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A comparative study of certain types of subject matter in scholastic aptitude tests

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A COMPARATIVE STUDY OF CERTAIN TYPES OF
SUBJECT MATTER IN SCHOLASTIC
APTITUDE TESTS

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A COMPARATIVE STUDY OF CERTAIN TYPES OF SUBJECT MATTER
IN SCHOLASTIC APTITUDE TESTS.

BY
CHARLES P. MCDONNELL.

"THESIS SUBMITTED FOR DEGREE OF MASTER OF SCIENCE."

"MASSACHUSETTS STATE COLLEGE, AMHERST."

JUNE, 1932.

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CHAPTER I
INTRODUCTION

The Problem: The purpose of this study is to investigate the comparative validity of different types of subject matter in Scholastic Aptitude Tests. In general the two types of subject matter considered are (1) that based on past experience and (2) that based on present ability to learn.

Why problem was chosen: Most scholastic aptitude tests, often called intelligence tests, are composed of subject matter based on past experience of the pupils tested. It is at least questionable if past experience has a high degree of correlation with ability to do school work. It seems plausible and logical to assume that scholastic aptitude tests based on ability to learn academic subject matter might show a higher correlation with school success than tests based upon past experience. It is the purpose of this study to try to determine objectively the comparative merits of these two types of tests.

Method of procedure:

A. Tests. A number of tests are available whose contents are based upon past experience. The writer has used for tests of this type the Terman Test of Mental Ability, Form A. There are no published tests available based on

CHAPTER II

BRIEF HISTORY AND CRITICISM OF MENTAL TESTS

Experiments in the field of mental testing were made thirty or forty years ago and have been carried on to the present time. The earlier forms of tests were more of the nature of the present achievement tests. Evolving parallel to the achievement tests was another type of intelligence test. This type of test first appeared in Paris in 1905, having been worked out by Binet and Simon. In the United States, Goddard, Yerkes, Terman, Thorndike, Whipple and others rapidly pushed forward further inventions in this field.

Most of the tests of the early period were single tests which dealt mostly with the sensory and the motor processes. In some cases simple tests of memory were used, and in a few cases such as some of the early tests of Binet-Simon and Ebbinghaus, the higher mental processes were included in the measurement. These, however, were exceptions. If a group of tests were given at the same time, the score in each test was used and not the gross score, as is done today. This is a marked contrast between the earlier tests and most of those which are now in use.

These early tests were not standardized and no careful method was used to determine whether or not the tests were reliable. There was no well organized method for accurately determining the significance of a test by comparing the

scores made in it with other measures of achievement. The results of the tests, so far as can be judged by the comparisons with other measures of achievement were for the most part negative.

The consequence of this negative outcome was that tests for a time fell into disfavor on the part of professional psychologists as well as on the part of practical school men. There was some interest revived in 1906 when a committee on tests was appointed, but they were not in general use or very popular until the United States entered the World War in 1917.

In that year the army and navy departments were confronted with the stupendous task of how best to train a large army of citizen soldiers in the shortest possible time. Some of the leading psychologists in the country were called to help solve the problem. They suggested classifying the soldiers and selecting the best fitted for the most important positions. It was impossible to use the individual tests such as the Binet-Simon, because it would take too long to administer them, so a group test, called the Army Alpha, was devised and administered to the army and navy. The results obtained appeared to be significant.

Since the close of the War, mental testing has become very popular, not only in the field of education but in business also. Most of the colleges today use some kind of intelligence or scholastic aptitude test in connection with

their entrance requirements. Many big business concerns are using various types of tests and are maintaining psychology departments to develop and administer such tests. Some grade schools and high schools are using standardized tests in many subjects for promotion. In West Springfield the entrance age to the first grade is six years, but a child may enter at the age of five and one-half if he can make a required score on the intelligence test.

So much time was used in administering the individual tests and obtaining results that a wide usage of them was impractical. The results obtained from the Army Alpha group tests were seemingly of such significance that some of the leading psychologists concentrated on group tests and many were invented and placed on the market. The following are some of the group tests now in general use in high schools and colleges: the Army Alpha, Miller Mental Ability, Otis Group Intelligence, Haggerty Intelligence Examination Delta 3, Terman A and B Group tests, The National, The Thurstone, and The Stanford Achievement. Diagnostic tests for all subjects and numerous other tests were prepared by individual colleges for use in their own schools.

An analysis of the tests mentioned will show the efficiency in these tests is largely dependent on past experience. The following analysis of the Terman test illustrates the nature of the subject matter of the tests. The parts of the

test are as follows: (1) Information, (2) Best answer, (3) Word meaning, (4) Logical selection, (5) Arithmetic, (6) Sentence meaning, (7) Analogies, (8) Mixed sentence, (9) Classification, (10) Number series. The first nine of these appear to be based on subject matter acquired sometime in the past.

The tenth test of the Terman A, Number Series, is different. The child does not have to revert to his past experience (excepting a little mental arithmetic) to make a good score on this test. He does not have to remember formerly acquired facts in history, English, geography, grammar, arithmetic, general information etc., for he is given the sample of what is expected and merely asked to use his power of thinking.

The Haggerty Reading Examination, Sigma 3 Form B, is mostly based on past experience but test three on paragraph reading seems to be based on mental ability. Tests four, nine and ten of Thurstone's Psychological Examination also appear to be based on ability to learn. The Aptitude Test for Nursing resembles the Ability to Learn test more than any other. In this test, sections three, four, five and seven all appear to rest on subject matter based essentially on ability to learn. In the Army Alpha group of tests, test six and possibly one are based on ability to learn, but not on the kind of learning met with in school.

CHAPTER III
COLLECTION OF DATA

There are many psychologists today who firmly believe that environment is the primary determiner of intelligence while others believe it hereditary. Possibly the safest position should include some of the doctrines of both theories. The behaviorist believes that environment plays the greater part in the molding of the child, and that the child brought up in a poor environment will not show as high intelligence as the child of the so-called "good" environment.

It might be well to ask the question: Is the environment that we have been accustomed to look upon as being the better environment better after all? Would not a more monotonous environment create an extraordinary desire in the child to get out of that environment and thereby develop more mental power to accomplish that desire? If, then, in making a test based on past experience, on what experience should the test be based - the child of the so-called poor environment, the child of the so-called good environment, or a combination of both - and how much of each? If the home plays the part we are led to believe it does in imparting knowledge to the child, then the child coming from immigrant parents who know little of the customs, language, etc., of this country should not be expected to have the same experiences as that of the child of the so-called better environment. With

this fact in mind the writer has constructed a test based on ability to learn new material which is not affected by environment to a great extent. Children from both rich and poor will start on the same level, each child exhibiting primarily his ability to learn.

Physical disabilities such as poor eye-sight, defective hearing, defective adenoids and tonsils, and other infirmities of the body, help to retard the child. Surely, the child afflicted with any of these ailments can not be expected to acquire the same experience throughout his young life as does the healthy child. A child with defective hearing, for instance, who might have great mental power, will be denied the opportunity of obtaining much knowledge through social contacts.

Then again a child gains much knowledge from observation. Some children possess a great ability for observing the slightest details and remembering them while others lack that ability. A child who possesses that power of observation very often does not have any more mental ability to learn than the child who is lacking that power.

Construction of the test¹ of Ability to Learn. In this attempt to investigate the validity of the ideas of change suggested, a group of tests was constructed on subject matter that the students were supposed to know little or nothing

1. Cf. Appendix for copy of the test.

about and administered to 115 students in the ninth grade and to the same number in the tenth grade. Each test calls for a reproduction of only the subject matter that was studied during the study periods of the test. Outside experience, other than the ability the student has acquired of how to study and his willingness to do his best, will not help him materially to answer the questions. He is thrown upon his own resources and is forced to exhibit his ability to "learn".

The test is made up of five study sheets and a test for each study sheet, with the exception of biology which has two tests. The artificial language test is both a study sheet and test combined. The first page of the test proper is used for tabulating the student's name and scores for the different sections of the test. The test and directions for administering it will be found in the appendix.

A. The test by sections.

a. Biology

A conference was held with the biology teacher to ascertain what material could be used in the test on biology that the student had not studied in his classes prior to December 1, 1931, the date of the administration of the test. A grasshopper was finally chosen as an appropriate subject to study, for the tenth grade was not scheduled to study the grasshopper until sometime later in the year. On the study sheet, fourteen different parts of the grasshopper are named

showing the location of each of these parts. These were thought to be sufficient number of parts to learn; for more than that number would probably make the test too difficult. On the same sheet there are eleven statements which the average student should know after several months study in biology. An effort was made to have these statements representative of those that are discussed in any first year biology class. It was thought that by having these different kinds of tests, (1) learning the names and location of various parts of a specified animal, (2) learning biological facts that apply to animals, fishes, plants and human beings, that a much broader field would be covered and it would be more readily determined whether the student had the ability to learn various phases of biology. The student is allowed five minutes to study.

On the test (Section 1, Part A) is a drawing of the grasshopper with the names of the various parts left out. The names are found below the drawing and the student is to place the correct number in the parenthesis after the name.

The test (Section 1, Part B) is a list of the definitions found on the study sheet with the biological names left out. A list of the terms defined is below the definitions. The student is to copy the number of the definition in the parenthesis after the term which the definition best defines as shown in the directions.

b. History.

The ninth or tenth grade student knows little or nothing about English history. English history was chosen to test the student's ability to remember dates, historical facts, etc., in preference to ancient or United States history. In the lower grades the students learn something about ancient history through stories of ancient mythology, religion, etc. and there is constant mention made of facts in United States history. A paragraph dealing with the character of Charles, the second, of England and some facts pertaining to his reign as kind were used for a test in history.

The sheet (Section II) is the study sheet and the students are allowed three minutes (see directions for giving test in appendix) to read the paragraph as many times as the time will permit.

On the test (Section II) there are twenty questions based on the paragraph on the study sheet. These questions are of varied nature dealing with dates, ages, religion, countries, character, politics, etc. The student is to place a check after the word that best completes the statement. It is hoped that some data can be found to determine whether the student has the ability to learn history. This test was compared with other similar tests in history and found to be representative.

c. Geography.

The study sheet (Section IV, Part A) is a map of

South America. There is no doubt in the writer's mind that the majority of the students tested recognized the map immediately as that of South America. While the student would recognize the map it is safe to say that pupils of this age know very little about any map other than that of the United States and Canada. All the countries, two rivers, eight cities, one island and the Panama Canal are all named. The student is given three minutes to study the map.

On the test (Section IV, Part A) there is a map with the name of the countries, rivers, etc., left out, and numbers substituted. At the left of the map is a list of the countries, rivers, etc., with parentheses after each name. The student is to place the numbers that are on the map in the parentheses after the correct names as indicated in the directions (cf. appendix). The writer hopes to determine by this test the ability a student possesses in learning and locating different countries, cities, etc., on the map.

On the study sheet (Section IV, Part B) is a list of twenty statements that are discussed in most industrial geography classes in the high school. On this sheet there is material dealing with countries, cities, rivers, minerals, manufactures, etc., which the student is asked to learn in three minutes.

The test (Section IV, Part B) is a list of the same twenty statements with the important word left out. Below

the statements is a list of words that belong in the blank spaces. The student is to copy the number of the statement in the parenthesis after the word that best completes the statement as shown in the directions (cf. appendix).

d. English.

Section V, Parts A and B, is a study sheet on which there are some literature and a poem. The student is allowed four minutes to study parts A and B. (see directions for giving test in Appendix).

The test (Section V, Part A) contains the same paragraph on literature as found on the study sheet with important words left out. Below the paragraph is a list of the words that have been left out. The student is to copy the number of each blank in the parenthesis after the word which belongs in the blank. The writer hopes to determine if the student has the ability to remember the important parts of any paragraph in literature.

In part B there are seven statements that refer to the poem studied on the study sheet (Section IV, Part B). To allow for the chance of guessing the student is to mark the statements, true, false, or didn't say. It is believed that from this test some data can be found to determine the students' ability to interpret poetry correctly. This however is not established.

e. Artificial language.

The test (Section III) is on an artificial language. It is placed first in the series of tests (1) because it is of a different nature from the others, (2) it is to break the continuity of thought of the other tests. The student has just finished studying five sheets of subject matter and no doubt expects to start immediately answering questions dealing with that subject matter. McGosch¹ made a study of remembering and forgetting and found that the amount of material a person forgets is not determined so much by the time interval between the studying and the reproduction as it is to what enters the mind during that interval. The artificial test is used then in this position to introduce material of an entirely different nature into the students' mind thereby making it harder to remember the previous studied matter. In this way the student will have to show more of his power and ability to learn. The artificial language test measures primarily the ability to be careful and to observe. The student is allowed to consult the rules and vocabulary while taking the test as often as he wishes and is required to remember only for a very short time.

To determine the proper amount of time to be allowed for each study sheet and each test, the test was administered to three groups (eight to ten individuals to the group) at dif-

1. McGosch, From lecture delivered at the meeting of American Psychological Association, Toronto, Canada, September, 1931.

ferent times. These groups were classified as bright, mediocre and poor students from the teachers' estimates and marks to determine what would be a fair time limit on the study sheets and the test itself.

In scoring the test of Ability to Learn, the scores for each test are placed in the location designated on the cover of the test itself. One point is given for everything the student does correctly but nothing is deducted for mistakes, excepting in the artificial language test. In this test credit is given (one point) for every correct word that is crossed out or underlined. For every wrong word crossed out or underlined the student is penalized one point. For example: in the first sentence, "ego set lat moh," lat should be crossed out. If only the word lat is crossed out credit of one point is given for the sentence. If any other word is crossed out there is a penalty of one point for every mistake and the score for the sentence is zero or minus what ever the number might be but in no case is the total score of this test scored less than zero. The scores of the different tests are added up and the gross score found. It is the gross score that is used in this study in making general interpretations.

Administration of test of Ability to Learn. In the ninth grade it was possible to administer the Ability to Learn test to the whole group of 115 students at the same time. In the tenth grade, however, the test was administered to the same

number in two groups. There was no room in the high school large enough to accommodate more than sixty-four students.

An attempt was made to make conditions as ideal as possible and to create an incentive in the students to do their best. The students were told that the marks on the tests would not count in their daily records but that each student was expected to do his best in order to make it easier for the teachers to determine what students needed extra help in their school studies. Whether every student did his best the writer has no way of determining. In every group there are some students who have the ability but either because they have never learned how to study, or they are satisfied to do just enough to get by or for other reasons, possibly not known even to themselves, never do their best in any kind of a test. Again there are others who through nervousness, fear, etc., just cannot do their best work in a test.

In the tenth grade one group of students took the test the first two periods of school and another group periods three and four. There was no way that one group could in any way give any information to the other group. It took about an hour and fifteen minutes to administer the test.

It appears to the writer that the best time of the year to administer the test to the tenth grade is in the second or third week of September. This eliminates any chance of the student gaining information in his classes that might aid him

later in the test. In the ninth grade there is very little opportunity for the student to gain any advance information in his classes that will later be used in the test, unless, perhaps, one or two facts in general science. The test can be safely administered to the ninth grade any time during the year but preferably during the first half. The test was constructed in the middle of November and was administered during the first week of December.

Securing of data on Terman test. The Terman Scores were taken from the scores the students made on April 1, 1931. The Ability to Learn Test was given December 1, 1931, eight months later. In order to find out what the student would probably make on the Terman Test on December 1, 1931 or eight months after he had taken the test, the method was employed as explained by Percival M. Symonds.¹ Symonds says, "If one does not wish to repeat the Terman test, scores may be estimated from a previous testing with only little less accuracy, over a year's interval, than they may be determined by a fresh testing. If the interval is not exactly a year, the values in Table 12 must be multiplied by the ratio of the time interval to one year, before adding to the original scores." The values in Table 12 of Symonds' "Ability Standards" were multiplied by $\frac{2}{3}$ (8 months is $\frac{2}{3}$ of one year) and the result added to the original score of April 1, 1931.

1. Symonds, P.M., Ability Standards.

School marks. In this study only the marks on academic subjects are used for this is a study of mental ability and not mechanical ability. In the ninth grade the subjects used are English, general science, social science, business arithmetic, Latin, algebra, and French. Of the 115 ninth grade students who took the test, there were only eleven who were studying Latin, algebra and French. There were not enough students in the college preparatory group (about fifty) so the test was given to the general group who were available at the time with the addition of eleven from the college group.

The marks in the above subjects were averaged for the first three marking periods. Each marking period is about nine weeks. Three marking periods were thought to be sufficient for there is a greater variety of marks between the first and third marking periods than between any other two periods. This difference is partly due to (1) the teacher might have found that she was either too severe or not severe enough during the first two marking periods, (2) the student who had been groping in the dark has found himself or (3) he has learned to know his teacher's ways, etc.

In the tenth grade the subjects used are English, biology, geography, medieval history, bookkeeping, and in a few cases French and algebra. The students examined were in the commercial or general group; there being no students of the college group tested. The first three marking periods were used as

in the ninth grade. The student's average mark in both grades is correlated with his Terman score and with the teacher's estimate and the Ability to Learn score.

Teachers' estimate. The teachers' estimate is what the teacher rated each student in her classes on his ability to learn that particular subject. The estimate was on a basis of 60-100 and the students were rated only in academic subjects. The estimates were averaged and correlated with the Terman test scores, the Ability to Learn scores, and the school marks.

In the ninth grade the coefficient of correlation between the teachers' estimate and the Terman scores (.54 ±.044), between teachers' estimate and the Ability to Learn test scores (.58 ±.041), between teachers' estimate and the school marks (.78 ±.024), were higher than those of the tenth grade. This is due possibly to several factors. The ninth grade teacher makes more contact with the student than the tenth grade teacher (1), she has known the student at least indirectly throughout the seventh and eighth grades (2), she has a knowledge from conversations with other teachers of the mental ability of many of the students before they enter the ninth grade (3), and she has been called on to help in disciplinary measures during the students' stay in the seventh and eighth grades (4), several other factors might be mentioned that assist the teacher one way or another.

The coefficients of correlation in the tenth grade between teachers' estimate and Terman scores (.44 \pm .05), between estimate and ability to learn scores (.38 \pm .053), between estimate and school marks (.74 \pm .028) were much lower. This is probably due to the fact that the teachers were not given a long enough period to get acquainted with the students. The estimate in this study was made after the third month. This might be long enough for some teachers to get fully acquainted with the student but for others it seems to be too short a period. In the West Springfield High School there are three teachers who have never taught in the system before, and their estimates were used in this study. One of these teachers is teaching in the public school system for the first time (he taught several years in private schools) and his system of marking seems severe. Possibly his estimates are too low and he has been expecting too much from his students. Another of the new teachers has had but two years experience teaching and she too might have set her standard too high. The different conditions that prevail in the senior high school such as new teachers, older fellow students, more home work, higher standards in the various subjects, more extra-curricular activities, more initiative to be shown, and possibly less supervised study might make it more difficult for the student to find himself, and give the teacher who is estimating his ability an unfavorable impression as to the

student's ability to learn his subject.

Owing to the fact that the coefficients of correlation between the Terman scores, the ability to learn scores, the school marks and the ninth grade teachers' estimate are higher than between the same factors in the tenth grade, it appears that the ninth grade teachers know the ability of their students better than the tenth grade teachers and that their estimate is more valid. Possibly the tests measure more accurately in the ninth grade.

Tabulations.

a. Tenth grade.

The following table shows the arrangement of the students in the tenth grade according to the Ability to Learn Test scores received, the highest first and then in descending order. The first column gives the number of the individual, the second column the Ability to Learn Test score, the third column the Terman Test score, the fourth column the teacher's estimate, the fifth column the school marks.

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
1	120	187	83	77
2	114	152	85	89
3	106	163	87	80
4	106	162	77	79
5	105	173	78	80
6	100	150	85	90
7	99	145	75	76
8	99	182	85	87
9	99	141	75	75
10	97	158	82	82
11	97	128	81	81
12	95	161	80	85
13	95	109	61	74
14	94	122	85	82

Number of Student	Ability to Learn Score	Termen Test	Teacher's Estimate	School Mark
15	94	144	73	72
16	94	118	77	75
17	93	157	77	73
18	93	151	77	78
19	93	128	85	81
20	92	142	75	74
21	92	102	71	76
22	90	124	83	80
23	89	148	76	82
24	88	135	80	78
25	87	159	90	88
26	86	155	81	70
27	86	140	70	72
28	86	136	80	81
29	85	126	76	74
30	84	183	69	72
31	83	132	78	79
32	83	128	80	71
33	82	126	77	72
34	82	100	69	76
35	81	118	75	78
36	81	107	75	74
37	80	139	81	84
38	80	133	73	75
39	79	113	76	74
40	78	120	77	80
41	77	134	78	79
42	77	120	76	73
43	77	123	81	77
44	77	119	73	75
45	76	124	63	62
46	75	120	80	74
47	75	113	85	81
48	75	95	76	72
49	74	155	81	76
50	74	142	81	76
51	74	141	74	77
52	74	132	78	79
53	74	97	60	71
54	71	151	87	68
55	71	113	75	72
56	71	111	81	82
57	71	69	77	76
58	70	126	80	81

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
59	70	120	75	75
60	70	95	70	73
61	69	115	76	71
62	68	124	85	86
63	68	115	76	76
64	68	111	67	66
65	68	111	67	74
66	68	110	71	79
67	67	124	78	72
68	67	114	71	69
69	67	114	71	69
70	67	112	71	77
71	67	112	67	73
72	67	107	76	80
73	66	130	70	68
74	67	107	80	80
75	66	112	76	71
76	66	103	71	75
77	64	116	76	77
78	64	115	75	79
79	63	144	75	70
80	63	116	75	70
81	63	99	70	76
82	62	128	75	69
83	61	98	75	74
84	60	101	70	67
85	59	84	70	70
86	58	83	70	64
87	57	133	68	67
88	57	112	70	69
89	56	121	60	63
90	56	104	68	75
91	56	97	61	69
92	55	118	68	70
93	54	99	75	74
94	54	85	70	67
95	53	89	60	68
96	52	101	76	76
97	51	130	70	68
98	51	97	71	78
99	50	126	71	66
100	49	133	70	69
101	49	115	71	75
102	47	115	72	69

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
103	45	110	75	75
104	45	98	70	69
105	45	77	70	67
106	44	120	61	65
107	42	99	70	69
108	40	71	65	70
109	37	85	75	69
110	36	84	66	68
111	35	129	76	75
112	35	103	80	86
113	34	115	70	72
114	33	122	81	83
115	30	78	67	68

Tabulations.

a. Ninth grade.

The following table shows the arrangement of the students in the ninth grade according to the Ability to Learn Test scores received, the highest first and then in descending order. The first column gives the number of the individual, the second column the Ability to Learn Test score, the third column his Terman Test score, the fourth column his Teacher's estimate, the fifth column his school marks.

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
1	99	151	85	85
2	95	189	83	85
3	94	148	86	87
4	90	156	88	86
5	90	154	75	82
6	88	159	88	89
7	88	148	90	78
8	87	149	77	76
9	87	147	87	86
10	84	163	85	84
11	84	117	84	82
12	82	147	70	76
13	81	110	75	80
14	80	142	85	86
15	80	128	75	75
16	78	111	72	80
17	77	153	77	76
18	77	131	77	81
19	76	127	74	80
20	74	124	76	77
21	73	136	71	75
22	72	113	88	88
23	71	138	78	82
24	71	139	77	79
25	69	107	66	76
26	69	104	71	75
27	68	158	76	75
28	68	130	76	79
29	67	122	80	81
30	67	104	80	81
31	66	126	86	76
32	66	119	73	79

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
33	63	144	79	82
34	63	142	79	80
35	63	131	77	79
36	63	113	65	63
37	63	102	68	73
38	62	139	78	77
39	62	116	75	77
40	62	116	73	78
41	62	108	73	75
42	61	145	68	71
43	61	118	77	71
44	61	103	76	86
45	60	125	72	77
46	60	113	76	81
47	60	112	76	80
48	59	125	70	77
49	59	112	78	76
50	58	138	70	72
51	58	105	71	71
52	58	93	68	71
53	57	143	71	71
54	57	131	80	80
55	57	118	77	81
56	57	115	63	71
57	57	103	73	73
58	57	101	72	81
59	56	105	70	81
60	55	109	68	77
61	53	118	66	72
62	53	110	73	78
63	53	106	72	72
64	53	94	80	77
65	52	109	75	77
66	52	95	67	71
67	51	113	70	75
68	50	129	75	76
69	50	102	71	78
70	50	101	75	74
71	49	102	75	73
72	48	107	75	78
73	48	105	63	70
74	48	105	76	77
75	48	103	64	76
76	48	96	68	73
77	48	86	67	75

Number of Student	Ability to Learn Score	Terman Test	Teacher's Estimate	School Mark
78	43	82	71	71
79	47	117	71	71
80	47	98	70	81
81	47	127	80	76
82	47	93	72	77
83	47	91	77	77
84	47	83	61	71
85	47	115	70	71
86	46	107	75	75
87	46	109	74	76
88	46	109	72	76
89	46	88	66	71
90	45	80	77	73
91	44	118	67	73
92	44	86	76	74
93	43	122	86	84
94	43	104	62	74
95	42	85	73	76
96	41	109	76	77
97	40	128	68	77
98	40	84	66	74
99	38	148	71	77
100	38	96	77	76
101	38	83	66	69
102	38	74	64	68
103	38	71	67	70
104	36	89	70	72
105	35	100	63	74
106	34	116	68	72
107	33	92	61	69
108	32	113	70	73
109	32	106	78	80
110	31	72	65	73
111	30	92	63	69
112	27	116	70	72
113	26	130	66	69
114	25	125	65	72
115	21	83	73	71

CHAPTER IV

STATISTICAL INTERPRETATION

Statistical methods are procedures which are helpful in analysing and summarizing collections of quantitative facts and the relationships existing between sets of paired quantitative facts. Any one statistical method may be an inadequate means of fully describing any group of data. In order to secure clear and valid interpretations of the data in this study the following methods are used:

(1) graphical, (2) coefficient of correlation (Pearsonian method), and (3) quartile.

Graphical method. The study of the distributions of Terman scores, Ability to Learn Test scores, teachers' estimate, and the school marks in the ninth and tenth grades is expressed by line graphs. The horizontal axis represents the scale along which the intervals of the frequency distribution are laid off. The vertical axis represents the number of cases.

These line graphs do not adhere exactly to the normal probability curve, due partly, no doubt, to the small number of cases. However, there is the customary rise in the center designating that the greater number of the group have a narrower range in score while there is a smaller number who excel and a like number who have scores below the majority of the group. Any distribution becomes smoother as the number of cases be-

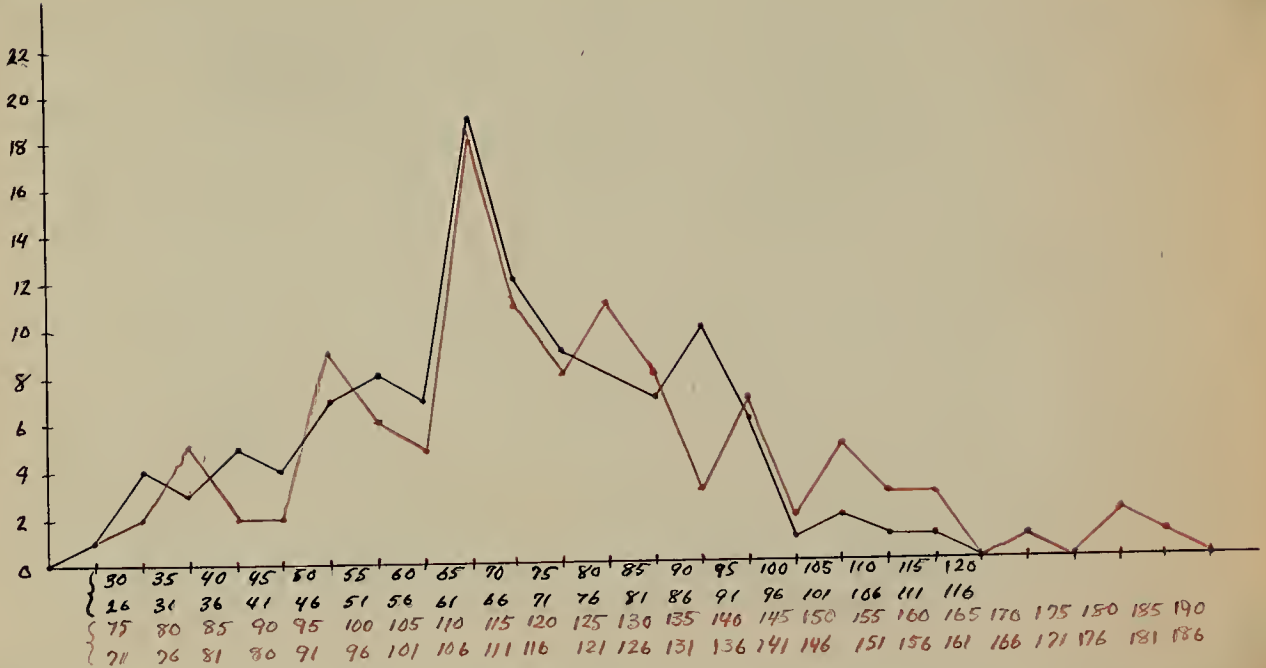
comes larger. When the total number of cases is as large as 400 or 500, the irregularities are not often pronounced.

Figure 1 shows the distribution of the Terman scores and the Ability to Learn scores of the tenth grade (115 cases.) The Ability to Learn distribution curves rises more evenly and is more regular throughout than the Terman distribution curve. It is a little higher, at one point, in the middle group than the Terman distribution curve but this is comparatively negligible. The lower end of the the Terman distribution curve is lower than the Ability to Learn distribution curve but the other end runs higher.

Figure 2 shows the distribution of the Ability to Learn test scores and the Terman scores of the ninth grade. The distribution curve of the Ability to Learn test has two distinct middle groups, one five places higher than the second. The distribution curve of the second middle group is just as high as the highest point in the Terman distribution curve. The lower end of the Ability to Learn is higher than the lower end of the Terman distribution curve but it is vice-versa on the other end.

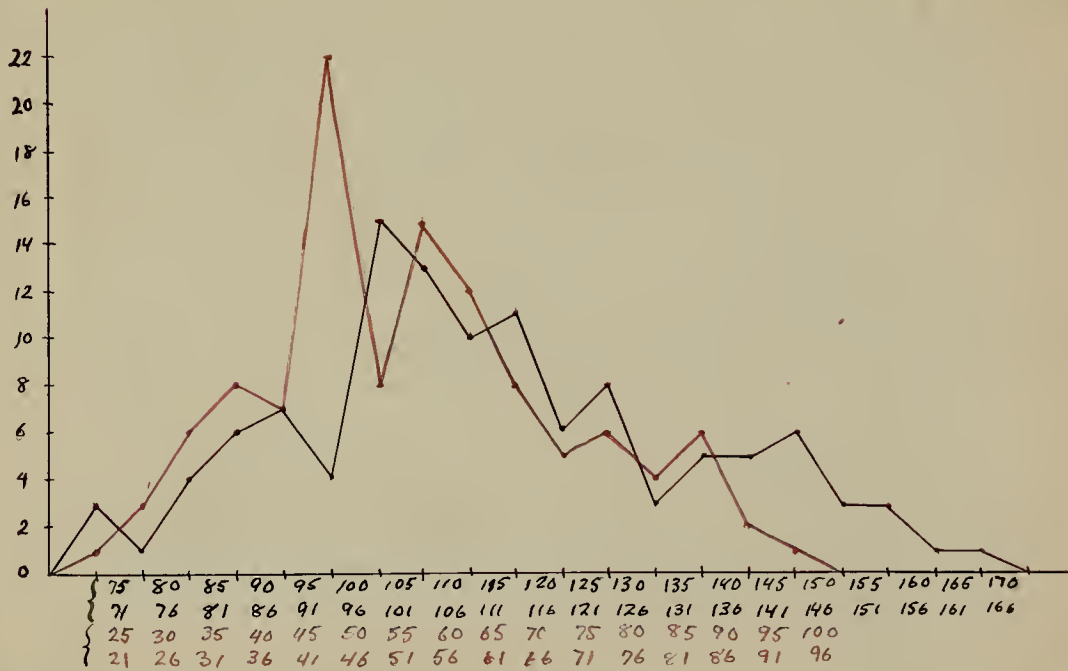
Figure 3 shows the distribution of the Ability to Learn scores in the ninth and tenth grades. The middle point in the tenth grade is twenty points higher than one of the middle points in the ninth grade and ten points higher than the other.

FIGURE 1



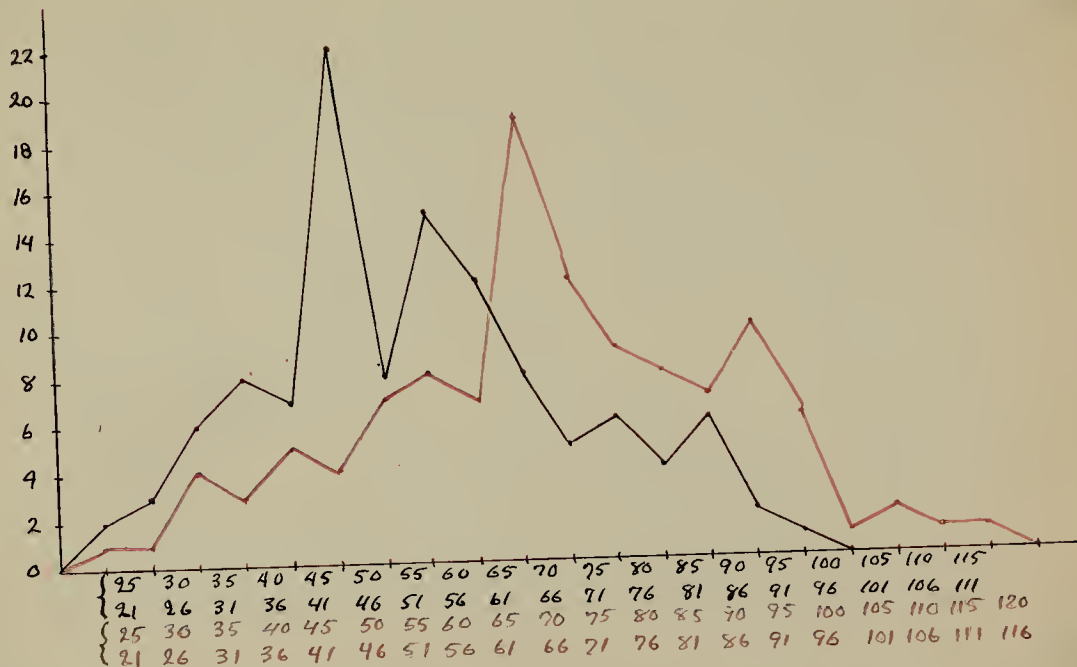
The black line represents the distribution of the Ability to Learn test scores of 115 students of the tenth grade. The red line represents the distribution of Terman test scores of the same grade (115 cases)

FIGURE 2



The red line represents the distribution of the Ability to Learn test scores of 115 students of the ninth grade. The black line represents the distribution of the Terman test scores in the ninth grade.

FIGURE 3



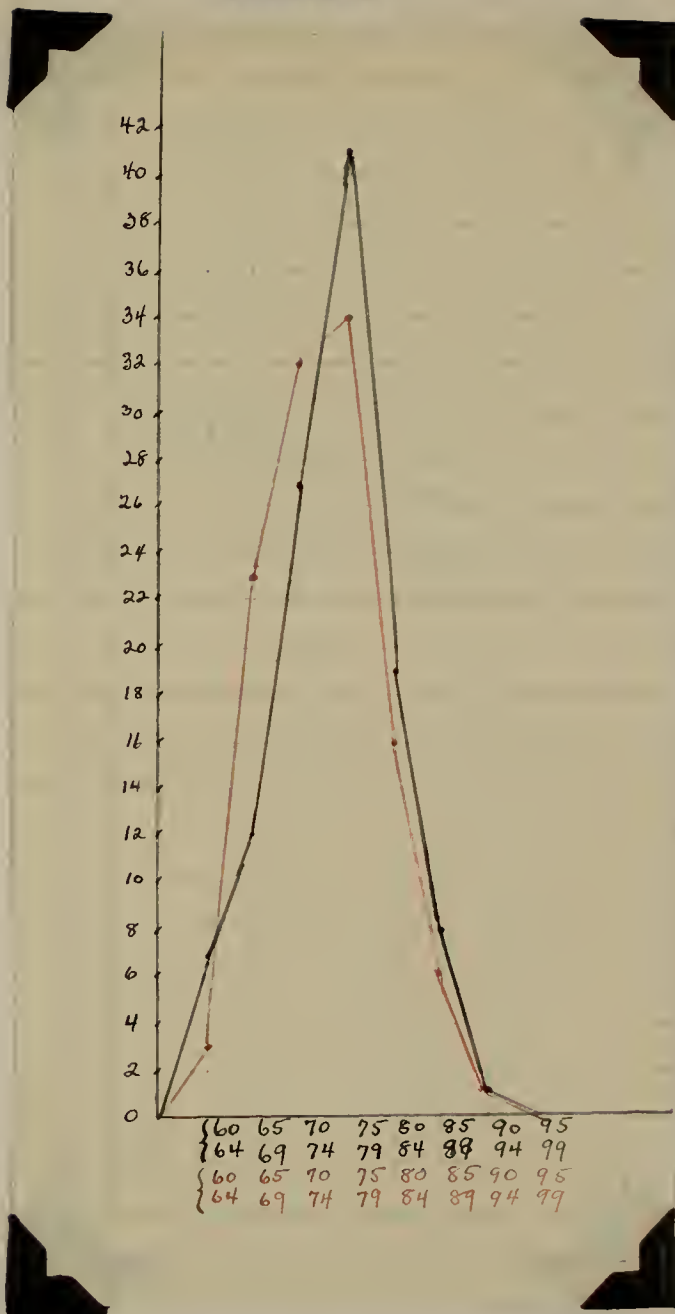
The red line represents the distribution of the Ability to Learn scores of 115 students of the tenth grade. The black line represents the distribution of the Ability to Learn scores in the ninth grade.

The curve in the tenth grade is much more even throughout. There are fewer low scores in the tenth grade and more high scores than in the ninth grade.

Figure 4 shows the distribution of the school marks and the teachers' estimate in the tenth grade. The teachers estimated that nineteen students would receive marks lower than seventy whereas the school marks show that twenty-six students failed. It was estimated that twenty-seven would receive marks between seventy and seventy-four but the school marks place thirty-two students in this group. In the center group the estimate placed forty-one students but the school marks have thirty-four. Between eighty-five and eighty-nine the estimate is two points higher while in the interval ninety-four it is the same as the school marks.

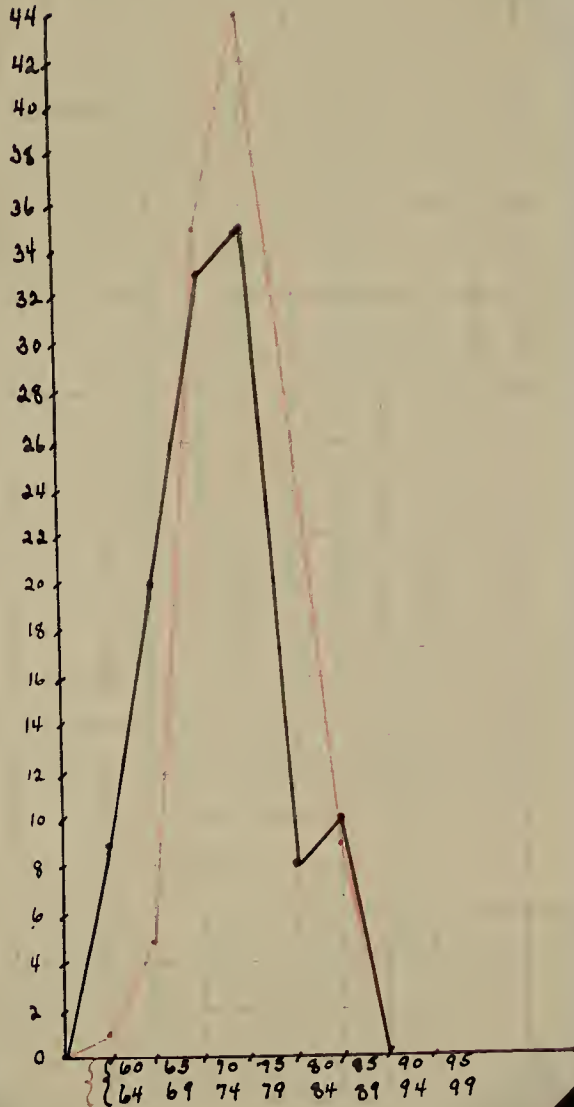
Figure 5 shows the distribution of the Ability to Learn scores and the school marks in the ninth grade. In the teachers' estimate there are twenty-nine students who received grades less than the passing mark (70) while the school marks show only six failures. Between 70-74 the estimate (33) and the school marks (35) have a difference of two points. The estimate predicts thirty-four will receive a grade 75-79 but the school marks place forty-four (nine more) in this interval. There are twenty-one according to the school marks between 80-84 but only eight in the estimate. The estimate has one more (10) between 85-89 than the school marks (9). There are no grades

FIGURE 4



The black line represents the distribution of the teachers' estimated marks of 115 students of the tenth grade. The red line represents the distribution of the school marks of 115 students of the same grade.

FIGURE 5



The red line represents the distribution of the school marks and the black line the distribution of the teachers' estimate marks of 115 students of the ninth grade.

above 89 in either the estimate or school marks.

In figures 6 and 7 it is possible to represent the Terman scores and Ability to Learn scores of the ninth and tenth grades at the same time that the teachers estimate and school marks are shown. This is shown by taking the lowest score to be used, and instead of intervals of five points, as in the case of the estimate and school marks, it is possible to let the interval represent fifteen points. In this way the curves of the Ability to Learn scores and Terman scores, spread over comparatively the same limits as those represented by the teachers' estimate and school marks.

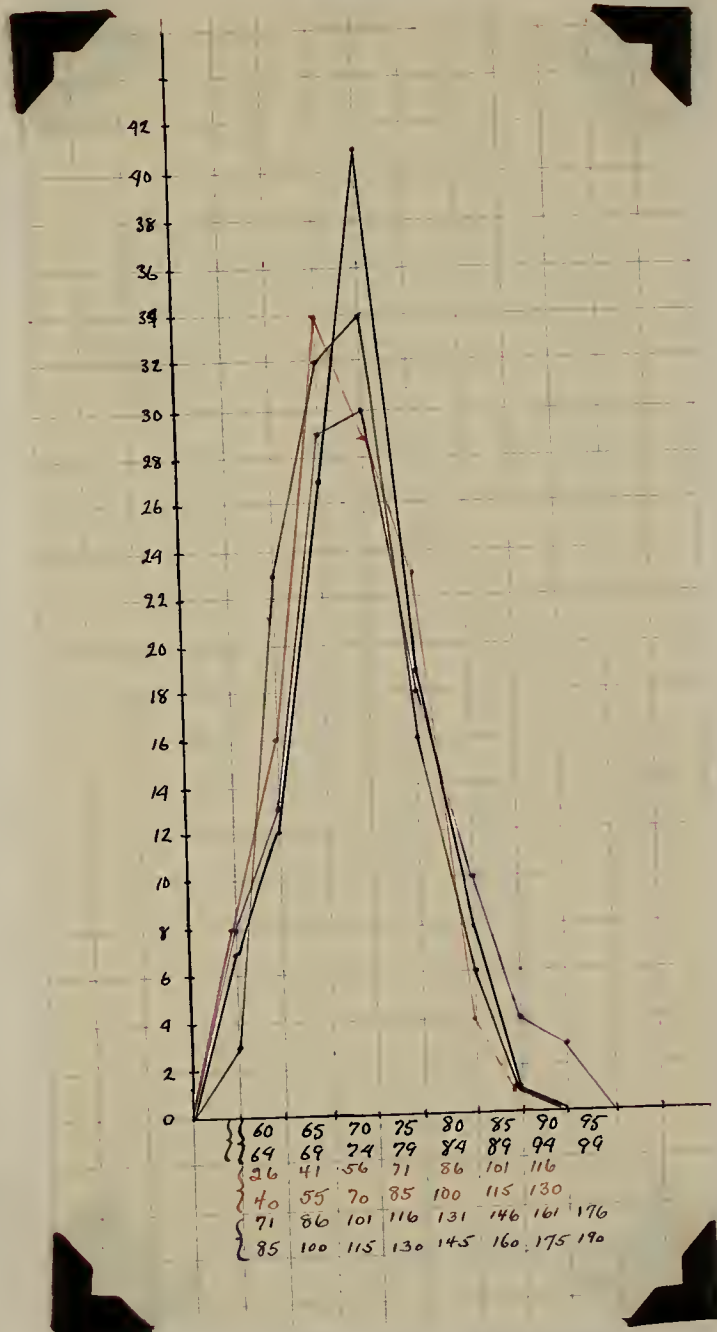
Tables 1-8 show the distributions of Ability to Learn scores and Terman scores and the teachers' estimate and school marks in the ninth and tenth grades. In order to make this data appear clearer it is represented graphically in figures 1-7.

Summary of graphical method:

Figure 1 showing the distribution of the Terman scores and Ability to Learn scores in the tenth grade appears to indicate that one test is about as reliable as the other, at least for the tenth grade. Both curves follow the normal probability curve as well as could be expected with so small a number of students (115). The Ability to Learn curve is a little more even throughout.

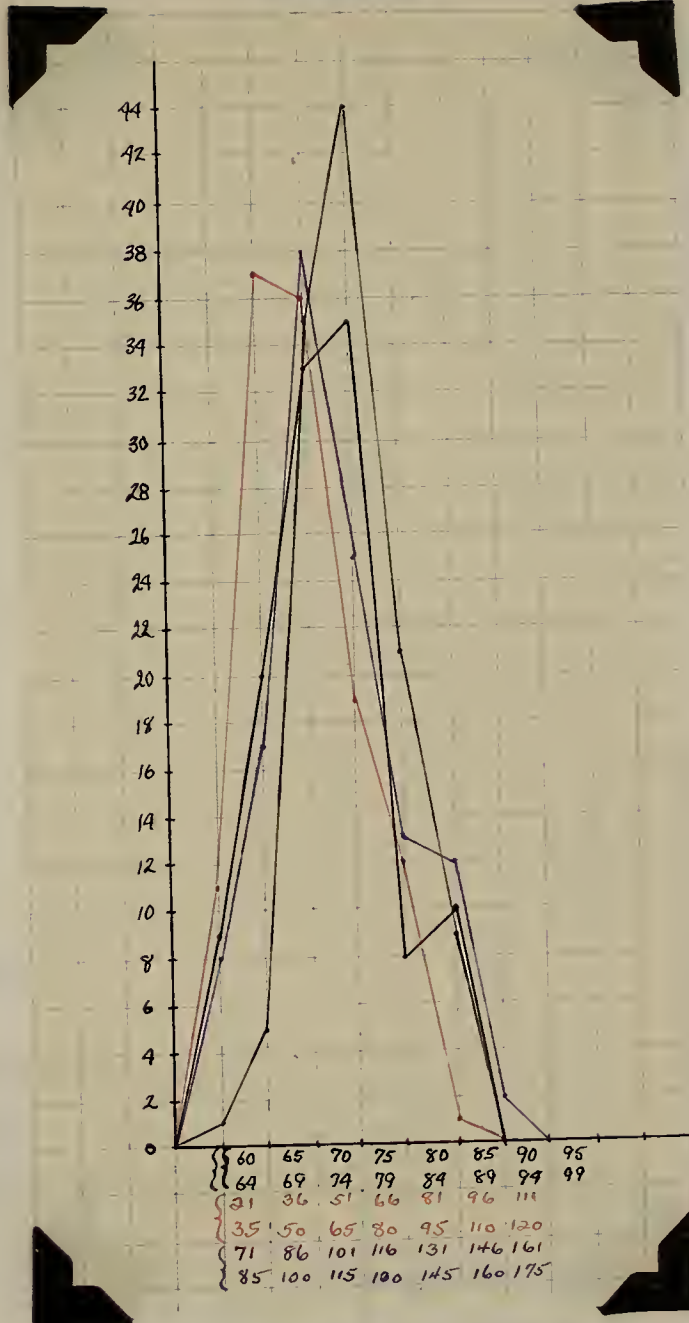
Figure 2, showing the distribution of the Ability to Learn scores and Terman scores in the ninth grade might indicate that

FIGURE 6



The red line represents the distribution of the Ability to Learn scores. The purple line the distribution of the Terman scores. The blue line the distribution of the school marks. The black line the distribution of the teachers' estimate marks of 115 students of the tenth grade.

FIGURE 7



The red line represents the distribution of Ability to Learn scores; the purple line the Terman scores; the black line the teachers' estimate marks; the blue line the school marks of 115 students of the ninth grade.

TABLE 1

The distribution of Ability to Learn Test scores of 115 students in tenth grade. These scores are grouped in five-point divisions.

<u>Test Scores</u>	<u>No. of Pupils</u>
116 - 120	1
111 - 115	1
106 - 110	2
101 - 105	1
96 - 100	6
91 - 95	10
86 - 90	7
81 - 85	8
76 - 80	9
71 - 75	12
66 - 70	19
61 - 65	7
56 - 60	8
51 - 55	7
46 - 50	4
41 - 45	5
36 - 40	3
31 - 35	4
26 - 30	1
	<hr/>
	115
 Median Scores	 70.8

An examination of Table 1 shows that more students received Ability to Learn Test scores between 66-70 than between any other five point interval. Five students received high scores while seventeen received low scores.

TABLE 2

The distribution of Terman Mental Test. Scores of 115 students in tenth grade. The Mental Test scores are grouped in five-point divisions.

<u>Terman Scores</u>	<u>Number of Pupils</u>
186 - 190	1
181 - 185	2
176 - 180	0
171 - 175	1
166 - 170	0
161 - 165	3
156 - 160	3
151 - 155	5
146 - 150	2
141 - 145	7
136 - 140	3
131 - 135	8
126 - 130	11
121 - 125	8
116 - 120	11
111 - 115	13
106 - 110	5
101 - 105	6
96 - 100	9
91 - 95	12
86 - 90	12
81 - 85	5
76 - 80	1
71 - 75	1
	<hr/> 115
Median Score:	119.4

An examination of Table 2 shows that more students received Terman Test scores between 111-115 than between any other five-point interval. Only three students received high scores, while twelve received low scores. The same number of students (11) received scores between 116-121 as those who received scores between 126-130.

TABLE 3

The distribution of marks taken from the tenth grade teachers' estimate of 115 students. The marks are grouped in five-point divisions.

<u>Teachers' Estimate</u>	<u>No. of Pupils</u>
95 - 99	1
90 - 94	8
85 - 89	19
80 - 84	41
75 - 79	27
70 - 74	12
65 - 69	7
60 - 64	<u>7</u>
	115
Median Score	76.4

An examination of Table 3 shows that one student received A (90-100) and eight received B (85-89) nineteen received B- (80-84) while sixty-eight or 59% of the class received C (70-79). Nineteen students failed to receive a passing grade (70).

TABLE 4

The distribution of school marks of 115 students in the tenth grade. These scores are grouped in five-point divisions.

<u>School Marks</u>	<u>No. of Students</u>
100	
95 - 99	
90 - 94	1
85 - 89	6
80 - 84	16
75 - 79	34
70 - 74	32
65 - 69	23
60 - 64	3
	<hr/>
	115
Median Score	74.9

An examination of Table 4 shows that over one half the group received marks between seventy and seventy-nine. Twenty-six students received marks less than the passing mark seventy. There was only one student who received a mark of ninety or A while six received a mark between eighty-five and eighty-nine or B.

TABLE 5

The distribution of Ability to Learn test students in ninth grade. These scores are group point divisions.

<u>Test Scores</u>	<u>No. of</u>
96 - 100	1
91 - 95	2
86 - 90	6
81 - 85	4
76 - 80	6
71 - 75	3
66 - 70	3
61 - 65	12
56 - 60	15
51 - 55	8
46 - 50	22
41 - 45	7
36 - 40	8
31 - 35	6
26 - 30	3
21 - 25	2
	<hr/>
	115
Median Score	56.5

An examination of Table 5 shows that more students received Ability to Learn test scores between 46-50 than between any other five-point interval. Only one student received a high score while twenty-six received low scores.

TABLE 6

The distribution of Terman Mental test scores of 115 students of ninth grade. These scores are grouped in five-point divisions.

<u>Terman Scores</u>	<u>No. of Pupils</u>
166 - 170	1
161 - 165	1
156 - 160	1
151 - 155	1
146 - 150	2
141 - 145	3
136 - 140	5
131 - 135	3
126 - 130	3
121 - 124	6
116 - 120	11
111 - 115	10
106 - 110	13
101 - 105	15
96 - 100	4
91 - 95	7
86 - 90	6
81 - 85	4
76 - 80	1
71 - 75	3
	<hr/>
	115
Median Score	113.2

An Examination of Table 6 shows that more students received Terman Test scores between 101-105 than between any other five point interval. There was only one student whose score was between 166-170. There were twenty-one low scores

TABLE 7

The distribution of marks taken from the ninth grade teachers' estimate of 115 students. The marks are grouped in five-point divisions.

<u>Teachers' Estimate</u>	<u>No. of Pupils</u>
100	
95 - 99	10
90 - 94	8
85 - 89	35
80 - 84	33
75 - 79	20
70 - 79	9
65 - 69	
60 - 64	<u>115</u>

Median Score 74.3

An examination of Table 7 shows that there were no students who received A (90-100) and only ten who received B (85-89) while sixty-eight or fifty-nine percent of the group received C (70-79). Twenty-nine received less than passing grade (70).

TABLE 3

The distribution of school marks of 115 students in the ninth grade. The marks are grouped in five point divisions.

School Marks	No. of Students
100	
95 - 99	
90 - 94	
85 - 89	9
80 - 84	21
75 - 79	44
70 - 74	35
65 - 69	5
60 - 64	1
	<hr/>
	115
Median Score	76.8

An examination of Table 3 shows that over half the class (eighty-five) received marks above seventy-five. There were only six students who received marks below passing grade (70). Nine students received the grade of B or 85-89, but there was none who received above 90 or A.

the Terman test is more reliable but there is no definite proof. The Ability to Learn curve is skewed to the left but it also has a second high point which is just as high as the Terman highest point. No explanation can be given for the two points in the Ability to Learn curve. It seems plausible to say that one test is no better than the other.

In the composite graphs figures 6-7 there doesn't seem to be enough evidence to say that one test is any better than the other.

In the graphical representation the relationship between two sets of data is shown in a general way and not specifically as in other statistical methods such as the correlation and quartile methods.

Coefficient of correlation method.

The Pearsonian method is used in computing the coefficients of correlation and is taken from Walter S. Monroe:¹ This method is possibly the most reliable of them all for indicating whether a relationship exists between two sets of data collected on the same individuals.

Mr. H. C. Rugg said., "When (r is the symbol used for the coefficient of correlation) is below .15 or .20 the correlation is negligible. It is present but low when " r " ranges

1. Monroe, W.S., Theory of Educational Measurements, Houghton Mifflin Co, 1925, p.362.

Tenth grade correlation (Pearsonian method)

TEST SCORES

TERMAN SCORES	26	31	36	41	46	51	56	61	66	71	76	81	86	91	96	101	106	111	116	f	d	fd	fd ²	Σ x	y
190																				1	15	15	225	150	
186																				2	14	28	392	126	
185																				0	13	0	0		
181																				1	12	12	144	84	
180																				0	11	0	0		
176																				3	10	30	300	210	
175																				3	9	27	243	135	
171																				5	8	40	320	160	
170																				2	7	14	98	70	
166																				2	6	42	252	144	-6
165																				3	5	15	75	50	
161																				8	4	32	128	48	-24
160																				11	3	33	99	42	-45
156																				8	2	16	32	38	-18
155																				11	1	11	11	15	-10
151																				18					
150																									
146																									
145																									
141																									
140																									
136																									
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f	1	4	3	5	4	7	8	7	19	12	9	8	7	10	6	1	2	1	1	(115)	(119)	(2853)	(1633)	(142)
d	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10					
fd	-8	-28	-18	-25	-16	-21	-16	-7	(139)	12	18	24	28	50	36	7	16	9	10	(210)				
fd ²	64	196	108	125	64	63	32	7		12	36	72	112	250	216	49	128	81	100	(1715)				

$C_x = \frac{210 - 139}{115} = .617$

$\sigma_x = \sqrt{\frac{1715}{115} - .38^2} = 3.812$

$C_y = \frac{315 - 119}{115} = 1.747$

$\sigma_y = \sqrt{\frac{2853}{115} - 3.052^2} = 4.664$

$C_x^2 = .3806$

$C_y^2 = 3.052$

$r = \frac{1491}{115} - 1.077 = .67 \pm .034$
 $\frac{3.812 \times 4.664}{3.812 \times 4.664}$

$C_x C_y = 1.077$

from .15 to .20 to .35 to .40. It is marked when "r" is above .60 or .70 .

The absence of any relationship between two sets of paired facts is expressed by the coefficient zero (0); a perfect positive relationship is expressed by unity (1); and a perfect negative relationship is expressed by minus one (-1).

The reliability coefficient is a general measure that tends to show the trend of behavior of the test when used with a large number of students. As the coefficient increases, the indication is that such tests will tend to give more nearly the same result if used again or that one equivalent form will give more nearly the same result as another.

In case the distribution is approximately normal, the quartile range can be interpreted as a measure of deviation from the median. This measure of deviation is called the probable error (P.E.) The formula for probable error is

$$\text{P.E.} = .6745 \frac{(1-r^2)}{\sqrt{N}}$$

A correlation to have validity must be four times greater than its probable error. In this study the coefficient of correlation between the Terman scores and the Ability to Learn scores is .67 and the P.E. is $\pm .034$. The coefficient (.67) is considerably greater than four times its probable error ($\pm .034$) which indicates that the correlation is reliable.

Coefficients of correlation for both the ninth and tenth

grades are obtained between the test of Ability to Learn score and (1) the Terman A test scores, (2) the teachers' estimated marks, (3) the school marks.

Summary of correlation. By the correlation method it is shown how the Terman test and the Ability to Learn test correlated with the teachers' estimate and school marks. There is a high correlation between the Terman and Ability to Learn tests in both grades, the coefficient being the same (.67). The coefficients of correlation between the Terman scores and school marks (.463) and the Ability to Learn scores and school marks (.467) in the tenth grade are practically the same, there being a difference of four thousandths. This might indicate that one test is just as reliable as the other in the tenth grade.

This, however, is not true in the ninth grade. The coefficient of correlation between the Ability to Learn scores and the school marks (.60) is fourteen points higher than the coefficient between the Terman scores and school marks (.46). This indicates that the Ability to Learn test is more reliable than the Terman test in the ninth grade.

The coefficient of correlation between the Terman scores and teachers' estimates in the tenth grade is ten points lower (.44) than the same in the ninth grade (.54). The coefficient between the Ability to Learn scores and teachers estimate in the tenth grade (.38) is twenty points lower than

that of the ninth grade (.56). This might indicate that the teachers' estimate in the ninth grade is more reliable than that of the tenth grade.

Quartile placement method. Students are arranged in quartiles according to their scores in the test to be compared, and the percentage of perfect correspondence and the total points misplacement are determined. The points of misplacement are determined (1) by the number of misplacements, and (2) by the amount of misplacement. One student changing one quartile equals one point of misplacement. Quartile number four is composed of the poorest students.

Perfect correspondence of cases means that a student's scores remain in the same quartile for the two tests that are compared. Misplacement means that a student's score in one factor of a comparison is in a certain quartile and in the other factor compared his score is in a different quartile. For example, a student may be in quartile II in one test and in quartile III, or IV in the other test as the case may be.

Point misplacement is obtained by finding the sum of the total misplacement in that particular quartile. For example, if a student in quartile IV in one test moves up to quartile II in the other test compared the point misplacement is one; if he moves up two quartiles the point misplacement is two, etc. (Table 12, in quartile IV there are

TABLE 9

Show the comparison of correlations between Terman test scores and each test of the Ability to Learn test scores of the ninth and tenth grades.

	<u>Tenth Grade</u>	<u>Ninth Grade</u>
Terman Scores and Test I	.56 ±.043	.47 ±.049
Terman Scores and Test II	.66 ±.035	.42 ±.051
Terman Scores and Test III	.28 ±.057	.48 ±.048
Terman Scores and Test IV	.62 ±.038	.47 ±.049
Terman Scores and Test V	.70 ±.032	.53 ±.045

An examination of Table 9 shows that the coefficients in the ninth grade while over are more constant than in the tenth grade. There is only a difference of six points between the lowest coefficient in the ninth and in the highest. There is a difference of forty-one points between the lowest and highest coefficient in the tenth grade. It is interesting to note that the coefficient of test No. III in the tenth grade was as low as .29 while in the ninth grade the same test was .48. No explanation was found to account for this difference of 19 points. The average coefficient of correlation for each test in both grades is

Ability to Learn Test minus test No. III vs Terman test	.60	Test I	.51 ±.046
Test No. I weighted vs Terman Test	.50	Test II	.54 ±.043
Ability to Learn Test minus test No. III vs School marks	.49	Test III	.38 ±.052
		Test IV	.54 ±.043
		Test V	.61 ±.038

The results of experimenting with test III and test I in the tenth grade.

TABLE 10

Show the comparison of correlations of Terman Test scores, Ability to Learn Test scores and teacher's estimate and school marks of 115 students in the ninth and tenth grades

	Tenth Grade	Ninth Grade
Terman Test Scores vs. Ability to Learn Test scores	.67 ±.034	.67 ±.034
Terman Test scores and Teachers' Estimate	.44 ±.050	.54 ±.044
Ability to Learn Test scores and Teachers' Estimate	.38 ±.053	.58 ±.041
Ability to Learn Test scores and School Marks	.467±.049	.60 ±.04
Terman Test scores and School marks	.463±.049	.46 ±.049
Teachers' estimate and School marks	.74 ±.028	.78 ±.024

An examination of Table 10 shows that the coefficient of correlation between the Terman scores and Ability to Learn scores is the same (.67 ±.034) in both grades. The average coefficient of correlation between the Terman scores and teachers' estimate in both grades (.49 ±.047) is one point higher than the average coefficient between the Ability to Learn and teachers' estimate in both grades (.48 ±.048). The average coefficient of correlation between the Ability to Learn scores and school marks in both grades (.53 ±.045) is seven points higher than the average coefficient between the Terman scores and the school marks in both grades (.46 ±.049). This seems to indicate that the Ability to Learn test is more reliable than the Terman test at least when the two tests are correlated with the school marks in both grades.

six one point misplacements, five, two point misplacements, and one, three point misplacements, giving a total of nineteen point misplacements.)

Table 11-23, shows the correspondence of cases, the quartiles, and the point misplacements. Comparing the Ability to Learn quartiles and the Terman quartiles of the tenth grade, there are 62 cases of perfect correspondence and 73 points of misplacement. Comparing the same in the ninth grade there are 53 cases of perfect correspondence and 79 points of misplacement. This indicates that more students of the tenth grade remained in their respective quartiles than in the ninth grade. Table 24 shows a complete summary of the quartile perfect correspondence and point misplacement of Terman and Ability to Learn scores; Ability to Learn scores and teachers' estimate; Terman scores and school marks; estimate and school marks; Ability to Learn scores and school marks in both ninth and tenth grades.

Summary of quartile method. When the Ability to Learn scores are compared with the school marks in the tenth grade there are thirteen more cases of perfect correspondence (47%) and twenty-five points less misplacement than when the Terman scores are compared with the school marks (34%). Comparing the Ability to Learn scores and the teachers' estimate in the same grade there are two percent more cases of perfect correspondence (48%) and seven points less misplacement than

TABLE 11

This table shows the range of the quartiles used in the Ability to Learn scores, Terman scores, teachers' estimate and school marks in the ninth and tenth grades.

Tenth Grade

Terman Scores	Ability to Learn Scores
First quartile (above 134.9)	(above 85.5)
Second quartile (120 - 134.9)	{ 71 - 85.5 }
Third quartile (108 - 119.4)	{ 59 - 70.8 }
Fourth quartile (up thru 107.9)	(up thru 58.9)

Teachers' Estimate	School Marks
First quartile (above 80)	(Above 79.2)
Second quartile (77 - 80)	{ 75 - 79.2 }
Third quartile (72 - 76.4)	{ 71 - 74.9 }
Fourth quartile (up thru 71.8)	(up thru 70.4)

Ninth Grade

Terman Scores	Ability to Learn Scores
First quartile (above 130.9)	(Above 68)
Second quartile (114 - 130.9)	{ 57 - 68 }
Third quartile (103 - 113.2)	{ 47 - 56.5 }
Fourth quartile (up thru 102.2)	(up thru 46.8)

Teachers' Estimate	School Marks
First quartile (above 78.4)	(Above 83)
Second quartile (75 - 78.4)	{ 77 - 82 }
Third quartile (70 - 74.3)	{ 74 - 76.8 }
Fourth quartile (up thru 69)	(up thru 73.3)

TABLE 12

Quartile Placement of Term Scores and Ability to Learn Test Scores of 115 Students of Tenth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	21	6	1	3	7	8
2	11	12	6		20	28
3	15	10	4		14	18
4	15	6	5	1	12	19
	62	34	18	1	53	73

53.9% Perfect Correspondence

73 Point Misplacement

TABLE 13
 Quartile Placement of Ability to Learn Test Scores and Tenth Grade
 Teachers' Estimate of 115 Students.

Quartile	Perfect Corres- pondence	Quartile Misplace- ment 1	Quartile Misplace- ment 2	Quartile Misplace- ment 3	Quartile Misplace- ment 4	Total Misplace- ment	Point Misplace- ment
1	12	8	5	3		16	27
2	8	16	5	0		21	26
3	13	14	1	0		15	16
4	22	6	1	1		8	11
	55	44	12	4		60	80

47.8% Perfect Correspondence 80 Point Misplacement

TABLE 14
 Quartile Placement of Terman Scores and Estimate of 115 Students of The Tenth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	11	7	7	3	17	30
2	9	14	6		22	30
3	14	13	2		15	17
4	19	6	2		8	10
	53	40	19	3	62	87

46% Perfect Correspondence 87 Point Misplacement

TABLE 15
 Quartile Placement of Terman Scores and School Marks of 115 Students of
 The Tenth Grade.

Quartile	Perfect Corres- pondence	Quartile Misplace- ment 1	Quartile Misplace- ment 2	Quartile Misplace- ment 3	Total Misplace- ment	Point Misplace- ment
1	11	9	5	3	17	26
2	7	15	9		25	33
3	8	19	2		21	23
4	13	6	6	2	14	24
	39	49	22	5	77	108

34% Perfect Correspondence 108 Point Misplacement

TABLE 16
 Quartile Placement of Ability to Learn Scores and School Marks of 115
 Students of The Tenth Grade.

Quartile	Perfect Corres- pondence	Quartile Misplace- ment 1	Quartile Misplace- ment 2	Quartile Misplace- ment 3	Total Misplace- ment	Point Misplace- ment
1	14	8	5	1	14	21
2	12	15	2		17	19
3	8	17	3		20	23
4	20	2	6	2	10	20
	54	42	16	3	61	83

47% Perfect Correspondence 83 Point Misplacement

TABLE 17
 Quartile Placement of Teacher's Estimate and School Marks of 115 Students of The Tenth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	15	4		1	5	7
2	8	11			11	11
3	13	19	2		21	23
4	25	8	9		17	26
	61	42	11	1	54	67

53% Perfect Correspondence 67 Point Misplacement

TABLE 18

The Quartile Placement of Texman Scores and Ability to Learn Test Scores of 115 Students of The Ninth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	17	9		1	10	12
2	11	8	8		16	24
3	10	16	5		21	26
4	15	13	2		15	17
	53	46	15	1	62	79

46% Perfect Correspondence

67 Point Misplacement

TABLE 19

Quartile Placement of Terman Scores and Ninth Grade Teacher's Estimate of 115 Students

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	12	9	5	1	15	22
2	7	13	7		20	27
3	11	18	2		20	22
4	15	8	6	1	15	23
	45	48	20	2	70	94

39% Perfect Correspondence

94 Point Misplacement

TABLE 20

Quartile Placement of Ability to Learn Test Scores and Ninth Grade Teachers' Estimate of 115 Students.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Quartile Misplacement 4	Total Misplacement	Point Misplacement
1	10	11	4	1		16	22
2	11	16	6			22	28
3	10	13	2			15	17
4	15	9	6	1		16	25
	46	49	18	2		69	92

40% Perfect Correspondence

92 Point Misplacement

TABLE 21

Quartile Placement of Ability to Learn Test Scores and School Marks of 115 Students of the Ninth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	9	10	7		17	24
2	17	6	10		16	26
3	5	20			20	20
4	17	9	4	1	14	20
	48	45	21	1	67	90

42% Perfect Correspondence

90 Point Misplacement

TABLE 22
 Quartile Placement of Term Scores and School Marks of 115 Students of
 The Ninth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	8	11	5	3	19	30
2	12	5	10		15	25
3	10	19	2		21	23
4	17	7	6		13	19
	47	42	23	3	68	97

41% Perfect Correspondence

97 Point Misplacement

TABLE 23
 Quartile Placement of Teachers' Estimate and School Marks of 115 Students of Ninth Grade.

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	10	9	1		10	11
2	19	11	3		14	17
3	8	25			25	25
4	21	6	2		8	10
	58	51	6		57	63

50% Perfect Correspondence

63 Point Misplacement

TABLE 24

A Summary of The Quartile Perfect Correspondence and Point Misplacement of Table 12-23.

Tenth Grade (115 Students)

	Perfect Correspondence	Point Misplacement
Terman and Ability to Learn scores	54%	73
Ability to Learn scores and teacher's estimate	48%	80
Terman scores and teachers' estimate	46%	87
Terman scores and school marks	34%	108
Estimate and school marks	47%	83
Ability to Learn scores and school marks	53%	67

Ninth Grade (115 students)

Terman and Ability to Learn scores	46%	79
Ability to Learn scores and teachers' estimate	40%	92
Terman scores and teachers' estimate	39%	94
Terman scores and school marks	41%	97
Teachers' estimate and school marks	50%	63
Ability to Learn scores and school marks	42%	90

Average for Ninth and Tenth Grades

Terman and Ability to Learn scores	50%	76
Ability to Learn scores and teachers' estimate	44%	86
Terman scores and teachers' estimate	42%	90
Terman scores and school marks	37%	102
Estimate and school marks	48%	73
Ability to Learn scores and school marks	47%	78

when the Terman scores are compared with the teachers' estimate (46%). This seems to indicate that the Ability to Learn test is more reliable than the Terman test when compared with the school marks and teachers' estimate in the tenth grade.

In the ninth grade the Ability to Learn scores compared with the school marks have one percent more cases of perfect correspondence (42%) and seven points less misplacement than the Terman scores compared with the school marks (41%). The Ability to Learn scores compared with the teachers' estimate show one percent more cases of perfect correspondence (40%) and two points less misplacement than the Terman scores compared with the teachers' estimate (39%). In the ninth grade also it seems to indicate that the Ability to Learn test is more-reliable than the Terman test.

The average for the Ability to Learn scores and school marks for both grades show ten percent more cases of perfect correspondence (47%) and twenty-four points less misplacement than the average for the Terman scores and school marks (37%).

The average for the Ability to Learn scores and teachers' estimate for both grades is two percent more cases of perfect correspondence (44%) and four points less misplacement than the Terman scores and teachers' estimate (42%). Once again it appears that the Ability to Learn test is more reliable than the Terman test at least when compared with the school marks and teachers' estimate.

CHAPTER V
SUMMARY AND CONCLUSIONS

Graphs are presented showing the distribution curve of (1) Terman scores with Ability to Learn scores in both grades, (2) Ability to Learn scores of both grades, (3) school marks with teachers' estimate in both grades.

The coefficients of correlation are found for the following in both ninth and tenth grades: Terman scores and Ability to Learn scores; Terman scores and teachers' estimate; Terman scores and school marks Ability to Learn scores and teachers' estimate; Ability to Learn scores and school marks; school marks and teachers' estimate.

The same combinations for the two grades are placed in quartiles and the percent of perfect correspondence and the point misplacement are found.

Tables are made showing the distribution for Terman scores, Ability to Learn scores, teachers' estimate and school marks for each grade; an example of the Pearsonian method of correlations of the Terman test scores and each test of the Ability to Learn test for each grade; a comparison of correlations of Terman test scores, Ability to Learn scores, teachers' estimate and school marks in each grade; the quartile placement of the different scores in each grade; and a comparison of the perfect correspondence and point misplacement of each grade.

In each grade the 115 students are arranged according to the Ability to Learn score received, the highest first and then in descending order. Each student is represented by a number. With the Ability to Learn score, each student's Terman score, teachers' estimate and school marks are recorded.

Graphical Method. The distribution curves of the Ability to Learn test scores and the Terman scores in the tenth grade Figure 1 follow the normal probability curve as closely as could be expected owing to the small number of cases. There are 115 students tested in each grade and this is hardly a large enough number to expect anything like a perfect normal probability curve. If there had been as high as 400 or 500 cases possibly the curve would have been smoother. The Ability to Learn curve, however, appears to be more even throughout than the Terman curve. Figure 1 seems to indicate that the Ability to Learn test is just as reliable in the tenth grade as the Terman test.

For the ninth grade the distribution curves of the Ability to Learn scores and the Terman scores, shown in Figure 2 are very uneven. This unevenness might be attributed in part to the reason stated above. With the exception of the two middle points in the Ability to Learn curve it is more even in the beginning and end than the Terman curve. No cause was found to explain the two high points in the middle of the

Ability to Learn curve. The fact that the Ability to Learn curve is skewed to the left might indicate that the Terman test is more reliable in the ninth grade; but this is not altogether certain.

In figure 3 the distribution curves for the Ability to Learn scores of both grades are shown. The curve in the tenth grade rises gradually until it reaches its highest point between 66-70 and descends gradually with the exception of one interval 91-95. The ninth grade curve rises rapidly and reaches its highest point between 46-50 twenty points sooner than the tenth grade. It descends very suddenly and then rises suddenly to a second high point between 56-60. From then on it descends gradually. The fact that there are ten more students in the tenth grade who received higher scores than the highest in the ninth would naturally make the curves look very much different. This figure seems to indicate that the Ability to Learn test is more reliable in the tenth grade than in the ninth grade.

In Figure 4 and 5 the range from 60-94 on the base line is narrow on account of being laid off in five point intervals. The result is that the graphs resemble a triangle more than they do a normal probability curve. In figure 4 there are seven more cases that fall under the middle point in the teachers' estimate than in the school marks. It appears that the teachers' estimates are not as accurate as the school marks.

In the ninth grade (Figure 5) there are nine more cases that fall under the middle point in the school marks than in the estimate. This would appear that the ninth grade teachers fell short in their estimate by nine cases in this particular interval (75-79). Both figures LV and V seem to substantiate the claim made by many educators and psychologists that a teachers' estimate is subjective and not very accurate.

Figure 6-7 do not seem to present enough evidence to be able to say with any degree of certainty that one test was better than the other.

Correlation results. It is interesting to note that that the coefficient of correlation between the Terman Test scores and the Ability to Learn test scores is the same, $.67 \pm .034$ in both grades. The coefficient of correlation between the Terman score and school marks in the tenth grade is $.463 \pm .049$ while the correlation between the Ability to Learn scores and school marks in the same grade was $.467$ -four thousandths higher. It would appear from these figures that the Ability to Learn test was just as valid as the Terman test for the tenth grade.

Objective tests or marks when correlated with other objective tests or marks will have a higher correlation than when they are correlated with subjective tests or marks. A teacher's estimate is more or less subjective so this fact might account for the correlation between the Terman scores

and estimate (.44 ±.05) being six points higher than the correlation (.38 ±.053) between the Ability to Learn scores and the estimate in the tenth grade.

In the ninth grade the coefficients of correlation are much higher. The correlation between the Terman scores and school marks is (.46 ±.049) but the correlation between the Ability to Learn scores and school marks is (.60 ±.04) a difference of fourteen points. These figures seem to indicate that the Ability to Learn test has much more validity than the Terman Test. The correlation between the Terman scores and teacher's estimate is .54 ±.044 while the correlation between the Ability to Learn scores and teachers' estimate is .58 ±.041, a difference of four points. Again the figures seem to point to the higher validity of the Ability to Learn test. It would appear from the correlations that the Ability to Learn test has considerable more validity in the ninth grade than in the tenth.

The following are some of the correlations found by W. A. Cowing:¹

Terman A I.Q. with Chapman Silent Reading
Test. .50 ±.046.

Terman A I.Q. with Monroe Silent Reading
Test. .64 ±.024.

1. Cowing, W.A., "Comparative Validity of Mental Tests and Silent Reading Tests in Predicting High School Success", Massachusetts State College Library, Amherst, June, 1931.

Chapman Silent Reading with Monroe Silent Reading. $.54 \pm .047$.

The correlation between the Terman A test and the Ability to Learn test in this study is $.67 \pm .034$, three points higher than the coefficient $.64 \pm .024$ obtained in Terman A I.Q. with Monroe Silent Reading Test. From these figures it appears that the Ability to Learn Test when correlated with Terman A test is three points more valid than the Monroe Silent Reading Test.

Quartile results: When the Terman scores and school marks in the tenth grade are placed in quartiles there is 34% perfect correspondence and 106 points misplacement. When the same is done to the Ability to Learn scores and school marks the perfect correspondence is 47% and the points misplacement 83. These figures show that there is 13% more perfect correspondence of the Ability to Learn scores and 25 points less misplacement. The Terman scores and teachers' estimate placed in quartiles show 46% perfect correspondence and 87 points misplacement while the Ability to Learn scores and teachers' estimate show 48% perfect correspondence and 80% misplacement. Here there is a difference of only 2% in perfect correspondence and seven points in misplacement. It appears that the students remain in their respective quartiles better when they take the Ability to Learn Test.

In the ninth grade the difference in perfect correspondence are not so large. The Terman scores and school marks have 41% perfect correspondence and 97 points misplacement while the Ability to Learn scores and school marks have 42% perfect correspondence and 90 points misplacement. This show only a different of one percent in perfect correspondence and seven points misplacement. The Terman scores and teachers' estimate have 39% perfect correspondence and 94 points misplacement while the Ability to Learn scores and teachers' estimate have 40% perfect correspondence and 92 points misplacement. From these results it is seen that the students remain in their respective quartiles better in the Ability to Learn test, indicating that such the Ability to Learn test is something more valid in predicting school success than the Terman test is.

Tabulations. The tabulations in the tenth grade show that the student having the highest scores in the Ability to Learn and Terman tests does not have the highest estimate or school mark. This student for some unknown reason received a 77 in his school marks and did not work up to his capacity during his daily work. The student rating sixth in the Ability to Learn test rates sixteenth in the Terman test and first in the school marks.

In the ninth grade the student receiving the highest school mark rated sixth in the Ability to learn test and third

in the Terman test. The student receiving the second in the school marks rated twenty-second in the Ability to Learn test and fifty-three in the Terman Test.

In order to ascertain what part of the Ability to Learn test might be less valid than the other each test is correlated with the Terman test. The results of this investigation are shown in Table 9. Test III (.29) is twenty-seven points lower than the next lowest in the tenth grade, (Test No. 1. .56) but no legitimate reason for this low correlation was found. An effort was made to bring this coefficient up higher by multiplying test III scores by two and correlating the result with Terman scores. The result of this correlation is (.33) four points higher than the original No. III test coefficient. This however does not appear to be sufficient remedy to make Test III more reliable, for the four points difference does not materially affect the validity of the test.

The Ability to Learn test minus test No. III is correlated with the Terman test and the coefficient obtained is .60. This is seven points lower than when test No. III is included in the correlation. Test No. I is weighted and correlated with the Terman test but the result obtained is .54 two points lower than the original correlation .56. The Ability to Learn test minus test No. III is correlated with the school marks in the tenth grade and the results obtained is .49 two points higher than the original correlation .47.

The results found from these experiments do not seem to warrant further experimenting so it was decided to leave the Ability to Learn test in its original form.

The following is a synopsis of the data found in this study when the Terman test and the Ability to Learn test are compared with the school marks and the teachers' estimate.

Ninth Grade

Graphical method

Figure 6. Does not seem to indicate that one test is any better than the other.

Correlation method

Ability to Learn and school marks	.60±	.04
Terman and school marks	.46±	.049
	.14	
Ability to Learn estimate	.58±	.044
Terman and estimate	.54±	.041
	.04	

These correlations seem to indicate that the Ability to Learn test is more valid than the Terman Test.

Perfect Correspondence

Quartile method

Ability to Learn and school marks	42%
Terman and school marks	41%
	1%
Ability to Learn and estimate	40%
Terman and estimate	39%
	1%

These results are also in favor of the Ability to Learn test.

Tenth Grade

Graphical method

Figure 7 Does not seem to indicate that one test is better than the other.

Correlation method

Ability to Learn and school marks	.467+	.049
Terman and school marks	.463+	.049
	<hr/>	
	.004	
Terman and estimate	.44+	.050
Ability to Learn and estimate	.387	.053
	<hr/>	
	.06	

These results seem to indicate that there is little difference in the two tests and one was about as reliable as the other.

Perfect
Correspondence

Quartile method

Ability to Learn and school marks	47%
Terman and school marks	34%
	<hr/>
	13%
Ability to Learn and estimate	48%
Terman and estimate	46%
	<hr/>
	2%

These results seem to indicate that the Ability to Learn test is more valid than the Terman test.

The results of the correlation method and the quartile method seem to favor the Ability to Learn test; and the graphical method seems to favor neither one. The correlation and quartile methods are probably the most accurate methods used in this study so it seems plausible to assume that the Ability to Learn test is more reliable than the Terman test.

CONCLUSION

It has been shown in Chapter II how the intelligence test from the time of Binet and Simon in 1905 to the present day, has undergone several changes from the single test dealing with sensory and motor processes, to the more practical group test (Terman A) based on past experience. In this study an attempt has been made to show that there is a field open for a new kind of test that has nothing or but very little to do with past experience namely a test based on ability to learn.

It would appear from the results of this study that a worth while idea has been presented, namely, a test construed on subject matter based on ability to learn. The Terman A intelligence test, has been accepted by many schools as a suitable test by which to rate the intelligence of their students. The Ability to Learn test when correlated with the school marks in the tenth grade is four thousandths higher (.467-± .463) than the Terman test. In the ninth grade the Ability to Learn test when correlated with the school marks is .60±.049 a difference of fourteen points in favor of the Ability to Learn Test. From these figures it seems plausible to assume that the Ability to Learn test has considerable greater validity than the Terman test at least in the ninth grade.

At the Massachusetts State College a test was constructed by Dr. H.W. Glick and Mr. A.H. Holway, and administered to the first year students. The subject matter in this test was also based on ability to learn. The results obtained were very satisfactory. This test when correlated with the college marks gave a higher coefficient of correlation than two other recognized intelligence test - the (Army Alpha, The Psychological Examination)¹ did with the same marks.

It would be interesting and enlightening to have a study made using the Ability to Learn test, achievement tests, silent reading tests and objective marks instead of the Terman A scores, teachers' marks and estimates as was done in this study.

1. Published by American Council on Education Washington, D.C.

WEST SPRINGFIELD HIGH SCHOOL

SCHOLASTIC APTITUDE TEST

For Ninth and Tenth Grades

Prepared by H. N. Glick and Chas. P. McDonnell

Name (Last name) (Given name or initials)

Age

Score

Section I
Section II
Section III
Section IV
Section V
Gross Score

Directions for West Springfield High School Scholastic
Aptitude Test

In this test you are to take, you may use either pencil or pen. Pay attention to the directions and there will be no need of asking any questions. This is not a test of what you know now and it will have no influence on your school marks. Before you begin the test you are not supposed to know the answers to any of the questions in it. It is intended to be a test of your ability to learn certain types of subject matter which you will meet in high school. In every part of the test, you will be given an opportunity to learn the answers to the questions. Some of the answers you may find difficult to learn out do not feel discouraged for no one is supposed to make a perfect score. Do the best you can in the time allowed.

The first papers to be passed out are study sheets and they will be handed to you face down. Do not look at them until told to do so. After these are studied, they will be collected and the test will be given to you.

(Study sheets are passed out and handed to pupils face down.)

Now look at the study sheets and read the directions under Section I while I read them over with you. (Read directions.) The printed material under part B has nothing to do with the drawing.

You will be allowed 5 minutes to study. Begin.

Now turn to the next sheet, Section II and look at the directions while I read them. (Read directions.)

You will be allowed 3 minutes to study. Begin.

Now turn to the next sheet, Section IV part A and look at directions while I read them. (Read Directions.)

You will be allowed 3 minutes to study. Begin.

Now turn to the next sheet, Section IV part B and look at directions

While I read them. (Read directions.)

You will be allowed 3 minutes to study. Begin.

Now turn to next sheet, Section VI and look at directions while I read them. (Read Directions.)

You will be allowed 4 minutes. Begin.

If you get through after 3 minutes are up, you may turn back and study any of the other sheets.

Now turn papers over and pass them forward. (Study sheets are collected and tests are given out.)

Write your name on the line indicated and your age.

Turn to first sheet Section III and look at the directions while I read them. (Read Directions.)

You will be allowed 10 minutes. Begin.

Now turn to next sheet Section I part A and look at directions while I read them. (Read Directions.)

You will be allowed 4 minutes. Begin.

Now turn to next sheet Section I part B and look at directions while I read them. (Read Directions.)

You will be allowed 4 minutes. Begin.

Now turn to next sheet Section II and look at directions while I read them. (Read Directions.)

You will be allowed 3 minutes. Begin.

Turn to next sheet IV part A and look at directions while I read them. (Read Directions.)

You will be allowed about 3 minutes. Begin.

Now turn to next sheet Section IV part B and look at directions while I read them. (Read directions.)

You will be allowed about 4 minutes. Begin.

Now turn to next sheet, Section 5. Part A and Part B. Look at directions while I read them. (Read Directions.)

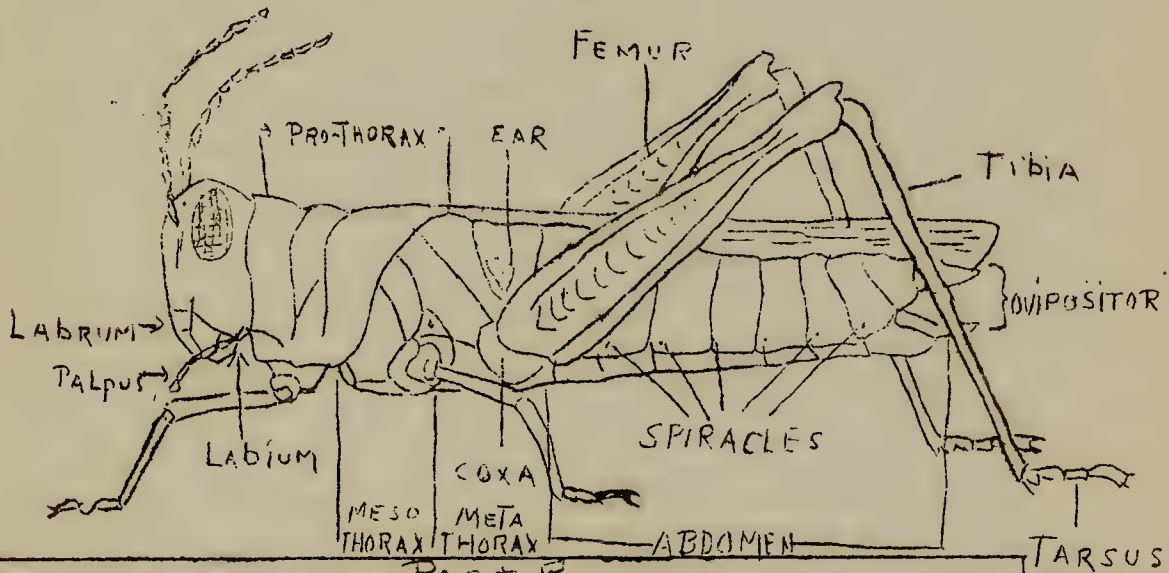
You will be allowed about 5 minutes.

Directions:-

Study thoroughly the drawing and the printed material on this sheet. You will be asked questions about it later. You will not be asked to reproduce the drawing.

PART A

GRASS-HOPPER



PART B

1. Metamorphosis is the change of form undergone from egg to adult, as in insects.
2. Operculum is a lid or flap in fishes, covering the gills.
3. Pharynx is an irregular cavity at the back of the mouth.
4. Proglottids are reproductive body segments of a tapeworm.
5. Diastase is an enzyme in plants which changes starch to sugar.
6. Cerebrum is the front part of the brain.
7. Chlorophyll is the green coloring matter of plants.
8. Ganglion is a mass of nerve tissue.
9. Pseudopodia are projections of protoplasm used for locomotion in the amoeba.
10. Pylorus is the valve between the stomach and the small intestines.
11. Diaphragm is the muscular wall at the base of the lungs.

H.S.

SECTION II

Study carefully the paragraph below. Read it over as many times as you can until you are asked to stop. You will be asked questions on it later.

Charles the second was thirty years old on the day that he entered London, May 29, 1660. He had received little systematic instruction from books; but his life had been a stirring one, full of harsh and varied lessons in the great school of experience. As a boy of twelve he had narrowly escaped capture at Edgehill; when only fifteen, he had been put in nominal command of the royal army of the West, and early in 1646, by the order of his father, he fled from England. Then followed long years of exile. Often out at the elbows; the recipient of grudging advances from those who found him a burden; disappointed, time and again, in his efforts to come to his own, he displayed through all his adversity the single virtue of cheerfulness. Once, and once only, he manifested an unselfishness that was truly praiseworthy. In order to "save his father's head" he forwarded to Parliament a sheet of paper with his signature attached, offering to observe whatever conditions they might choose to insert. At all times he appears simply as a "needy and frivolous but agreeable prince," who continually vexed his grave and learned counselor, Hyde, by his unwillingness to work and his loose habits. His brief experience in Scotland under the "sour tyrannies of the Kirk" led him to declare that Presbyterianism "was not a religion for a gentleman," and emphasized by contrast the "gorgeous ceremonies and easy morals," of Roman Catholicism as he found it in France. That became his faith, so far as he can be said to have had any, though he was not received into the fold of the Church until he lay on his deathbed. Although he hated the details of business and was too sensible to believe in the Divine Right of Kings, he aimed to keep as free from parliamentary control as possible; to that end, he set up a standing army, he sought to re-introduce Roman Catholicism, to secure toleration for dissenters, and furthermore allied himself with France. He bribed, flattered, and managed, but fully alive to his royal limitations he yielded when popular opposition proved too strong. Thus, before the close of his reign, he gave up all his projects except the French alliance which he clung to tenaciously; with a political cunning rare in history, he shifted to the Anglican side and by playing the Anglicans and the French against one another he managed to spend his last years free from parliamentary restraint.

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SECTION IV
Part A

Directions:- You are to study this map carefully. Later you will be asked questions on it. You will not be asked to reproduce the map.



SECTION IV
Part B

Directions:- You are to study the statements below. You will be asked questions about them later.

1. The Roosevelt Dam is seventy miles from Phoenix, Arizona, and is used to store water for irrigation.
2. The official language of the people of Mexico is Spanish.
3. The mines of Sudbury, Canada, produce about 2/3 of the nickel of the world.
4. Coffee is the only crop of importance on the Pacific coast of Central America.
5. Platinum is found in Russia and in Colombia.
6. The climate of England is modified by the Gulf Stream.
7. An arm of the sea extending into the land is called a fiord. And there are many of these in Norway.
8. Singapore is the great commercial city of the East Indies.
9. India and Japan have the best railroads of all the Asiatic countries.
10. The most valuable tree within the tropics is the coconut tree.
11. Buenos Aires in Argentina is an important and modern city.
12. Denmark is known all over the world for its bacon.
13. The Rhine River in Germany is famous for its scenic beauty.
14. Hawaii sends a great deal of sugar and pineapples to the United States.
15. Cork is the bark of a species of oak tree that grows in Portugal.
16. Switzerland has the most democratic government in the world.
17. The largest line of manufacturing in Japan is cotton goods.
18. The three great sugar beet countries of Europe are Poland, Germany, and France.
19. Cinchona or Peruvian bark supplies quinine, one of the most important drugs of commerce.
20. Rabbits do an enormous amount of damage to the crops in Australia.

Directions:-Study carefully the selections given below. You will be asked questions about them later. You will not be expected to memorize the selections.

PART A

As we look back upon the age of Elizabeth, we are conscious of certain outstanding features. It was, first of all, an age of change and expansion. Within the lifetime of Shakespeare the religion of England changed from something close to Catholicism to something close to Puritanism. Within his lifetime England changed from a position of comparative isolation and international insignificance to a position of proud national strength; capable of resisting on the sea the full strength of Spain, then the dominant European power.

(Social Backgrounds of Eng. Lit.)

PART B

The world stands out on either side
No wider than the heart is wide;
Above the world is stretched the sky,
No higher than the soul is high.
The heart can push the sea and land
Father away on either hand;
The soul can split the sky in two
And let the **face** of God shine through.
But East and West will pinch the heart
That cannot keep them pushed apart;
And he whose soul is flat—the sky
Will cave in on him by and by.

Edna St. Vincent Millay

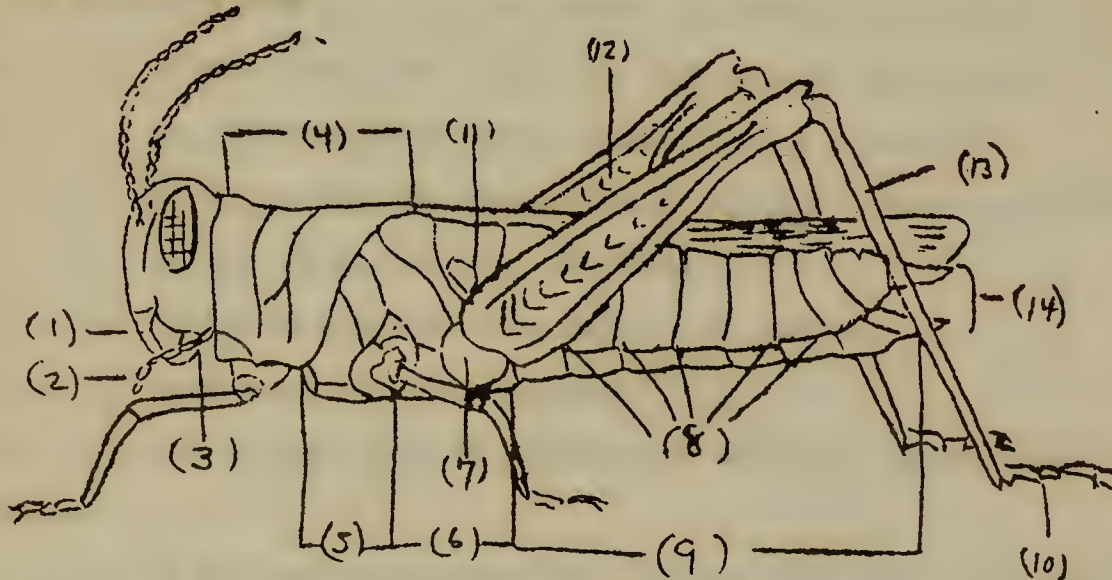
SECTION I

PART A

Directions:-

This is the drawing you studied; the parts are numbered and the names of the parts are below the drawing. You are to copy the number of each part in the parenthesis after the name of that part.

Example:- Number 1 is the Labrum, so 1 is placed in the parenthesis after Labrum. Do nothing with the names of parts which do not belong to this drawing.



Labrum.....(1)	Mandibles.....()
Abdomen.....()	Spiracles.....()
Meta-Thorax.....()	Tarsus.....()
Ovipositor.....()	Ear.....()
Pro-Thorax.....()	Labium.....()
Meso-Thorax.....()	Palpus.....()
Femur.....()	Coka.....()
Tibia.....()	Maxillipeds.....()

SECTION I (Continued)

Directions: (Part B)

Below are the definitions which you studied with the terms defined left out. The terms defined are in the list of terms below. What you are to do is to copy the number of the definition in the parenthesis after the term which the definition best defines.

~~Example:~~ Definition Number 1 defines Metamorphosis, so 1 is placed in the parenthesis after Metamorphosis. Do nothing with the terms in the list which are not defined by any of the definitions.

1.----- is the change of form undergone from egg to adult, as in insects.

2.----- is a lid or flap in fishes, covering the gills.

3.----- is an irregular cavity at the back of the mouth.

4.----- are reproductive body segments of a tapeworm.

5.----- is an enzyme in plants which changes starch to sugar.

6.----- is the front part of the brain.

7.----- is the green coloring matter of plants.

8.----- is a mass of nerve tissue.

9.----- are projections of protoplasm used for locomotion in the amoeba.

10.----- is the valve between the stomach and small intestines.

11.----- is the muscular wall at the base of the lungs.

metamorphosis.....(1) operculum.....()

pharynx.....() proglottids.....()

chlorophyll.....() diastase.....;.....()

ganglion.....() cerebrum.....;.....()

pylorus.....() pseudopodia.....()

diaphragm.....() pancreas.....()

SECTION II

Directions:

Below are some statements taken from the paragraph you studied in Section II. You are to place a check after the expression which you think best completes the statement. Example: In the first statement a check is placed after the date 1660. Check only one expression in each statement.

1. Charles II entered London in the year

1660	<input checked="" type="checkbox"/>
1672	<input type="checkbox"/>
1650	<input type="checkbox"/>

.
2. When he entered London he was

20	<input type="checkbox"/>
40	<input type="checkbox"/>
30	<input type="checkbox"/>

 years old.
3. He gained most of his education in the great school of

Cambridge	<input type="checkbox"/>
Oxford	<input type="checkbox"/>
Experience	<input type="checkbox"/>

.
4. On his father's orders he fled from England in the year of

1630	<input type="checkbox"/>
1646	<input type="checkbox"/>
1655	<input type="checkbox"/>

.
5. During his exile he was

never	<input type="checkbox"/>
always	<input type="checkbox"/>

 in need of money.
6. Charles was usually

sad	<input type="checkbox"/>
happy	<input type="checkbox"/>

.
7. His councilor's name was

Hyde	<input type="checkbox"/>
Cromwell	<input type="checkbox"/>
Peel	<input type="checkbox"/>

.
8. The religion which he said was not for a gentleman was the

Presbyterian	<input type="checkbox"/>
Baptist	<input type="checkbox"/>
Catholic	<input type="checkbox"/>

 religion.
9. The religion he preferred was the

Methodist	<input type="checkbox"/>
Presbyterian	<input type="checkbox"/>
Catholic	<input type="checkbox"/>

 religion.
10. As a worker he was

lazy	<input type="checkbox"/>
industrious	<input type="checkbox"/>

.
11. His habits were

strong	<input type="checkbox"/>
loose	<input type="checkbox"/>

.
12. He escaped capture at Edgehill when he was

12	<input type="checkbox"/>
18	<input type="checkbox"/>
20	<input type="checkbox"/>

 years old.
13. He was received into the Catholic Church

on his death bed	<input type="checkbox"/>
at his coronation	<input type="checkbox"/>
never	<input type="checkbox"/>

.
14. Most of the time Charles was

selfish	<input type="checkbox"/>
unselfish	<input type="checkbox"/>

.
15. In this paragraph

France	<input type="checkbox"/>
Italy	<input type="checkbox"/>
Spain	<input type="checkbox"/>
Germany	<input type="checkbox"/>

 was mentioned.
16. Charles would probably have made a

good	<input type="checkbox"/>
poor	<input type="checkbox"/>

 business man.
17. He allied himself with

France	<input type="checkbox"/>
Sweden	<input type="checkbox"/>
Holland	<input type="checkbox"/>

.
18. He tried to re-introduce the

Methodist	<input type="checkbox"/>
Catholic	<input type="checkbox"/>
Baptist	<input type="checkbox"/>

 religion.
19. As a politician he was considered

cunning	<input type="checkbox"/>
good	<input type="checkbox"/>
fair	<input type="checkbox"/>

.
20. At the close of his reign he shifted to the

Anglican	<input type="checkbox"/>
Catholic	<input type="checkbox"/>
Presbyterian	<input type="checkbox"/>

 religion.

SECTION III

Directions: On this sheet you will find a vocabulary, some rules and some sample sentences of an artificial language. On the opposite sheet are some English sentences and just beneath each English sentence is its translation into the artificial language. Some of these translations are correct and some are incorrect. You are to study the language on this sheet and draw a line through every word which is incorrectly translated on the opposite sheet. Do not try to memorize the vocabulary and forms on this sheet but you may consult them freely while checking the translation. If you mark through correctly translated words, it will count against you.

Vocabulary

I--ego
 see--set
 the--le
 cat--moh
 dog--can
 and--et
 run--unray
 away--ay
 that--lat
 house--chi
 he--fu
 she--fe
 study--etud
 lesson--esson
 to--fo
 at--mo
 difficult--ne
 boy--gar
 good--ber
 school--lol
 like--mek
 girl--far
 for--or
 large--gat
 home--chien
 is--as
 book--ko

Rules

1. Plurals of nouns and pronouns are formed by adding "w"
 Example: we--egow
 they--fuw
2. Past time is indicated by placing "ez" before the verb.
 Example: see--set
 saw--ezset
3. Opposites are formed by adding "en"
 Example: difficult--ne
 easy--neen
4. The objective case is indicated by placing "om" before the noun or pronoun
 Example: him--omfu
 them--omfuw

Samples: (The incorrect translations are marked.)

A I see the dog.
 ego unray le mek.

B The house is large.
 le chien as gaten

1. I see the cat.
ego set lat moh.
2. The cat sees me.
le moh set omego.
3. The dog runs away.
fo can unray chi.
4. He ran to the cat.
fe etud et le ko.
5. He saw that dog.
fu ezset lat can.
6. The house is large.
le chien ezas gat.
7. She studies the lessons.
fe etud le essonw.
8. He studied at home.
fu ezetud fo chien.
9. He runs to that house.
or unray fo le lol.
10. The lesson was difficult.
le esson as ne .
11. The good boy studied the lessons at school.
ko ber far ezetud les essonw mo lol.
12. The cat and the boy were at home.
le moh et lat gar ezas mo chien.
13. The lesson was easy for her.
le gat as neen fo omfe.
14. The dog ran to the girl.
le can ezunray fo le far.
15. They saw the dog and cat.
fu set le can et moh.
16. That boy likes the girl and she likes him.
lat gar mek le far le fe gat omfu.
17. We saw a large boy and small girl.
ego set gat gar et gar far.
18. The boy ran to the house for that book.
le gar unray fo le chi or lat ko,
19. The girl is studying the difficult lessons.
le gar as le neen esson.

Directions: This is the map you studied with the names left out. The names are given in the column at the left of the sheet. You are to place the numbers that are on the map in the parentheses after the names on the left. Example: The section of the map where you see a number 1 is Brazil, so you place a 1 in the parenthesis after the name Brazil. ()

Brazil ()

Buenos Aires ()

Columbia ()

Bolivia ()

Guiana ()

Uruguay ()

Peru ()

Venezuela ()

Chile ()

Amazon River ()

Rio Janeiro ()

Santiago ()

Ecuador ()

Parana River ()

Paraguay ()

Caracas ()

Panama Canal ()

Sao Francisco River ()

Argentina ()

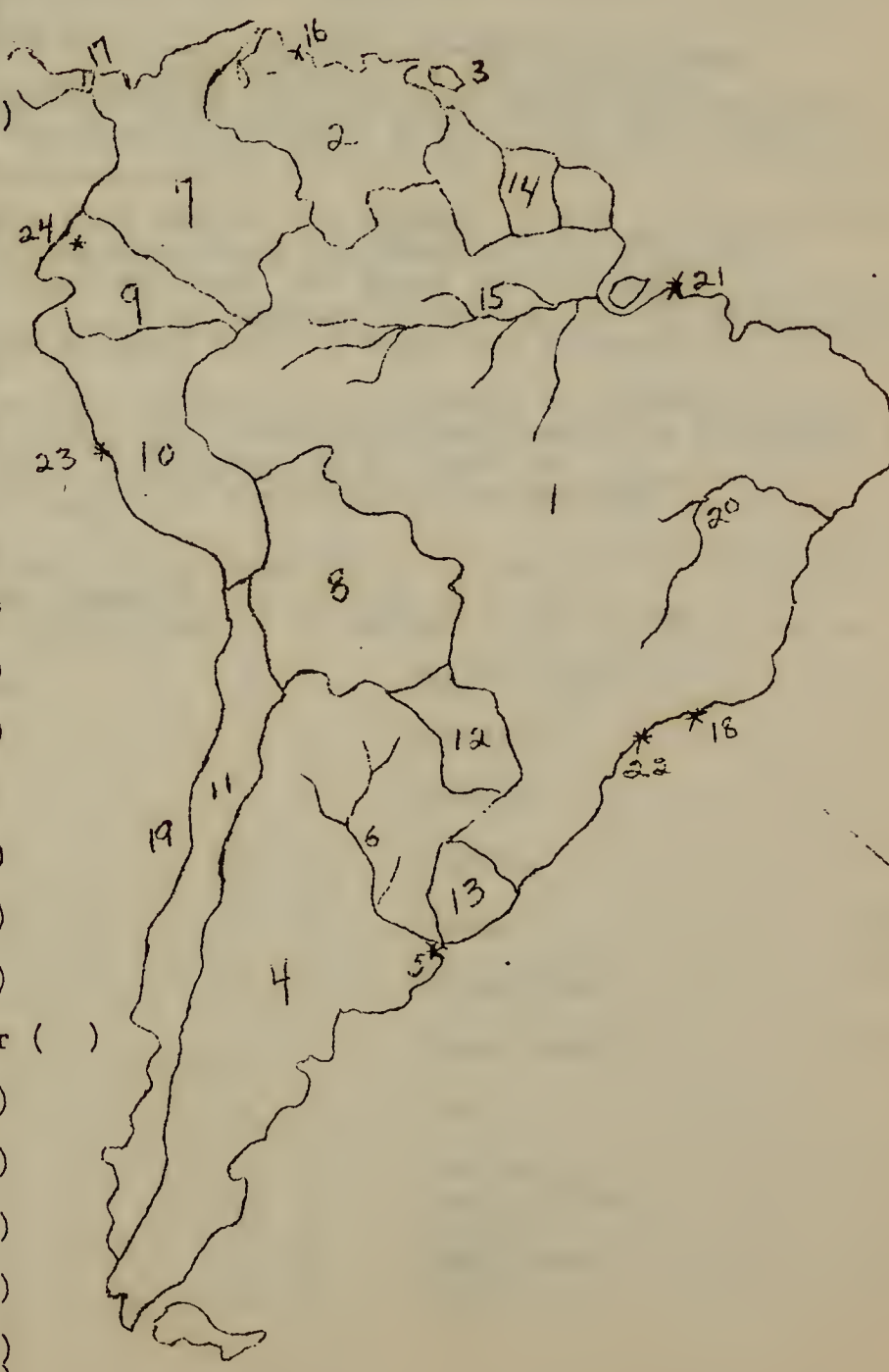
Trinidad Island ()

Para ()

Santos ()

Lima ()

Quito ()



Directions:- Below are the statements you studied with the answers left out. You are to copy the number of the statement in the parenthesis after the word that best completes the statement. Example: The word that best completes the first statement is Roosevelt Dam, so a 1 is placed in the parenthesis after the word Roosevelt Dam.

1. The _____ is seventy miles from Phoenix, Arizona and is used to store water for irrigation.
2. The official language of the people of Mexico is _____.
3. The mines of Sudbury, Canada produce about 2/3 of the _____ of the world.
4. _____ is the only crop of importance on the Pacific coast of Central America.
5. Platinum is found in _____ and _____.
6. The climate of _____ is modified by the Gulf Stream.
7. An arm of the sea extending into the land is called a _____.
8. _____ is the great commercial city of the East Indies.
9. _____ and _____ have the best railroads of all the Asiatic countries.
10. The most valuable tree within the tropics is the _____ tree.
11. _____ in Argentina is an important and modern city.
12. _____ is known all over the world for its bacon.
13. The _____ in Germany is famous for its scenic beauty.
14. _____ sends a great deal of sugar and pineapples to the United States.
15. Cork is the bark of a species of oak tree that grows in _____.
16. _____ has the most democratic government in the world.
17. The largest line of manufacturing in Japan is _____.
18. The three great sugar beet countries of Europe are _____, _____ and _____.
19. Cinchona or Peruvian bark supplies _____, one of the most important drugs of commerce.
20. Rabbits do an enormous amount of damage to the crops in _____.

Roosevelt Dam.....(1)	Rhine River.....()
England.....()	Quinine.....()
Spanish.....()	Coconut.....()
Germany.....()	France.....()
Russia.....()	China.....()
India.....()	Switzerland.....()
Poland.....()	Cotton goods.....()
Singapore.....()	Fiord.....()
Coffee.....()	Portugal.....()
Colombia.....()	Buenos Aires.....()
Denmark.....()	Norway.....()
Hawaii.....()	Australia.....()
Nickel.....()	Japan.....()

PART A

Section 6

Directions:-Part A. Below is the substance of the first selection you read with some numbered blanks indicating that some of the words are left out. The words left out are listed below. You are to copy the number of each blank in the parentheses after the word which belongs in the blank.

As we look back upon the age of (1) we are conscious of certain outstanding features. It was, (2), of all an age of change and (3). Within the lifetime of (4) the (5) of England changed from something close to (6) to something close to (7). Within his life-time (8) changed from a (9) of comparative (10) and international insignificance to a position of proud (11) (12), capable of resisting on the sea the full strength of (13), then the dominant (14) (15).

(Social Backgrounds of Eng. Lit.)

- | | |
|---------------------|---------------------|
| Elizabeth.....() | progress.....() |
| expansion.....() | Catholicism.....() |
| strength.....() | Shakespeare.....() |
| Spain.....() | isolation.....() |
| Puritanism.....() | national.....() |
| England.....() | religion.....() |
| position.....() | first.....() |
| development.....() | power.....() |
| European.....() | leadership.....() |
| most.....() | |

PART B

Directions:-Answer the following questions according to the poem which you read. If a statement is true, check (✓) true; if it is false check false; if the poem doesn't say whether a statement is true or false, check didn't say. The samples are checked correctly.

	side.	true	false	didn't say
Samples: 1. The world stands out on either heart.		✓		
2. The world is wider than the planets.			✓	
3. The world is bigger than the				✓
1. The poem implies the existence of God.				
2. The world is bounded by the heart.				
3. The sky stretches higher than our souls.				
4. The world itself helps us to find God.				
5. The soul can let the face of God shine through the sky.				
6. Narrow horizons will pinch the heart that doesn't expand.				
7. Mountains help to expand our hearts.				

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Approved by:

H. M. Glick

W. H. Davis

Graduate Committee

Date June 13, 1932

