1971

The Relationship of Selected Cumulative Grade Point Averages to Intelligence Quotient

Donald G. Varner
Eastern Illinois University

PAPER CERTIFICATE

TO: Graduate Degree Candidates who have written formal theses.

SUBJECT: Permission to reproduce theses.

The University Library is receiving a number of requests from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow theses to be copied.

Please sign one of the following statements.

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university for the purpose of copying it for inclusion in that institution's library or research holdings.

11 August 1971
Date

I respectfully request Booth Library of Eastern Illinois University not allow my thesis be reproduced because _____

_____

_____

_____ _____

Date Author

THE RELATIONSHIP OF SELECTED CUMULATIVE GRADE POINT AVERAGES TO INTELLIGENCE QUOTIENT

(TITLE)

BY

Donald G. Varner

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science in Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1971
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

Aug. 10, 1971
DATE

Aug. 10, 1971
DATE

TABLE OF CONTENTS

ACKNOWLEDGMENTS

The author wishes to express his gratitude to his advisor, Dr. Louis Grado, for his guidance and assistance in the organization and writing of the thesis.

Special thanks is given to Dr. Joseph Carey who was kind enough to give advice on the processing, analysis and interpretation of the data. His interest and concern were greatly appreciated.

Acknowledgment is also given to Mr. Don Long and Mr. Charles Smith of Morrisonville Community Unit No. 1 for their oooperation in this project.

Finally, the writer owes a very special thanks to his wife, Joyce, for her assistance, patience, and understanding during the writing of this thesis.

LIST OF TABLES

Chapter I

INTRODUCTION TO THE PROBLEM

Although many schools have printed statements of their marking policy, apparently few teachers adhere strictly to them. Very often the policies are ambiguously worded so that various interpretations can be made. Even where the marking system of the district is specific, teachers tend to mark on their own. They may all use the same set of symbols, but there the resemblance ends.[1]

In spite of this lack of uniformity in the assignment of school marks, some students tend to receive similar marks from different instructors as they progress through school. Girls, for example, are well known to receive higher marks than boys, at least in the United States.[2] Teachers, as members of a group, have also demonstrated differences, e.g., men are reported to assign lower marks than women, on the average.[3]

---

[1]Joseph W. Halliwell, "The Relationship of Certain Factors to Marking Practices in Individual Reporting Programs," Journal of Educational Research, LIV, (January, 1960), p. 77.

[2]Clifford Swenson, "Packing the Honor Society," Clearing House, XVI, (May, 1942), p. 524.

[3]R. W. Edmiston, "Do Teachers Show Partiality toward Boys or Girls?" Peabody Journal of Education, XX, (January, 1943), p. 238.

In an historical review of the development of modern intelligence tests, Guilford states that there should be a high relationship between school achievement and intelligence test results because the majority of early intelligence tests were attempts to predict academic success.[4]

James McKeen Cattell was one of the first Americans to attempt to predict success in college by means of a test of intelligence.[5] He was unsuccessful in his attempt to show a significant relationship between scores on his test and success in college. Nelson believes that this may have been due to the nature of his test as he measured such abilities as color vision, sensitivity to pain, rote memorization, keeness of hearing and vision, reaction time, and color preference.[6]

Alfred Binet and Theodore Simon developed the first successful intelligence test, the immediate use being to determine which students in Paris should be segregated for special instruction. The first Binet-Simon scale was published in 1905 in France, and American versions followed.[7]

---

[4]J. P. Guilford, Personality (New York: McGraw-Hill Book Company, 1959), p. 240.

[5]Ibid., p. 241.

[6]Martin J. Nelson, "Intelligence and Special Aptitude Tests," in Encyclopedia of Education Research, ed. by Robert L. Ebel (4th ed.; London: Macmillan Company, 1969), p. 667.

[7]Guilford, Personality, p. 240.

Other American tests followed. The Terman scale, produced at Stanford University, became popular during World War I.[8] Special tests of intelligence were constructed for use by the Army, and after the war similar tests were constructed for use in schools.[9]

Although intelligence tests have been largely constructed as predictors of academic success in school, researchers have measured suocess in terms of achievement test scores. Degree of success in school, however, can also be measured by cumulative grade point averages. It is the purpose of this study to investigate the relationship of intelligence quotient to cumulative grade point average.

NEED FOR THE STUDY

In a review of the literature numerous studies were discovered which attempt to relate intelligence quotient to achievement test scores. However, relatively few studies relating intelligence quotient to cumulative elementary school grade point averages, or other indication of school marks, could be located. The research relating intelligence quotient to school marks is somewhat dated and no study could be located which involved the children of central

---

[8]Herbert Sorenson, Psychology in Education (3rd. ed., New York: McGraw-Hill Book Company, 1954), p.240.

[9]Guilford, Personality, p. 242.

Illinois as subjects.

Since school marks have become an important measure of success in school on the elementary level, a need exists for study of the correlation of cumulative grade point average with scores on intelligence tests.

STATEMENT OF THE PROBLEM

The purpose of this study is to determine the extent of the relationship of the intelligence quotient of each child in the sixth grade of Morrisonville Elementary School to his over-all six year cumulative grade point average as well as to his six year cumulative grade point average in social studies, mathematics, and physical education.

HYPOTHESIS

There is no significant correlation between an individual's cumulative grade point average and his intelligence quotient.

DEFINITION OF TERMS

Achievement test. A test which measures skills, knowledges, and understanding of a specific school subject.

Coefficient of correlation. The relationship between two or more sets of data which usually vary from +1 through 0 to -1.

Cumulative grade point average. A measure of average scholastic success in all school subjects taken by a student during an accumulation of several terms, semesters, or years.

General intelligence test. A composite test made up of parts that have been found empirically to correlate well with some practical indirect measure of intelligence ability, such as success in school.

Intelligence quotient (I.Q.). The most commonly used device for expressing level of mental development in relation to chronological age; obtained by dividing the mental age (as measured by a general intelligence test) by the chronological age and multiplying by 100.[10]

Mental age. The level of a person's mental ability expressed in terms of norms based on the median mental age of a group of persons having the same chronological age.

Pearson product-moment coefficiant correlation. A statistical process which expresses the degree of relationship between two sets of data. The technique is more thoroughly discussed in chapter IV.

Permanent cumulative record. An individual record that is kept up to date by a member of the counseling staff and includes educational, social, vocational, health, and

---

[10] Carter V. Good, ed., Dictionary of Education (New York: McGraw-Hill Book Company, 1959), p. 436.

personal data.[11]

School Mark. The evaluation that a teacher makes of pupil progress or achievement as based on defined standards. Commonly called grade or teacher's mark.[12]

[11] Ibid. p. 148.

[12] Ibid. p. 330.

Chapter II

REVIEW OF RELATED LITERATURE

Speculation about what is actually measured by general intelligence tests is as old as the tests themselves. It is an accepted fact in education, however, that many complex factors, such as mental development, personal and social adjustment, interest patterns, and amount and kinds of information picked up through experience interact with each other to influence greatly the child's educational progress.[1]

In today's schools, the school marks students receive seem to be influenced by many of these same complex factors. For example, such items as effort, punctuality, interest, behavior, and neatness of written work may effect the school marks assigned by some teachers in the elementary school.[2]

Studies relating intelligence quotient to school marks are described in this chapter, in chronological order.

SCHOOL MARKS AS RELATED TO INTELLIGENCE QUOTIENT

In a study to check the validity of Stanford University's

---

[1]Miles A. Tinker and Constance M. McCullough, Teaching Elementary Reading (New York: Appleton-Century-Crofts, Inc., 1962), p. 53.

[2]I. L. Russell and William H. Talman, "Personality: Does It Influence Teacher's Marks?" Journal of Educational Research, XLVIII, (April, 1955), p. 563.

revision of the Binet-Simon Intelligence Test, Whitcomb supervised the administration of this individual intelligence test to 2360 children who were pupils in the kindergarten and primary grades of Council Bluffs, Iowa, with the cooperation of Dr. Terman of Stanford University. The resulting intelligence quotient obtained for each child was then compared with the grade point average the same child received from the subjects studied during the previous school semester. In interpreting her summary it is necessary to know that the teachers adhered strictly to the school policy assigning the school mark of H (honor) to the best ten per cent of the pupils in each classroom, and that the school marks of A, B, and C were assigned to the remaining students, in successively lower groups, each thirty per cent in all.[3] Her summary table follows:

Marks	56-85 I.Q.	86-115 I.Q.	116-145 I.Q.
H.....	.5%	9%	24%
A.....	10.0%	31%	51%
B.....	29.0%	34%	16%
C.....	60.5%	26%	9%

In another early study Shidelar administered the Terman Group Intelligence Test to 170 students and correlated the combined school marks received during both semesters of the 1920-1921 school year in all subjects taken by the students.

---

[3]M. Edith Whitcomb, "Intelligence Tests in the Primary Grades," Journal of Educational Research, V, (January, 1922), p. 58-61.

He concluded that: (1) There is a positive correlation between school marks and intelligence quotients. (2) The correlation is higher in subjects which are purely academic and taught by traditional methods. (3) The correlation is less marked in the so-called drill subjects. (4) The correlation is less marked in subjects in which the teacher has an opportunity to hold pupils to the task until they have mastered it. (5) Intelligence tests are valuable as a supplement to teacher's judgment in determing whether pupils are working up to their mental capacity.[4]

In an attempt to group children for instruction, Glenn[5] administered three different intelligence tests, four separate academic tests, and five different "motor" tests to each of the children in grades six through eight of a school in Somerville, Massachusetts. She then correlated the score the pupils received on each of the fifteen tests with their rank in class as determined by the teacher. The results were a series of low correlations, except for the correlation of general intelligence and language comprehension, which was high. In general, the correlations between the various academic subjects and the results of the general intelligence

---

[4]John W. Shideler, "Correlations of Teacher's Grades and Scores on Intelligence Tests," School Review, XXIX, (December, 1921), pp. 733-734.

[5]Irene Glenn, "A Report on the Correlation of Psychological Tests with Academic and Manual Subjects." Journal of Educational Psychology, XIII, (November, 1922), pp. 496-500.

tests were higher than the correlations of test combinations involving non-academic areas of the curriculum.

Feingold discovered that the coefficient of correlation in the three upper elementary grades of the school he studied varied from +.4 to +.7 between intelligence quotients obtained from a modified form of the Army Alpha Tests and the final examination scores in a variety of subjects. He also concluded that the degree of correlation between intelligence and what he terms scholarship is greatly influenced by the method of measuring scholarship. To prove this point he correlated the school marks received on final written examinations with the intelligence quotients and compared the results with the correlations between the same intelligence quotient and achievement as measured by the school marks received as a result of oral recitation. The average of all the correlations between intelligence quotient and achievement as measured by the written final examination was found to be twenty-six per cent higher than the average correlation between intelligence quotient and achievement as measured by oral recitation school marks.[6]

In an ambitious study, Fleming used the students of the Horace Mann School for Boys and the Horace Mann School for Girls. The following factors were analyzed: average school

---

[6]Gustave A. Feingold, "Correlations Between Intelligence and Scholarship," School Review, XXXII, (June, 1924), p.466.

mark and general intelligence, reading and achievement score, chronological age, health, energy, teacher's estimate of intelligence, industry, attitude, emotional balance, leadership, perseverance, conscientiousness, desire to excel, mean of teacher's ratings for all groups, speed of movement, freedom from inertia, speed of objective decision, verbal memory, coordination of impulses, and volitional preservation. Unfortunately, most of her study was based on the opinions of teachers and is, therefore, of limited value. The factors which appeared to have the most influence on school marks were the teachers' estimates of intelligence, school attitude, energy, and chronological age. Fleming also recorded the fact that the school marks of girls were higher than those of boys.[7]

Using the data obtained from a long range Harvard University study of child growth, St. John compiled the intelligence quotients obtained from several tests of general intelligence administered to 958 students of the elementary schools of a Boston suburb. A correlation was then produced between the composite intelligence quotient and each of the following: teacher's marks, records of promotion, scores on the Haggerty Reading Examination, Scores on the Ayres Reading Scale, and scores on the Peet-Dearborn Progress Test in

---

[7] Cecile W. Fleming, A Detailed Analysis of Achievement in the High School (New York: Teacher's College, Columbia University, 1927), pp. 66-68.

Arithmatic. The coefficient of correlation of the composite intelligence quotient and the four year cumulative grade point average for each individual child was +.44 for the boys and +.55 for the girls. Concerning school marks, he concludes that the coefficient of correlation between grade point average and intelligent quotient is approximately +.50, but warns that there are marked exceptions to this generalization, especially for the boys.[8]

During the 1930's and 1940's numerous studies were conducted on the cumulative grade point averages of students grouped by sex. The universal conclusion was that girls receive higher cumulative grade point averages than boys. One such study included over 10,000 school marks and presented additional evidence that both men and women teachers assign girls the higher marks, women more so than men.[9] Speculations were made about the possible reasons for the difference in cumulative grade point average between the sexes, but no conclusion was reached. One researcher sought the opinions of his fellow teachers and found that the most common reasons given were that the girls had achieved greater maturity, were more meticulous, more punctual, and neater about their

---

[8] Charles W. St. John, Educational Achievement in Relation to Intelligence (Cambridge: Harvard University Press, 1930), pp. 100-147.

[9] Charles E. Garner, "Survey of Teachers' Marks," School and Community, XXI (January, 1942), p. 42.

written work.[10]

Tyler notes that because achievement tests and intelligence tests both rely on questions which are deliberately designed to give the same mean for both sexes, they are of no value in determining whether or not girls are more intelligent than boys.[11]

Textbooks in measurement and evaluation, as well as in some other areas of psychology, typically quote the figures +.50 to +.70 as the coefficient of correlation of school marks and intelligence quotients without any reference to the source of the coefficient of correlation. An example is the following from Guilford:[12]

> Designed originally for predicting academic success, intelligence tests have shown their greatest practical validity in that area. In the elementary grades and in high school, correlations between verbal-intelligence scores and achievement in terms of school marks have been typically in the range .5 to .7.

Despite the fact that Guilford footnoted extensively, he did not indicate the source of his figures.

The folly of reading the published marking procedures and objectives of a school system and then assuming that all

---

[10]Dean Lobaugh, "Girls, Grades and I. Q.'s," Nation's Schools, XXX (January, 1942), pp. 42-43.

[11]Leona E. Tyler, "Sex Differences," in Robert L. Ebel, ed., Encyclopedia of Educational Research (4th ed.; Macmillan Company, 1969), p. 1218.

[12]J. P. Guilford, Personality (McGraw-Hill Book Co., 1959), pp. 244-245.

teachers follow the stated procedures and objectives was demonstrated by Halliwell. He discovered that when a school system adopted an official policy of marking on an "individual basis," the teachers did not comply. Supposedly, in the school system he studied, teachers were to grade on the relative achievement of the student, regardless of intelligence quotient. Therefore, a student with a low intelligence quotient who demonstrated higher achievement than he had in the past was to be given a better school mark than a student with a high intelligence quotient who demonstrated little achievement in comparison with his past record of educational growth. The conclusion in this study was that there was no relationship between learning efficiency, i.e. achievement, and the school marks assigned by the teachers. Upon further examination he concluded that teachers were marking as they had in the past.[13]

According to Manson, any study of the relationship of intelligence quotient to cumulative grade point average must take into account the marking system utilized by the school system under study. He describes a school system in British Columbia which gave intelligence tests to each class and then required teachers to give only the specified number of A's,

---

[13]Joseph W. Halliwell, "The Relationship of Certain Factors to Marking Practices in Individual Reporting Programs," Journal of Educational Research, LIV, (October, 1960), p. 77.

B's, C's, D's, and F's to correspond to a normal curve for that class.[14] In a follow-up study of one such system, however, he found that the school marks did not differ significantly from those given before the requirement was mandated.[15]

SUMMARY

The earliest studies coincided with the appearance of intelligence tests. Studies during the 1930's and 1940's were concerned with sex differences. The interest in sex differences continued into the 1950's. Later studies have tended to use achievement tests instead of school marks as indicators of school success on the elementary level.

---

[14] Geoffrey Manson, "Studies and Reports--An Empirical Analysis of a System of Achievement Grading Based on the Distribution of Scholastic Aptitude in a Class." British Columbia Educational Research Council Report No. 8, 1965, in ERIC (ED-014113), pp. 1-7.

[15] Geoffrey Manson, An Investigation of Achievement Grading Based on Scholastic Ability Distribution (Victoria: British Columbia Educational Research Council, 1967) in ERIC (ED-014132), pp. 17-22.

Chapter III

METHODS AND PROCEDURES

It has been postulated that cumulative grade point averages are not reliable indicators of intelligence quotients. To test the stated hypothesis an examination was made of the permanent cumulative records of the fifty-two students of the 1970-1971 sixth grade class of Morrisonville Elementary School, Morrisonville, Illinois, a midwest community of approximately 1100 population.

The permanent cumulative records indicated that thirty-eight of the fifty-two students had attended Morrisonville Elementary School exclusively for the complete six years of their elementary education. The permanent cumulative records of these thirty-eight students were selected for use in the study, and the others were rejected.

At the close of each of the six school years, the child's teacher recorded on the permanent cumulative records a "yearly average" school mark for each of nine subjects: language, spelling, reading, social studies, mathematics, physical education, music, handwriting, and science. Thus for each child the permanent cumulative records contained six school mark averages for each of the nine subjects. All school marks were recorded on the cumulative records as A, B, C, D, or F. The cumulative grade point averages for each

student are recorded in Table 1.

The permanent cumulative records also contained two intelligence quotients. Information on the permanent cumulative records indicates that the earlier test, the Otis Quick-Scoring Test of Mental Ability, Beta Form,[1] was administered by a guidance counselor to part of the class on April 24, 1968, and to the remainder of the class on April 25, 1968. The permanent cumulative records also indicate that the second intelligence quotient was obtained from the SRA Test of Primary Mental Abilities[2] on October 15, 1970, and was administered by the same guidance counselor.

The intelligence quotients obtained from the SRA Test of Primary Mental Abilities and the intelligence quotients obtained from the Otis Quick-Scoring Test of Mental Maturity, Beta Form, were averaged to obtained an average intelligence quotient for each child. All are listed in Table 1.

Three of the nine subjects were selected for the study: mathematics, a skill subject; social studies, a content subject; and physical education, a non-academic subject. For these three subjects, the letter marks listed on the permanent cumulative records were converted to a number system as follows: A = 5; B = 4; C = 3; D = 2; and F = 1. Three

---

[1]Published by Harcourt, Brace & World, Inc., 1962.

[2]Published by Science Research Associates, 1963.

TABLE I

INTELLIGENCE QUOTIENTS AND CUMULATIVE GRADE POINT AVERAGES
GRADES 1 THROUGH 6

Student Number	SRA I.Q.	Otis I.Q.	Average I.Q.	Spelling	Reading	Handwriting	Mathematics	Language	Social Studies	Science	Music	Physical Education	Over-all G. P. A.
S1..	91	107	99.0	3.50	3.33	3.00	2.50	2.50	3.00	3.00	3.17	3.50	3.56
S2..	110	100	105.0	4.17	3.50	4.00	4.17	3.50	3.33	3.67	3.17	4.00	3.72
S3..	116	121	118.5	4.5	4.83	4.33	5.00	4.67	4.67	4.50	4.17	4.83	4.61
S4..	89	93	91.0	3.67	3.33	3.17	3.17	3.17	3.50	3.50	3.50	3.17	3.35
S5..	85	95	90.0	2.00	2.50	3.50	2.83	3.00	3.00	3.67	3.33	3.67	3.06
S6..	94	110	102.0	2.17	2.33	2.50	2.67	2.67	2.83	2.50	2.67	2.83	2.57
S7..	117	110	113.5	4.17	3.67	3.50	4.17	3.50	4.00	4.00	3.50	4.33	3.87
S8..	107	110	108.5	5.00	4.50	4.50	4.33	4.50	4.00	4.33	4.00	4.00	4.35
S9..	107	116	111.5	5.00	4.50	3.83	3.83	4.33	4.00	4.33	4.50	3.67	4.22
S10.	97	114	105.5	3.67	3.67	3.83	3.67	3.50	3.67	3.83	4.17	4.33	3.82
S11.	106	120	113.0	4.67	4.67	4.00	4.00	4.00	4.67	4.67	4.00	4.00	4.30
S12.	121	122	121.5	3.83	4.00	3.67	3.83	3.67	4.33	4.33	4.00	3.67	3.93
S13.	95	106	100.5	3.50	4.00	3.67	4.00	3.50	4.00	4.00	3.17	3.33	3.69
S14.	90	104	97.0	3.50	3.33	4.17	3.67	3.50	3.00	3.50	3.50	4.00	3.57
S15.	108	114	111.0	4.17	4.17	3.50	4.17	3.67	4.00	4.00	3.67	3.83	3.91
S16.	108	112	110.0	4.83	4.33	4.50	4.67	4.00	4.00	4.00	3.67	3.83	4.20
S17.	94	88	91.0	3.50	3.33	3.33	3.50	3.67	3.00	3.83	3.17	3.33	3.41
S18.	107	112	109.5	3.50	3.33	3.50	3.67	3.17	3.50	3.83	3.50	3.33	3.48
S19.	101	103	102.0	3.50	3.00	3.50	3.50	3.50	3.50	4.17	3.50	4.00	3.57
S20.	83	94	88.5	3.00	3.00	2.50	4.00	2.00	3.33	3.67	3.67	4.00	3.13

TABLE I-Continued

Student Number	SRA I.Q.	Otis I.Q.	Average I.Q.	Spelling	Reading	Handwriting	Mathematics	Language	Social Studies	Science	Music	Physical Education	Over-all
S21	135	119	127.0	4.50	5.00	4.50	4.33	4.33	4.50	4.50	4.50	5.00	4.57
S22	106	101	103.5	4.50	4.00	4.00	3.67	4.00	3.00	3.17	4.00	3.33	3.74
S23	93	102	97.5	4.00	3.33	4.00	3.17	4.50	3.00	3.00	3.33	3.17	3.50
S24	75	91	83.0	2.00	1.67	2.83	2.67	1.67	2.33	2.33	2.50	3.00	2.33
S25	112	118	115.0	4.50	3.83	4.50	4.50	4.17	3.83	4.00	4.00	3.83	4.13
S26	120	106	113.5	4.50	4.17	4.00	4.00	4.00	3.67	4.17	3.67	3.83	4.00
S27	101	111	106.5	3.33	3.00	3.00	2.83	2.83	3.17	3.17	2.50	3.00	2.98
S28	121	112	116.5	5.00	5.00	3.83	5.00	4.67	4.67	5.00	4.17	5.00	4.70
S29	107	102	104.5	4.67	4.50	4.83	4.50	4.67	4.33	4.17	4.00	4.17	4.43
S30	120	129	124.5	5.00	5.00	4.33	5.00	5.00	4.33	4.83	4.17	4.33	4.67
S31	115	116	115.5	4.67	4.83	4.17	4.83	4.50	5.00	5.00	4.00	4.17	4.57
S32	109	101	105.0	3.67	2.67	3.17	3.00	3.00	3.00	3.00	3.33	4.33	3.24
S33	130	137	133.5	4.67	4.83	4.50	5.00	4.67	4.67	5.00	4.83	4.50	4.74
S34	86	99	92.5	4.33	3.50	4.33	4.17	3.83	4.00	3.67	4.00	3.17	3.89
S35	101	105	103.0	3.83	3.67	3.67	3.67	4.17	3.50	3.83	4.33	3.33	3.78
S36	76	76	76.0	3.83	2.67	2.33	2.17	2.50	2.50	2.50	2.83	3.33	2.74
S37	85	92	88.5	3.00	3.33	3.33	3.00	3.33	2.67	3.67	3.17	4.00	3.28
S38	103	104	103.5	3.50	3.67	3.67	3.83	3.50	3.33	4.00	3.83	4.17	3.72
Ave	102.2	107.6	104.9	3.93	3.74	3.72	3.81	3.67	3.65	3.85	3.66	3.82	3.77

cumulative grade point averages were established for each of the thirty-eight students by averaging the six "yearly average" school marks in the following subjects: social studies, mathematics, and physical education. An over-all cumulative grade point average was established for the nine subjects, also.

The Pearson product-moment coefficient of correlation was then applied to the data to obtain the relationship between the intelligence quotient and each of the three cumulative grade point averages as well as the over-all cumulative grade point average. Significance was determined by means of a table of significant r's for varying degrees of freedom.[1]

---

[1]Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1956), p. 152.

Chapter IV

STATISTICAL ANALYSIS OF THE DATA

Intelligence quotient scores and six year cumulative grade point averages in nine school subjects were obtained from the permanent cumulative records of each of thirty-eight sixth grade students at the close of the 1970-1971 school year. An analysis of the correlation of each student's over-all cumulative grade point average, as well as cumulative grade point average in social studies, physical education, and mathematics with intelligence quotient is presented here.

INTELLIGENCE QUOTIENT AND OVER-ALL GRADE POINT AVERAGE

The thirty-eight individual sets of scores were listed randomly in pairs (see Table 2). The X scores represent the median intelligence quotient as obtained by averaging the scores from the Otis Quick-Scoring Mental Ability Test, Beta Form and the SRA Primary Mental Abilities Test, Revised Form; the Y column represents the over-all cumulative grade point average obtained by averaging the "yearly average" school marks recorded in the permanent cumulative records of each child. The individual scores in columns X and Y were "squared" and noted in the columns marked X^2 and Y^2. The final column represents the product of the individual's

TABLE 2

CALCULATING THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT: A CORRELATION OF INTELLIGENCE QUOTIENT AND OVER-ALL CUMULATIVE GRADE POINT AVERAGE

X	X^2	Y	Y^2	XY
99.0	9801.00	3.56	12.6736	352.440
105.0	11025.00	3.72	13.8384	390.600
118.5	14042.25	4.61	21.2521	546.285
91.0	8281.00	3.35	11.2225	304.850
90.0	8100.00	3.06	9.3636	275.400
102.0	10404.00	2.57	6.6049	262.140
113.5	12882.25	3.87	14.9769	439.245
108.5	11772.25	4.35	18.9225	471.975
111.5	10302.25	4.22	17.8084	470.530
105.5	11130.25	3.82	14.5924	403.010
113.0	12769.00	4.30	18.4900	485.900
121.5	14762.25	3.93	15.4449	477.495
100.5	10100.25	3.69	13.6161	370.845
97.0	9409.00	3.57	12.7449	346.290
111.0	12321.00	3.91	15.2881	434.010
110.0	12100.00	4.20	17.6400	462.000
91.0	8281.00	3.41	11.6281	310.310
109.5	11990.25	3.48	12.1104	381.060
102.0	10404.00	3.57	12.7449	364.140
88.5	7832.25	3.13	9.7969	277.005
127.0	16129.00	4.57	20.8849	580.390
103.5	10712.25	3.74	13.9876	387.090
97.5	9506.25	3.50	12.2500	341.250
83.0	6889.00	2.33	5.4289	193.390
115.0	13225.00	4.13	17.0569	474.950
113.0	12769.00	4.00	16.0000	452.000
106.0	11236.00	2.98	8.8804	315.880
116.5	13572.25	4.70	22.0900	547.550
104.5	10920.25	4.43	19.6249	462.935
124.5	15500.25	4.67	21.8089	581.415
115.5	13340.25	4.57	20.8849	527.835
105.0	11025.00	3.24	10.4976	340.200
133.5	17822.25	4.74	22.4676	632.790
92.5	8556.25	3.89	15.1321	359.825
103.0	10609.00	3.78	14.2884	389.340
76.0	5776.00	2.74	7.5076	208.240
88.5	7832.25	3.28	10.7584	290.280
103.5	10712.25	3.72	13.8384	385.020
3986.5	423841.75	143.33	554.1471	15295.910

intelligence quotient and over-all cumulative grade point average over the six year period. To determine the relationship between the two sets of scores, the Pearson product-moment coefficient of correlation was computed. The formula used was:

$$\frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{\left[N\Sigma X^2 - (\Sigma X)^2\right]\left[N\Sigma Y^2 - (\Sigma Y)^2\right]}}$$

The calculated results were:

$$r = \frac{38(15295.91) - (3986.5)(143.33)}{\sqrt{\left[38(423841.75) - (3986.5)^2\right]\left[38(544.1471) - (1433.33)^2\right]}}$$

$$r = \frac{581244.58 - 571385.045}{\sqrt{(16105986.5) - (15893182.25)(21057.59) - (20543.49)}}$$

$$r = \frac{9859.535}{\sqrt{(213804.25)(514.10)}}$$

$$r = \frac{9859.535}{\sqrt{10991674.925}}$$

$$r = \frac{9859.535}{10484.120}$$

$$r = .80$$

The results of this data indicate a positive relationship between intelligence quotient and over-all cumulative grade point average. Significance is at the .01 level.[1]

---

[1]Significance was determined by consulting the following: "Values of r, the Coefficient of Correlation, at the .05 and .01 levels of significanoe," in Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1956), p. 152.

TABLE 3

CALCULATING THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT: A CORRELATION OF INTELLIGENCE QUOTIENT AND SOCIAL STUDIES MARKS

X	X^2	Y	Y^2	XY
99.0	9801.00	3.00	9.0000	297.000
105.0	11025.00	3.33	11.0889	349.650
118.5	14042.25	4.67	21.8089	553.395
91.0	8281.00	3.50	12.2500	318.500
90.0	8100.00	3.00	9.0000	270.000
102.0	10404.00	2.83	8.0089	288.660
113.5	12882.25	4.00	16.0000	454.000
108.5	11772.25	4.00	16.0000	434.000
111.5	~~10302.25~~ 12432.25	4.00	16.0000	446.000
105.5	11130.25	3.67	13.4689	387.185
113.0	12769.00	4.67	21.8089	527.710
121.5	14762.25	4.33	18.7489	526.095
100.5	10100.25	4.00	16.0000	402.000
97.5	9409.00	3.00	9.0000	291.000
111.0	12321.00	4.00	16.0000	444.000
110.0	12100.00	4.00	16.0000	440.000
91.0	8281.00	3.00	9.0000	273.000
109.5	11990.25	3.50	12.2500	383.250
102.0	10404.00	3.50	12.2500	357.000
88.5	7832.25	3.33	11.0889	294.705
127.5	16129.00	4.50	20.2500	571.500
103.5	10712.25	3.00	9.0000	310.500
97.5	9506.25	3.00	9.0000	292.500
83.0	6889.00	2.33	5.4289	193.390
115.0	13225.00	3.83	14.6689	440.450
113.0	12769.00	3.67	13.4689	414.710
106.0	11236.00	3.17	10.0489	336.020
116.5	13572.25	4.67	21.8089	544.055
104.5	10920.25	4.33	18.7489	452.485
124.5	15500.25	4.33	18.7489	539.085
115.5	13340.25	5.00	25.0000	577.500
105.0	11025.00	3.00	9.0000	315.000
133.5	17822.25	4.67	21.8089	623.445
92.5	8556.25	4.00	16.0000	370.000
103.0	10609.00	3.50	12.2500	360.500
76.0	5776.00	2.50	6.2500	190.000
88.5	7832.25	2.67	7.1289	236.295
103.5	10712.25	3.33	11.0889	344.655
3986.5	423841.75	138.83	524.4713	14849.240

INTELLIGENCE QUOTIENT AND SOCIAL STUDIES

The same procedure was employed to determine the relationship between intelligence quotient and cumulative grade point average in social studies.

The calculated results were:

$$r = \frac{38(14849.24) - (3986.5)(138.83)}{\sqrt{[38(423841.75) - (3986.5)^2][38(524.4713) - (138.83)^2]}}$$

$$r = \frac{564271.12 - 553445.795}{\sqrt{(16105986.5) - (15893182.25)(19929.91) - (19273.77)}}$$

$$r = \frac{10825.325}{\sqrt{(213804.25)(656.14)}}$$

$$r = \frac{10825.325}{\sqrt{140285627.5}}$$

$$r = \frac{10825.325}{11844.223}$$

$$r = .91, .81$$

The results of this data indicate a positive relationship between intelligence quotient and cumulative grade point averages in social studies. Significance is at the .01 level.[2]

---

[2]Significance was determined by consulting the following: "Values of r, the Coefficient of Correlation, at the .05 and 01. levels of significance," in Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1956), p. 152.

TABLE 4

CALCULATING THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT: A CORRELATION OF INTELLIGENCE QUOTIENT AND PHYSICAL EDUCATION MARKS

X	X^2	Y	Y^2	XY
99.0	9801.00	3.50	12.2500	346.500
105.0	11025.00	4.00	16.0000	420.000
118.5	14042.25	4.83	23.3289	572.355
91.0	8281.00	3.17	10.0489	288.470
90.0	8100.00	3.67	13.4689	330.300
102.0	10404.00	2.83	8.0089	288.660
113.5	12882.25	4.33	18.7489	491.455
108.5	11772.25	4.00	16.0000	434.000
111.5	~~10302.25~~ 1243 225	3.67	13.4689	372.505
105.5	11130.25	4.33	18.7489	456.815
113.0	12769.00	4.00	16.0000	452.000
121.5	14762.25	3.67	13.4689	445.905
100.5	10100.25	3.33	11.0889	334.665
97.0	9409.00	4.00	16.0000	388.000
111.0	12321.00	3.83	14.6689	425.130
110.0	12100.00	3.83	14.6689	421.300
91.0	8281.00	3.33	11.0889	303.030
109.5	11990.25	3.33	11.0889	364.635
102.0	10404.00	4.00	16.0000	408.000
88.5	7832.25	4.00	16.0000	354.000
127.0	16129.00	5.00	25.0000	635.000
103.5	10712.25	3.33	11.0889	344.655
97.5	9506.25	3.17	10.0489	309.075
83.0	6889.00	3.00	9.0000	249.000
115.0	13225.00	3.83	14.6689	440.450
113.0	12769.00	3.83	14.6689	432.790
106.0	11236.00	3.00	9.0000	318.000
116.5	13572.25	5.00	25.0000	582.500
104.5	10920.25	4.17	17.3889	435.765
124.5	15500.25	4.33	18.7489	539.085
115.5	13340.25	4.17	17.3889	481.635
105.0	11025.00	4.33	18.7489	454.650
133.5	17822.25	4.50	20.2500	600.750
92.5	8556.25	3.17	10.0489	293.225
103.0	10609.00	3.33	11.0889	342.990
76.0	5776.00	3.33	11.0889	253.080
88.5	7832.25	4.00	16.0000	354.000
103.5	10712.25	4.17	17.3889	431.595
3986.5	423841.75	145.31	566.7625	15395.970

INTELLIGENCE QUOTIENT AND PHYSICAL EDUCATION

The same procedure was employed to determine the relationship between intelligence quotient and cumulative grade point average in physical education.

The calculated results were:

$$r = \frac{38(15395.97) - (3986.5)(145.31)}{\sqrt{[38(423841.75) - (3986.5)^2][38(566.76) - (145.31)^2]}}$$

$$r = \frac{585046.86 - 579278.315}{\sqrt{(16105986.5) - (15893182.25)(21536.98) - (21115.00)}}$$

$$r = \frac{5768.545}{\sqrt{(213804.25)(421.98)}}$$

$$r = \frac{5768.545}{\sqrt{22117.415}}$$

$$r = \frac{5768.545}{9498.48}$$

$$r = .61 \text{ ,} 60$$

The results of this data indicate a positive relationship between intelligence quotient and cumulative grade point average in physical education. Significance is at the .01 level.[3]

---

[3]Significance was determined by consulting the following: "Values of r, the Coefficient of Correlation, at the .05 and .01 levels of significance," in Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1956), p. 152.

TABLE 5

CALCULATING THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT: A CORRELATION OF INTELLIGENCE QUOTIENT AND MATHEMATICS MARKS

X	X^2	Y	Y^2	XY
99.0	9801.00	2.50	6.2500	247.000
105.0	11025.00	4.17	17.3889	437.850
118.5	14042.25	5.00	25.0000	592.500
91.0	8281.00	3.17	10.0489	288.470
90.0	8100.00	2.83	8.0089	254.700
102.0	10404.00	2.67	7.1289	272.340
113.5	12882.25	4.17	17.3889	473.295
108.5	11772.25	4.33	18.7489	469.805
111.5	~~10302.25~~ 12432.25	3.83	14.6689	427.045
105.5	11130.25	3.67	13.4689	387.185
113.0	12769.00	4.00	16.0000	452.000
121.5	14762.25	3.83	14.6689	465.345
100.5	10100.25	4.00	16.0000	402.000
97.0	9409.00	3.67	13.4689	355.990
111.0	12321.00	4.17	17.3889	462.870
110.0	12100.00	4.67	21.8089	513.700
91.0	8281.00	3.50	12.2500	318.500
109.5	11990.25	3.67	13.4689	401.865
102.0	10404.00	3.50	12.2500	357.000
88.5	7832.25	4.00	16.0000	354.000
127.0	16129.00	4.33	18.7489	549.910
103.5	10712.25	3.67	13.4689	379.845
97.5	9506.25	3.17	10.0489	309.075
83.0	6889.00	2.67	7.1289	221.610
115.0	13225.00	4.50	20.2500	517.500
113.0	12769.00	4.00	16.0000	452.000
106.0	11236.00	2.83	8.0089	299.980
116.5	13572.25	5.00	25.0000	582.500
104.5	10920.25	4.50	20.2500	470.250
124.5	15500.25	5.00	25.0000	622.500
115.5	13340.25	4.83	23.3289	557.865
105.0	11025.00	3.00	9.0000	315.000
133.5	17822.25	5.00	25.0000	667.500
92.5	8556.25	4.17	17.3889	385.725
103.0	10609.00	3.67	13.4689	378.010
76.0	5776.00	2.17	4.7089	164.920
88.5	7832.25	3.00	9.0000	265.500
103.5	10712.25	3.83	14.6689	396.405
3986.5	423841.75	144.00	571.8746	15470.055

INTELLIGENCE QUOTIENT AND MATHEMATICS

The same procedure was employed to determine the relationship between intelligence quotient and cumulative grade point average in mathematics.

The calculated results were:

$$r = \frac{38(15470.06) - (3986.5)(144.69)}{\sqrt{[38(423841.75) - (3986.5)^2][38(571.8746) - (144.69)^2]}}$$

$$r = \frac{587862.11 - 576806.69}{\sqrt{(16105986.5) - (15893182.25)(21731.23) - (20935.20)}}$$

$$r = \frac{11055.424}{\sqrt{(213804.25)(796.04)}}$$

$$r = \frac{11055.424}{\sqrt{170196735.17}}$$

$$r = \frac{11055.424}{13045.947}$$

$$r = .85, 73$$

The results of this data indicate a positive relationship between intelligence quotient and cumulative grade point average in mathematics. Significance is at the .01 level.[4]

---

[4]Significance was determined by consulting the following: "Values of r, the Coefficient of Correlation, at the .05 and .01 levels of significance," in Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1956), p. 152.

Chapter V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to attempt to determine the relationship of the intelligence quotient of each child in the sixth grade of Morrisonville Elementary School to the six year cumulative grade point average he obtained in three selected subjects, social studies, physical education, and mathematics, as well as to his over-all six year cumulative grade point average.

In a review of the literature it was found that the early studies of cumulative grade point averages coincided with the widespread use of intelligence tests, and that the studies involving cumulative grade point averages during the 1930's and 1940's were often concerned with sex differences. Later studies have tended to use achievement tests instead of cumulative grade point averages to determine success in school.

This study involved data from thirty-eight sixth grade students of the Morrisonville Elementary School. The data was obtained at the close of the 1970-1971 school year from the permanent cumulative records of each child. The intelligence quotients were obtained by averaging the intelligence quotients each child received from the Otis

Quick-Scoring Test of Mental Ability, Beta Form and the SRA Test of Primary Mental Abilities. The resulting score was correlated with the cumulative grade point average the child had acquired in three selected subjects, social studies, physical education, and mathematics, as well as with the child's over-all cumulative grade point average. The correlation was accomplished by the Pearson product-moment correlation coefficient technique. The results indicated the following positive correlations: over-all cumulative grade point average and intelligence quotient, ~~.94~~ .80; social studies cumulative grade point average and intelligence quotient, ~~.91~~ .81; physical education cumulative grade point average and intelligence quotient, ~~.61~~ .60; mathematics cumulative grade point average and intelligence quotient, ~~.85~~ .73.

A table of significant r's for various degrees of freedom was consulted, and all four r's were found significant at the .01 level.

CONCLUSIONS

This study found a high positive correlation to exist between intelligence quotient and over-all cumulative grade point average, as well as with cumulative grade point averages in social studies, physical education, and mathematics. All four relationships were found to be significant at the .01 level.

BIBLIOGRAPHY

Books

Bradfield, James M. and Moredock, H. Stewart. Measurement and Evaluation in Education. New York: Macmillan Co., 1957.

Buros, Oscar K. (ed.) The Sixth Mental Measurements Yearbook. Princeton: Gryphon Press, 1965.

Fleming, Cecile W. A Detailed Analysis of Achievement in the High School. New York: Teacher's College Press, 1927.

Garrett, Henry E. Elementary Statistics. New York: Longmans, Green and Company, 1956.

Good, Carter V. (ed.) Dictionary of Education. New York: McGraw-Hill Book Company, 1959.

Guilford, J. P. Personality. New York: McGraw-Hill Book Company, 1959.

St. John, Charles W. Educational Achievement in Relation to Intelligence. Cambridge: Harvard University Press, 1930.

Sorenson, Herbert. Psychology in Education. (3rd.ed.) New York: McGraw-Hill Book Company, 1954.

Tinker, miles A. and McCullough, Constance M. Teaching Elementary Reading. New York: Appleton-Century-Crofts, Inc., 1962.

Turabian, Kate L. A Manual for Writers of Term Papers, Theses and Dissertations. Chicago: University of Chicago Press, 1955.

Periodicals

Bolton, F.B. "Value of Several Intelligence Tests for Predicting Scholastic Achievement," Journal of Educational Research, XLI, (October, 1947), pp. 133-138.

Carter, Robert S. "How Invalid are Marks Assigned by Teachers?" Journal of Educational Psychology, XLIII, (April, 1952), pp. 218-228.

Day, Lawrence C. "Boys and Girls and Honor Ranks," School Review, XLVI, (March, 1938), pp. 288-299.

Douglass, H. R. "Relation to High School Marks to Sex in Four Minnesota Senior High Schools," School Review, XLV, (March, 1937), pp. 282-288.

Edmiston, R. W. "Do Teachers Show Partiality toward Boys or Girls?" Peabody Journal of Education, XX, (January, 1943), pp. 234-238.

Feingold, Gustave A. "Correlations between Intelligence and Scholarship," School Review, XXXII, (June, 1924), pp. 455-467.

Garner, Charles E. "Survey of Teacher's Marks," School and Community, XXI, (January, 1935), pp. 116-117.

Glenn, Irene, "A Report on the Correlation of Psychological Tests with Academic and Manual Subjects," Journal of Educational Psychology, XIII, (November, 1922) pp. 496-500.

Halliwell, Joseph W. "The Relationship of Certain Factors to Marking Practices in Individualized Reporting Programs," Journal of Educational Research, LIV, (January, 1960), pp. 76-78.

Knief, Lotus M. and Stroud, James B. "Intercorrelations Among Various Intelligence, Achievement and Social Class Soores," Journal of Educational Psychology, L, (January, 1959), 117-120.

Loubaugh, Dean "Girls, Grades and I. Q.'s," Nation's Schools, XXX, (January, 1942), p. 42.

McNemar, Quinn "Lost-Our Intelligenoe-Why?" American Psychologist, XIX, (December, 1964), pp. 871-882.

Nelson, Martin J. "Intelligence and Special Aptitude Tests," in Encyclopedia of Educational Research, ed. by Robert L. Ebel (4th ed) London: Macmillan Company, 1969,

Newton, R. F. "Do Men Teachers Grade Higher than Women Teachers," School and Society, LVI, (January, 1942), pp. 70-73.

Passow, A. Harry. "The Maze of research on Ability Grouping," Education Digest, XXVIII, (January, 1962), pp. 18-20.

Pressey, S.L. "The Efficiency of a Group Scale of Intelligence in Prognosticating Success and Failure in Junior High School," Journal of Applied Psychology, III, (December, 1919), pp. 381-383.

Russell, I. L. and Talman, William H. "Personality: Does It Influence Teacher's Marks?" Journal of Educational Research, XLVIII, (April, 1955), pp. 563-564.

Shideler, John W. "Correlations of Teacher's Grades and Scores on Intelligence Tests," School Review, XXIX, (December, 1921), pp. 733-734.

Shinner, Mack C. "Failure Ratio: Two Boys to One Girl," Clearing House, XVIII, (March, 1944), pp. 264-270.

Swenson, Clifford. "Packing the Honor Society," Clearing House, XVI, (June, 1942), pp. 521-524.

Thorndike, Robert L. "Intellectual Status and Intellectual Growth," Journal of Educational Psychology, LVII, (January, 1966), pp. 121-127.

Tyler, Leona. "Sex Differences," in Encyclopedia of Educational Research, ed. by Robert L. Ebel (4th ed.) London: Macmillan Company, 1969.

Volberding, Eleanor. "Characteristics of Successful and Unsuccessful Eleven-year Old Pupils," Elementary School Journal, XLIX, (May, 1949), pp. 410-419.

Yourman, Julius. "The Case Against Group I. Q. Testing," Phi Delta Kappan, XLVI, (February, 1964), pp. 108-110.

Whitcomb, M. Edith. "Intelligence Tests in the Primary Grades," Journal of Educational Research, V, (January, 1922), pp. 58-61

REPORTS

Manson, Geoffrey. An investigation of Achievement Grading Based on Scholastic Ability Distribution (Victoria: British Columbia Educational Research Council, 1967) in ERIC (ED-014132), pp. 17-22.

Manson, Geoffrey. "Studies and Reports-An Empirical Analysis of a System of Achievement Grading Based on the Distribution of Scholastic Aptitude in a Class." British Columbia Educational Research Council Report No. 8, 1965, in ERIC (ED-014113).

UNPUBLISHED MATERIAL

Carey, Joseph E. "The Relationship between Creative Thinking Ability, Intellectual Ability, Educational Achievement, and Writing Ability of Sixth Grade Children." Unpublished Ed.D. dissertation, Indiana University, 1966.