_2 = means of the two samples

s^2_1 and s^2_2 = variances of the two samples

N_1 and N_2 = number of cases in the two samples

Formula 5 (used to determine criterion "t" when there are exaggerated differences in the number of subjects in the two samples or when obtained value of "t" and Table value of "t" are very close):

$$t = \frac{(s_{\bar{x}1}^2)(t_1) + (s_{\bar{x}2}^2)(t_2)}{s_{\bar{x}1}^2 + s_{\bar{x}2}^2}$$

where:

$s_{\bar{x}1}^2$ and $s_{\bar{x}2}^2$ = square of the standard error of the mean for each sample

t_1 and t_2 = table value for each sample for the corresponding degrees of freedom.