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An Investigation of the values of some factors influencing student achievement

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AN INVESTIGATION OF THE VALUES OF SOME FACTORS INFLUENCING STUDENT ACHIEVEMENT

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CHAPTER I

THE PROBLEM AND DEFINITIONS OF TERMS USED

"An attempt to predict underlies every use of testing."[1] For some time there has existed a question among educators as to the value of intelligence quotients in the determination of teacher marks or grades, and more recently there has been frequent mention of personality as a determiner of these marks or grades.

I. THE PROBLEM

Statement of the problem. It was the purpose of this investigation to compare and analyze intelligence quotients, personality scores, scholarship indexes, and General Educational Development scores of students; and by these comparisons and analyses, secure a picture of their relative values as determiners and predictors of the indexes and of the trends of accomplishment.

Importance of the investigation. Teacher marks are often discussed as to their validity and subjectivity, and as to factors involved in their making. In spite, however, of these frequent discussions there is little evidence that

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[1] Lee J. Cronbach, Essentials of Psychological Testing. (New York: Harper and Brothers), p. 9.

much has been done beyond the discussion period to increase their validity, to decrease their subjectivity, or to determine definitely objective criteria for their formation.

In this study an attempt was made to compare and correlate intelligence quotients and personality scores, two factors often used in the establishment of teacher marks, with school marks. Additional comparisons were also made involving General Educational Development scores in an effort to secure indications of achievement trends.

II. DEFINITIONS OF TERMS USED

Intelligence quotients. The intelligence quotient is the ratio between the mental age and the chronological age. The instrument used in this study for determining the intelligence quotient of the pupils studied was the Otis Quick Scoring Test of Mental Ability.

Personality rating. The personality rating is a rating of an individual's total behavior in social situations as secured by the California Test of Personality.

General educational scores. General educational scores are standard scores derived from the interpolation of raw scores secured on these tests into standard scores. This interpolation was made by the use of a table furnished with the General Educational Development tests.

III. LIMITATIONS

This investigation was subject to considerable limitation in that data were secured through group testing methods; in light of the fact that personality testing is of decidedly debatable validity; because in this study the author was able to use only twelve (12) of the innumerable facets of personality as a basis for comparison; and in the limitation of cases since only one hundred twenty four (124) cases were used.

IV. ORGANIZATION OF THE REMAINDER OF THE THESIS

In Chapter II the author has attempted to review literature that is pertinent to this investigation and has followed this material with a Chapter (III) concerning the materials used and the groups studied.

Chapter IV embodies the techniques and the results of computations while Chapter V is devoted to summary and conclusions of this investigation.

CHAPTER II

REVIEW OF THE LITERATURE

Much has been written concerning intelligence quotients, and a great deal of material may be found on the general discussion of personality, but only fragmentary material is to be secured on the measurement of personality, and very, very little material is available on the comparison of intelligence and personality, or upon their influence upon indexes.

Literature on measurement of personality. Arthur E. Traxler,[2] in calling attention to the unique nature of "The California Test of Personality" series, indicates that the majority of personality inventories are tests for use with individuals from the beginning of the secondary to the adult levels.

Engle,[3] in a study made in South Bend, Indiana, used personality tests to measure adjustment of young Negro children and white Amish children with a control group of white non-Amish children. These tests revealed that the white

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[2] Arthur Edwin Traxler, "Measurement in the Field of Personality," Education, March, 1946.

[3] T. L. Engle, "Personality Adjustment of Children Belonging to Two Minority Groups," Journal of Educational Psychology, Vol. 26, No. 9, December, 1945.

non-Amish children were better adjusted than the pupils of the minority groups although no detailed personality patterns were found to be characteristic of these children.

Studies by Claude Thompson[4] and Eleanor Volkerding[5] are perhaps the most closely related works found by this author. Thompson's study was to determine whether or not greatest success in dental school is related to personality traits. The Volkerding study used personality tests in determining degrees of school success wherein the successful child was defined as one who was achieving academically according to his ability, and who was well adjusted socially in the school setting.

Literature on measurement of intelligence. Freeman[6] lists three concepts of intelligence--the organic, the social, and the psychological or behavioristic. He considers that the third is the only one which is of direct concern to intelligence testers and calls the others "factors of intelli-

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[4] Claude E. Thompson, "Personality and Interest Factors in Dental School Success," Educational and Psychological Measurement, Vol. 4, pp. 299-306, Winter, 1944.

[5] Eleanor Volkerding, "Characteristics of Successful and Unsuccessful Eleven Year Old Pupils," Elementary School Journal, March, 1949, pp. 405-10.

[6] Frank N. Freeman, "The Meaning of Intelligence; Its Nature and Nurture," Thirty-Ninth Year Book of the National Society for the Study of Education, Pt. 1, Chap. 1, pp. 11-20.

gence." This concept accepts as intelligence the types of behavior which are measured by intelligence tests.

Spearman[7] presented his two-factor theory of intelligence in 1904, in which he spoke of general factors present in all types of performance, and of specific factors which join with the general factors to determine total activity. He later added a third type of factor[8] called "Group factors" which represents overlapping of specific factors.

Following the ideas of Spearman, the ideas of L. L. Thurston[9] should be mentioned. He advances the ideas of Primary Mental Abilities. This type of testing is so new that this author was forced to disregard it in this study because of limited data.

In another vein of thought on intelligence testing Dearborn[10] in his discussion of "The Ploicy of the School and of Society" speculated that testing, if too extensive, might tend to create a caste system of "intellectual aristocracy."

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[7] Charles Spearman, "General Intelligence, Objectively Determined and Measured." American Journal of Psychology, Vol. 15, pp. 201-93.

[8] Ibid., The Abilities of Man (New York: Macmillan Co., 1927), p. 82.

[9] L. L. Thurston, The Nature of Intelligence, (New York: Harcourt, Brace and Co., Inc., 164 pp.).

[10] W. F. Dearborn, Intelligence Tests (Boston: Houghton Mifflin Company), p. 314.

In contrast to the above expressed idea, we might note the statements expressed in an article in the May, 1950, Atlantic Monthly, by Doctor J. Russell Gallagher.[11] He states that Intelligence Quotients will not tell the whole story and he adds that "the child must be given what he needs and not what the school wants him to have."

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[11] J. Russell Gallagher, M.D., "Why Boys Fail," Atlantic Monthly, pp. 49-52, May, 1950.

CHAPTER III

THE MATERIALS USED AND THE GROUPS STUDIED

The California Test of Personality. The California Test of Personality was used in securing the personality ratings in this study. This test was first administered to the entire student body of the Linden High School in Montgomery County, Indiana. The test was given as a group test with the entire group assembled in an auditorium. Tests were passed out by rows and instructions were given verbally as to the purpose and intent of the test. Reference was made to the printed instructions contained in the test. At a later date the above mentioned procedure was followed in administering the test to three groups of students at the Indiana State Teachers College Laboratory School, Terre Haute. These groups included in turn, the senior class, the junior class, and the second-term sophomores. No time limit was set, and the groups were held as groups until each test was completed. The tests were scored at once and percentile ratings were affixed to each section of the test and to the total test.

Otis Quick Scoring Test of Mental Ability. The intelligence quotients were secured from the cumulative records of the two high schools. These quotients had been determined by the administration and scoring of the Otis Quick

Scoring Test of Mental Ability, and had been recorded in the cumulative records of the two schools.

General Educational Development Tests. The General Educational Development tests were given to the seniors at the Laboratory School in a series of five two hour sessions, after which the tests were scored, and the raw scores were transposed into standard scores to better enable the author to make comparisons of standardized data.

Scholarship indexes. The scholarship indexes were secured from the same cumulative record cards that were mentioned in connection with the Intelligence Quotients. These indexes were determined by the process of counting letter grades in the following manner:

A . . . 4	C . . . 2.0
A- . . . 3.7	C- . . . 1.7
B+ . . . 3.3	D+ . . . 1.3
B . . . 3	D . . . 1
B- . . . 2.7	D- . . . 0.7
C+ . . . 2.3	F . . . 0

Upon securing the scholarship points, a ratio between the points and the attempted credit hours was set up. Thus, a scholarship of 100 (16 points/16 hours earned) would make a record of 4 "A's" while a scholarship index of 25 (4 points/16 hours earned) would represent the lowest passing grade--4 "D's".

When all available material had been secured and tabu-

lated, all individuals whose tabulations were incomplete were stricken from the investigation, and only those were used whose data were complete. A total of one hundred and twenty-four (124) pupils was included in a final comparison i.e. Scholarship Index vs. Intelligence Quotient; Scholarship Index vs. Total Personal Adjustment; Scholarship Index vs. Self Adjustment; Scholarship Index vs. Social Adjustment; Intelligence Quotient vs. Total Personal Adjustment; Intelligence Quotient vs. General Educational Development; Scholarship Index vs. General Educational Development; Personality vs. General Educational Development; Social Adjustment vs. General Educational Development; School Attitude vs. General Educational Development; Average of Intelligence Quotients and Personality Percentiles vs. Scholarship Index; Average Intelligence Quotient, Personality, and General Educational Development vs. Scholarship Index; but it is to be noted that only thirty-four pupils were used in comparisons involving the above named and the General Educational Development scores.

CHAPTER IV

TECHNIQUE AND RESULTS OF COMPUTATIONS

The scores derived from the intelligence tests and the scholarship indexes ascertained by the aforementioned method were placed on a correlation table to show their relationship by use of the Pearson Product-Moment Method.

Upon completion of the computation of the correlation coefficient, it was found that there existed a positive coefficient of correlation of .573, p.e. .227. The computation for this correlation is shown in Figure 1, page 21 of the Appendix.

The next step was the placing of the index scores upon another correlation table (Figure 2, page 22, Appendix) with the personality rating scores, and an identical process was used to determine their correlation. In this computation the correlation was found to be positive in nature and equal to .117 p.e.$\pm$ .03.

Following the correlating of the indexes and personality scores, the author selected the group of scores from the personality test that are known as "Self-Adjustment" scores and repeated the correlating process, and secured a very small positive correlation (.108 p.e.$\pm$ .08). These data and correlation are found in Figure 3, page 23 of the Appendix.

The next computation was the securing of the correlation between Indexes and the section of the Personality score known as "Social Adjustment". This proved to be positive (.15) as shown in Figure 4, page 24 of the Appendix.

The author went one step farther and compared Intelligence Quotients with Personality scores. Interestingly enough there existed virtually no correlation, i.e.- .056. The computation for this correlation will be found in Figure 5, page 25 of the Appendix.

Considering the before mentioned comparisons, it will be noted that there is only one correlation that is large enough to be considered significant. That is the .573 correlation existing between Intelligence Quotients and Indexes. There appears, however, something that to the author was interesting if not significant. That was the fact that while there was no correlation between Intelligence and Personality, there did exist throughout a small positive correlation between Indexes and the facets of Personality i.e. Total Adjustment, Self-Adjustment, and Social Adjustment in the following order: .117, .108, .150.

Following the completion of the above mentioned comparisons, the author then applied the same technique to Intelligence Quotients and General Educational Development scores and secured a positive and significant correlation of .667. (Figure 6, page 26, Appendix)

Another comparison was made between the Scholarship Indexes of the senior class of the Laboratory School and their General Educational Development Scores. A positive correlation of .581 was found. (Figure 7, page 27, Appendix.)

The Personality Ratings were then compared with General Educational Development scores and a negative correlation of -.18 was secured. (Figure 8, page 28, Appendix.) Social Adjustment Scores and General Educational Development scores produced a negative correlation of -.260. (Figure 9, page 29, Appendix.) Then a comparison was made between scores on a personality sub-test listed as School Relationship and the General Educational Development scores, and a positive relationship of .236 was found. (Figure 10, page 30, Appendix.)

The author, continuing to seek the highest correlating factors of the investigation, applied previously discussed methods of comparison to averages of Intelligence Quotients and percentile ratings of Personality Scores against Scholarship Indexes and in so doing secured a positive correlation of .533. (Figure 11, page 31, Appendix.)

The above comparison was followed by one in which the Intelligence Quotients, Personality Ratings, and General Educational Development scores of the seniors of the Indiana State Laboratory School were averaged and compared with their Scholarship Indexes. The result of this comparison was a positive correlation of .580. (Figure 12, page 32, Appendix.)

A final comparison was made assigning letter grades to Intelligence Quotients and to General Educational Development Scores. These were compared to determine those students who achieved, as indicated by the General Educational Development Scores, within the range of expectancy as indicated by their Intelligence Quotients. The results in this comparison were as follows:

18 students achieved as expected
15 students achieved above expectancy
1 student achieved below expectancy

Following the above comparison, the author made a careful study of the various facets of the Personality Test and secured the following information:

12 of the 18 students who achieved according to expectancy were below the 50th percentile in that section of the Personality Test known as School Relationship.

10 of the 15 students who surpassed their expectancy had scores above the 50th percentile in the same test section.

2 of the 15 students who exceeded their expectancy had total Social Adjustment scores on the 50th percentile or above.

The one student who fell below expectancy had very low percentile ratings in both School and Community Relationship. (Figure 13, page 33, Appendix.)

CHAPTER V

SUMMARY AND CONCLUSIONS

The controversy among educators concerning determiners of teachers marks brought to the author's attention the need of some objective study in this field. The problem, that of the inter-comparison of Intelligence Quotients, Personality scores, Scholarship Indexes, and General Educational Development Test scores, and of attempting to determine their relative significance as determiners of student marks and achievement was then considered. The importance of this study is based on the obvious need of more objective criteria for the formulating of marks and the prediction of achievement.

The terms--Intelligence Quotient, Personality Rating, and General Educational Development scores--as used in the study are qualified as to the type of objective tests used in their establishment.

In investigating materials related to this study, the author was able to find a very limited number of studies or statements that were pertinent.

In summarizing the materials used and the groups studied, three tests were used: the Otis Quick Scoring Test of Mental Ability, The California Test of Personality, and General Educational Development Tests. From the cumulative records of the students of Linden High School, Montgomery County,

Indiana, and of the Indiana State Teachers College Laboratory School, Terre Haute, Indiana, the scholarship indexes were secured. The test results and the indexes were then compared, and correlations were determined as follows:

Index and Intelligence Quotients	.573
Scholarship Indexes and Personality Ratings	.117
Scholarship Indexes and Self Adjustments	.108
Scholarship Indexes and Social Adjustments	.150
Personality Ratings and Intelligence Quotients	.056
G.E.D. and Intelligence Quotients	.667
G.E.D. and Scholarship Indexes	.581
G.E.D. and Personality Ratings	-.180
G.E.D. and Social Adjustments	-.260
G.E.D. and School Relationships	.236
Average I.Q. and Personality vs. Index	.533
Average I.Q., Personality, and G.E.D. vs. Index	.580

Intelligence Quotients and General Educational Development scores were then placed on a normal distribution curve, and the author found that by this comparison eighteen (18) students achieved as expected, fifteen (15) students achieved above expectancy, and one (1) student achieved below expectancy.

The author after careful study of materials and data in this investigation has arrived at the following conclusions:

1. Intelligence quotients are better predictors of General Educational Development than are teacher marks.

2. There exists no relationship between intelligence and personality.

3. Total personality can not be used reliably as a

predicting factor of achievement.

4. Certain facets of personality have a positive but slight relation with achievement.

5. Scholarship indexes may have been somewhat affected by personality traits. (There were isolated cases in the final comparison.)

6. Teacher marks are open to question as to validity. (Index and G.E.D. had a correlation of .581 in this study.)

7. Achievement prediction based on intelligence quotients will likely be of some value.

8. Certain facets of personality seemingly assist a large percentage of the over-achievers.

9. This study indicates that intelligence may have been the outstanding influencing factor for other over-achievers.

10. This study indicates lack of any highly valid means of prediction as far as the data available for the study goes.

11. The study was too limited to offer definite conclusions.

12. The author feels that this study contains evidence warranting further study of personality and personality traits as aids in predicting future scholastic achievement.

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APPENDIX

I.Q. \ Index	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	f	d	fd	fd^2	xy
135-139									1							1	6	6	36	12
130-134												1				1	5	5	25	25
125-129													1			1	4	4	16	24
120-124					2		1	1	2	1	2		2	3		14	3	42	126	141
115-119		1							1			3		2		7	2	14	28	52
110-114		1	1		1		4	5				2	2	2		18	1	18	18	30
105-109	1	1	3	1		3	1	2	2	3	1	2		1		21				
100-104			1	2	2	3	3	6	1		1	1		1		21	-1	-21	21	-7
95-99		1		3	6	5	2	2	2		1					22	-2	-66	132	34
90-94			1	1	2	1	1	1								7	-3	-21	63	45
85-89	1	1	1			1	1									5	-4	-20	80	64
80-84		1		1		1		1								4	-5	-20	100	40
75-79																0	-6			
70-74			1	1												2	-7	-14	98	49
f	2	6	8	9	13	14	13	18	9	4	5	9	5	9		124		-73	743	509
d	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7						
fd	-12	-30	-32	-27	-26	-14		18	18	12	20	45	30	63		65				
fd^2	72	150	128	81	52	14		18	36	35	80	225	180	441		1513				

$c_x = .524$ $\quad s_x^2 = \frac{1513}{124} = 12.2$ $\quad c_y = -.588$ $\quad s_y^2 = 5.98$

$\bar{\sigma}_x = 3.49$ $\quad \bar{\sigma}_y = 2.44$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\bar{\sigma}_x \; \bar{\sigma}_y} = \frac{4.10 + .208}{7.52} = .573$$

FIGURE I

CORRELATION OF INDEX AND I.Q.

Per. Adj.	Index 25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	f	d	fd	fd^2	xy
95-99				2									1			3	10	30	300	0
90-94						1							1	1		3	9	27	243	108
85-89				1	1		2	1								5	8	40	320	-32
80-84	1				1	1	1	2	3		2			1		12	7	84	588	98
75-79				1	1	1						1	1			5	6	30	180	19
70-74				1			1	1	2			1				6	5	30	150	25
65-69					1	1					1		1			4	4	16	64	28
60-64		1		1	1						1					4	3	12	36	-18
55-59					1			1						1		3	2	6	12	12
50-54			1			1		1				2				5	1	5	5	1
45-49	1		1		1	2	3	1	1					4		14				
40-44		1	1	1	1	3	1	5	2		1	4				20	-1	-20	20	- 15
35-39		1	3		2	1		1				1				9	-2	-18	36	42
30-34			1	1		2	1	1		2						8	-3	-24	72	6
25-29		1						3	1	2						7	-4	-28	112	-24
20-24			1			1	2	1								5	-5	-25	125	20
15-19													1			1	-6	-6	36	-36
10-14				1	1		1							1		4	-7	-28	196	-14
5-9		1			1		1							1		4	-8	-32	256	0
0-4		1			1											2	-9	-18	162	63
f	2	6	8	9	13	14	13	18	9	4	5	9	5	9		124		81	2813	283
d	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7						
fd	-12	-30	-32	-27	-26	-14		18	18	12	20	45	30	63		65				
fd^2	72	150	128	81	52	14		18	36	36	80	225	180	441		1513				

$c_x = .524 \quad \sigma x = 3.49 \qquad c_y = .653 \quad \sigma y = 4.76$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{2.28 - .342}{16.61} = .117$$

FIGURE II

CORRELATION OF INDEX AND TOTAL ADJUSTMENT

Self Adj. \ Index	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	f	d	fd	fd^2	xy
95-99				2				1					1			4	10	40	400	10
90-94						1			1				1			3	9	27	243	63
85-89	1													1		2	8	16	128	56
80-84					2		2	2			1					7	7	49	343	14
75-79				1		3	1				1	1				7	6	42	252	18
70-74					2		1	1	1					1		6	5	30	150	30
65-69					3	1	1		1							6	4	24	96	-20
60-64				2				1	1			1				5	3	15	45	6
55-59											1	1	2	1		5	2	10	20	58
50-54		2	1		1		1		1							6	1	6	6	-14
45-49	1		1			2		2	1		1			1		9				
40-44			1			2	1	3	1			4		2		14	-1	-14	14	-33
35-39			3				3	2				1		1		10	-2	-20	40	-4
30-34		1		1	1	1	1	2		2		1				10	-3	-30	90	3
25-29			1	1	2	1			2	2	1					10	-4	-40	160	-8
20-24		1				1		2								4	-5	-20	100	20
15-19						1		1					1			3	-6	-18	108	-36
10-14			1	2	1	1	2	1						1		9	-7	-63	441	35
5-9														1		1	-8	-8	64	-56
0-4		2			1											3	-9	-27	243	108
f	2	6	8	9	13	14	13	18	9	4	5	9	5	9		124		19	2943	232
d	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7						
fd	-12	-30	-32	-27	-26	-14		18	18	12	20	45	30	63		65				
fd^2	72	150	128	81	52	14		18	36	36	80	226	180	441		1513				

$c_x = .524 \quad \sigma_x = 3.49 \qquad c_y = .153 \quad \sigma_y = 4.82$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{1.791}{16.82} = .108$$

FIGURE 3

CORRELATION OF INDEX AND SELF ADJUSTMENT

Soc. Adj. \ Index	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	f	d	fd	fd^2	xy
95-99				1									1		2	10	20	200	30
90-94				2	1	1	2	2	1		1	1	2	1	14	9	126	1134	207
85-89						1			2		1			1	5	8	40	320	112
80-84						1		1			1				3	7	21	147	28
75-79					2	1	1		1				1		6	6	36	216	18
70-74	1			1	2		1		1					1	7	5	35	175	-20
65-69		1		1	1		1					2			6	4	24	96	
60-64						1		1			1	1			4	3	12	36	24
55-59		1	1	1		1	1	2			1			1	9	2	18	36	
50-54					2	1		1	1					2	7	1	7	7	14
45-49	1		2		1	3		3	1			2			13				
40-44		1	2	1	2	1		1	1			1	1	1	11	-1	-11	11	
35-39			2			1	1	4		1		2			11	-2	-22	44	-18
30-34			1			2	1	2		1					7	-3	-21	63	3
25-29								1		1				1	3	-4	-12	48	-52
20-24		1							1	1			1		4	-5	-20	100	-30
15-19					1		1								2	-6	-12	72	12
10-14				1			1								2	-7	-14	98	21
5-9		1		1			2							1	5	-8	-40	320	8
0-4		1			1		1								3	-9	-27	243	63
f	2	6	8	9	13	14	13	18	9	4	5	9	5	9	124		160	3366	420
d	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7					
fd	-12	-30	-32	-27	-26	-14		18	18	12	20	45	30	63	65				
fd^2	72	150	128	81	52	14		18	36	36	80	225	180	441	1513				

$c_x = .524$ $\quad \sigma_{\bar{x}} = 3.49$ $\quad c_y = 1.29$ $\quad \sigma_{\bar{y}} = 5.22$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_{\bar{x}}\ \sigma_{\bar{y}}} = \frac{3.39 - .676}{18.12} = .15$$

FIGURE 4

CORRELATION OF INDEX AND SOCIAL ADJUSTMENT

Per. Adj.	I.Q. 70-74	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-129	130-134	135-139	f	d	fd	fd^2	xy
95-99			1			1					1				3	10	30	300'	-40
90-94						1	1				1				3	9	27	243	
85-89						2		1	1		1				5	8	40	320	
80-84				1		2	3	3		1	2				12	7	84	588	-21
75-79						2		2	1						5	6	30	180	-18
70-74							2	1	2		1				6	5	30	150	15
65-69			1			2						1			4	4	16	64	-20
60-64			1			1	1				1				4	3	12	36	-15
55-59									1		2				3	2	6	12	14
50-54					1		2		1	1					5	1	5	5	- 2
45-49					1	1	3	4	4	1					14				
40-44	1		1	1	2	3	3	4	1	2	1		1		20	-1	-20	20	18
35-39	1					1	3	3			1				9	-2	-18	36	18
30-34				2		3		2	1						8	-3	-24	72	39
25-29				1			1	1	2		1			1	7	-4	-28	112	-24
20-24							2		2		1				5	-5	-25	125	-15
15-19									1						1	-6	-6	36	- 6
10-14					1	2					1				4	-7	-28	196	28
5-9					1	1				2					4	-8	-32	256	8
0-4					1				1						2	-9	-18	162	18
f	2	0	4	5	7	22	21	21	18	7	14	1	1	1	124		81	2813	-3
d	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6					
fd	-14		-20	-20	-21	-44	-21		18	14	42	4	5	5	-73				
fd^2	98		100	80	63	88	21		18	28	126	16	25	30	743				

$c_x = .588$ $\sigma_x = 2.44$ $c_y = .653$ $\sigma_y = 4.76$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{.0242 - (-.627)}{11.61} = -.056$$

FIGURE 5

CORRELATION OF I.Q. AND TOTAL PERSONAL ADJUSTMENT

G.E.D. \ I.Q.	84-87	88-92	93-96	97-100	101-104	105-108	109-112	113-116	117-120	121-124	125-128	129-132	133-136	137-140	141-144	f	d	fd	fd²	xy
325-334										1						1	7	7	49	14
315-324									1						1	2	6	12	72	48
305-314																0	5			
295-304									2							2	4	8	32	8
285-294						1	2		1							4	3	12	36	-9
275-284					1			1		2			1			5	2	10	20	14
265-274					1	1	1									3	1	3	3	-6
255-264					1	1										2				
245-254			1	1	2											4	-1	-4	4	15
235-244			2		1											3	-2	-6	12	26
225-234		1	1	1	1	1										5	-3	-15	45	50
215-224																0	-4			
205-214						1										1	-5	-5	25	10
195-204																-	-6			
185-194	1															1	-7	-7	49	49
175-184	1															1	-8	-8	64	56
f	2	1	4	2	7	5	3	1	4	3			1		1	34		7	411	275
d	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	5	7					
fd	-14	-6	-20	-8	-21	-10	-3		4	6			5		7	960				
fd²	98	36	100	32	63	20	3		4	12			25		49	442				

$c_x = -1.77 \quad \sigma_x = 3.64 \qquad c_y = .206 \quad \sigma_y = 3.48$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{8.455}{12.67} = .667$$

FIGURE 6

CORRELATION OF SENIOR G.E.D. SCORES AND I.Q.

	Index																		
GED	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	f	d	fd	fd^2	xy
325-334									1					1	7	7	49	14
315-324								1		1				2	6	12	72	24
305-314														0	5			
295-304								1			1			2	4	8	32	20
285-294							1	1			2			4	3	12	36	27
275-284				1		1	1				2			5	2	10	20	8
265-274									1		1		1	3	1	3	3	12
255-264			1				1							2				
245-254		1		1		1				1				4	-1	-4	4	6
235-244					3									3	-2	-6	12	12
225-234			1	1		2				1				5	-3	-15	45	18
215-224														0	-4			
205-214		1												1	-5	-5	25	25
195-204														0	-6			
185-194					1									1	-7	-7	49	14
175-184	1													1	-8	-8	64	48
f	1	2	2	3	4	4	3	3	2	3	6	0	1	34		7	411	228
d	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6					
fd	-6	-10	-8	-9	-8	-4		3	4	9	24		6	6				
fd^2	36	50	32	27	16	4		4	8	27	96		36	335				

c_x = ,177 σ_x = 3.13 c_y = .206 σ_y = 3.48

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{6.674}{11.49} = .581$$

FIGURE 7

CORRELATION OF SENIOR INDEX AND G.E.D.

G.E.D.

Per.	175-184	185-194	195-204	205-214	215-224	225-234	235-244	245-254	255-264	265-274	275-284	285-294	295-304	305-314	315-324	f	d	fd	fd2	xy
95-99																				
90-94																				
85-89											1					1	7	7	49	14
80-84						2							1			3	6	18	108	-12
75-79							1									1	5	5	25	-10
70-74									2							2	4	8	32	
65-69																0	3			
60-64	1							1							1	3	2	6	12	- 6
55-59																0	1			
50-54										1						1				
45-49						1				1						2	-1	-2	2	2
40-44		1		1		1	1	1			2	2	1			10	-2	-20	40	8
35-39							1	1			1	1				4	-3	-12	36	-6
30-34																0	-4			
25-29										1		1			2	4	-5	-20	100	-80
20-24											1					1	-6	-6	36	-12
15-19																0	-7			
10-14										1						1	-8	-8	64	- 8
5-9						1										1	-9	-9	81	27
f	1	1	0	1	0	5	3	3	2	4	5	4	2	0	3	34		-33	585	- 83
d	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6					
fd	-8	-7		-5		-15	-6	-3		4	10	12	8		18	7				
fd^2	64	49		25		65	12	3		4	20	36	32		108	416				

$c_y = .206$ $\quad \sigma_{\bar{y}} = 3.48$ $\quad c_x = -.97$ $\quad \sigma_{\bar{x}} = 4.19$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_{\bar{x}} \sigma_{\bar{y}}} = \frac{-2.44 - (-.199)}{14.58} = -.180$$

FIGURE 8

CORRELATION OF PERSONALITY AND G.E.D.

G.E.D.

Soc. Adj.	175-184	185-194	195-204	205-214	215-224	225-234	235-244	245-254	255-264	265-274	275-284	285-294	295-304	305-314	315-324	f	d	fd	fd^2	xφ
90-94											1					1	8	8	64	16
85-89																0	7			
80-84						1			1							2	6	12	72	-18
75-79						2	1									3	5	15	75	-40
70-74						1						1				2	4	8	32	
65-69	1									1						2	3	6	18	-21
60-64		1									1				1	3	2	6	12	2
55-59								1		1						2	1	2	2	
50-54								1					1			2				
45-49											1	1				2	-1	-2	2	- 5
40-44				1		1										2	-2	-4	8	16
35-39								1			1	2	1			5	-3	-15	45	- 30
30-34							1								1	2	-4	-8	32	- 16
25-29							1									1	-5	-5	25	10
20-24										1					1	2	-6	-12	72	- 42
15-19																0	-7			
10-14								1								1	-8	-8	64	8
5-9						1					1					2	-9	-18	162	9
f	1	1	0	1	0	6	3	4	1	3	5	4	2	0	3	34		-15	685	-111
d	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6					
fd	-8	-7		-5		-18	-6	-4		3	10	12	8		18	7				
fd^2	64	49		25		54	12	4		3	20	36	32		108	411				

$c_x = -.44$ $\sigma_x = 4.5$ $c_y = .206$ $\sigma_y = 3.48$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{-4.17}{15.66} = -.260$$

FIGURE 9

CORRELATION OF SOCIAL ADJUSTMENT AND G.E.D.

School Relationships

GED	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	f	d	fd	fd2	xy
325-334																1					1	7	7	49	35
315-324										1										1	2	6	12	72	48
305-314																					0	5			
295-304						1				1											2	4	8	32	-24
285-294													2			2					4	3	12	36	42
275-284			1	1						1			1							1	5	2	10	20	10
265-274						1				2											3	1	3	3	-7
255-264													1			1					2				
245-254			1			1										1			1		4	-1	-4	4	
235-244	1												1						1		3	-2	-6	18	
225-234		1	1													2			1		5	-3	-15	45	3
215-224																					0	-4			
205-214						1															1	-5	-5	25	25
195-204																					0	-6			
185-194										1											1	-7	-7	49	7
175-184						1															1	-8	-8	64	40
f	1	1	3	1		5				6			5			7			3	2	34		7	411	159
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9					
fd	10	-9	-24	-7		-25				-6			10			35			24	18	46				
fd2	100	81	192	49		125				6			20			175			192	162	1102				

$c_x = .177$ $\quad \sigma_{\bar{x}} = 5.69$ $\quad c_y = .206$ $\quad \sigma_{\bar{y}} = 3.27$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_{\bar{x}}\ \sigma_{\bar{y}}} = \frac{4.644}{19.64} = .236$$

FIGURE 10

CORRELATION OF G.E.D. AND SCHOOL RELATIONSHIPS

I.Q. Per. \ Index	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	f	d	fd	fd^2	xy
95-99													1		1	8	8	64	40
90-94					1									1	2	7	14	98	21
85-89							1		1					1	3	6	18	108	36
80-84									1				1		2	5	10	50	30
75-79			1				2	1			2	2	1	2	11	4	44	176	86
70-74					1	1	1		1			2			6	3	18	54	12
65-69				2	1	1	1	6	1		1	2	1	2	17	2	34	68	30
60-64				1	2		2		3	1		1		1	11	1	11	11	3
55-59			1	1	1	2	1	3	1			1			11				
50-54		2	3	1	1	2		3		2	2	1	1	1	19	-1	-19	19	13
45-49	1					2	1	3		1					9	-2	-18	36	20
40-44		1	1		3	1	2	1	1						10	-3	-30	90	69
35-39	1	1		1	1	4									8	-4	-32	128	112
30-34		1			1			1							3	-5	-15	75	45
25-29						1	1								2	-6	-12	72	18
20-24				2			1	1							4	-7	-28	196	64
15-19		1	1	1											3	-8	-24	192	120
10-14			1		1										2	-9	-18	162	72
f	2	6	8	9	13	14	13	18	9	4	5	9	5	9	124		-41	1499	790
d	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6					
fd	-14	-36	-40	-36	-39	-28	-13		9	8	15	36	25	54	-53				
fd^2	98	216	200	144	117	56	13		9	16	45	144	125	324	1507				

$c_x = .43 \quad \sigma_x = 3.5 \qquad c_y = .33 \quad \sigma_y = 3.5$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{6.50}{12.20} = .533$$

FIGURE 11

CORRELATION OF AVERAGE I.Q. PLUS PERSONALITY PERCENTILES AND INDEX

I.Q. per GED \ Index	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-95	f	d	fd	fd^2	xy
165-169										1				1	6	6	36	18
160-164				1				2						3	5	15	75	- 5
155-159									1					1	4	4	16	8
150-154											2			2	3	6	18	24
145-149							1	1			3			5	2	10	20	26
140-144			1			1	1				1		1	5	1	5	5	5
135-139				1	1	1	1			1				5	0			
130-134									1	1				2	-1	-2	2	-5
125-129		1			1	1								3	-2	-6	12	16
120-124				1	1									2	-3	-6	18	15
115-119		1				1								2	-4	-8	32	24
110-114			1											1	-5	-5	25	20
105-109	1				1									2	-6	-12	72	48
f	1	2	2	3	4	4	3	3	2	3	6	0	1	34		7	331	194
d	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6					
fd	-6	-10	-8	-9	-8	-4		3	4	9	24		6	6				
fd^2	36	50	32	27	16	4		3	8	27	96		36	335				

$c_x = .177 \qquad \sigma_x = 3.13 \qquad c_y = .206 \qquad \sigma_y = 3.12$

$$r = \frac{\frac{xy}{N} - c_x c_y}{\sigma_x \sigma_y} = \frac{5.67}{9.77} = .580$$

FIGURE 12

CORRELATION OF AVERAGE I.Q. PLUS PERSONALITY PLUS G.E.D. AND INDEX (SENIOR)

	I.Q.	Expected G.E.D.	Actual G.E.D.
S. 1.	D	D	C
S. 2.	B	B	B
S. 3.	C	C	C
S. 4.	C	C	C
S. 5.	C	C	C
S. 6.	C	C	B
S. 7.	C	C	D
S. 8.	D	D	C
S. 9.	C	C	C
S. 10.	F	F	F
S. 11.	C	C	B
S. 12.	C	C	B
S. 13.	C	C	B
S. 14.	C	C	B
S. 15.	D	D	C
S. 16.	C	C	B
S. 17.	C	C	C
S. 18.	C	C	C
S. 19.	D	D	D
S. 20.	C	C	B
S. 21.	C	C	C
S. 22.	C	C	C
S. 23.	C	C	B
S. 24.	D	D	C
S. 25.	C	C	B
S. 26.	C	C	C
S. 27.	C	C	C
S. 28.	C	C	C
S. 29.	D	D	C
S. 30.	C	C	C
S. 31.	C	C	A
S. 32.	A	A	A
S. 33.	C	C	C
S. 34.	C	C	C

FIGURE 13

COMPARISON OF I.Q., EXPECTED G.E.D. AND ACTUAL G.E.D.

WHEN CONVERTED TO LETTER GRADES