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Results of the Army Intelligence Tests in Minnesota Public Schools

By

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Calendar, 1921-1922

Summer Term

Enrollment of Students	Monday, June 13
Class Work Begins	Tuesday, June 14
Summer Term Closes	Friday, July 22

Fall Term

Enrollment of Students	Tuesday, September 6
Class Work Begins	Wednesday, September 7
Fall Term Closes	Friday, December 2

Winter Term

Term Begins	Monday, December 5
Holiday Vacation Begins	Friday, December 16
Class Work Resumed	Tuesday, January 3
Winter Term Closes	Friday, March 10

Spring Term

Term Begins	Tuesday, March 21
Commencement Sermon	Sunday, June 4
Annual Commencement	Friday, June 9

A REPORT OF THE USE OF THE ARMY ALPHA TESTS IN MINNESOTA HIGH SCHOOLS.

By Ward G. Reeder, Head of the Department of Education and Director of the Bureau of Educational Standards and Measurements.

INTRODUCTION

One of the outstanding characteristics of present-day class-room procedure is the attempt to measure scientifically the abilities of pupils with the end in view that instruction may be better adapted to the varying abilities found. In determining these abilities, the instrument which is coming more and more to be used is the mental test, and particularly the group mental test is being increasingly employed for this and other purposes. 1.

During the school year of 1920-1921, the Moorhead State Teachers College extended to the high schools of Minnesota an invitation to join in a co-operative survey of the general intelligence of students in the high schools of the State. This invitation was accepted by one hundred and forty-nine schools as follows: 2.

Ada,	Eyota,	McIntosh,
Adams,	Fairmont,	Medford,
Albert Lea,	Farmington,	Melrose,
Alexandria,	Felton,	Middle River,
Alvarado,	Fertile,	Milroy,
Amboy,	Fergus Falls,	Minneota,
Backus,	Fisher,	Minnesota Lake,
Barrett,	Floodwood,	Montevideo,
Baudette,	Foley,	Moose Lake,
Bellingham,	Fossston,	Newfolden,
Bird Island,	Franklin,	Park Rapids,
Blackduck,	Frazee,	Pelican Rapids,
Bloomington Con.	Glencoe,	Philbrook,
Braham,	Glyndon,	Reading,
Brandon,	Goodhue,	Remer,
Browns Valley,	Good Thunder,	Rush City,
Buffalo Lake,	Grasston,	Rushford.
Byron,	Halstad,	Ruthton,
Caledonia,	Hanley Falls,	Saum,
Cannon Falls,	Hanska,	Sebeka,
Ceylon,	Hawley,	Sioux Valley,
Chisago Lake,	Hector,	Sherburn,
Chisholm,	Hendrum,	Sleepy Eye,
Chokio,	Herman,	So. Stillwater,
Clara City,	Hitterdahl,	Spring Grove,
Clarkfield,	Holt,	Springfield,
Clontarf,	Houston,	Spring Valley,
Coleraine,	Hugo,	Spooner,
Comfrey,	Humboldt,	Staples,
Comstock,	Huntley,	Stewart,
Correll,	Janesville,	Stewartville,
Cromwell,	Kasson,	St. Paul Park,

1. The group mental test is to be distinguished from the individual mental test. The former may be given to an entire class or a whole school at one time; the latter is given to one pupil only at a time.

For a discussion of the the uses of mental tests, see Manual of Directions for Giving and Scoring the Army Tests, pp. 14-15. Bureau of Educational Standards and Measurements, State Teachers College, Moorhead, Minnesota.

2. It is a pleasure to bear witness to the progressive attitude of Minnesota principals and superintendents whose unusual co-operation has made possible this survey.

Crookston,	Lake Benton,	Stephen,
Crosby-Ironton,	Lake City,	Strandquist,
Currie,	Lakeville,	Tracy,
Cyrus,	Le Roy,	Ulen,
Dilworth,	Lester Prairie,	Villard,
Dodge Center,	Le Sueur,	Walker,
Doran,	Lewiston,	Walnut Grove,
Dover,	Lindstrom,	Warren,
Dundas,	Long Prairie,	Warroad,
Eagle Bend,	Luverne,	Wells,
East Grand Forks,	Mabel,	West Concord,
Eden Valley,	Madison,	White Bear,
Elbow Lake,	Magnolia,	Wilder,
Erskine,	Mantorville,	Wilmot,
Ellsworth,	Marble,	Worthington,
Eveleth,	Marietta,	Zumbrota.

It is the purpose of this bulletin to report the salient facts coming from this survey, and particularly those facts which are thought to be of greatest immediate interest and service to the co-operating schools. Further results of the investigation will be reported at a later date and these also will be made available to those interested.

THE SELECTION OF A TEST

After one has decided to give a mental test, the first problem confronted is, "Which test is the best to give"? Like most general questions, the foregoing can not be answered categorically. In fact, there is probably no "best" test. A test may be the "best" when it is used under certain conditions and for certain purposes, but when these conditions and purposes are changed the relative efficiency of the test may be altered. It is evident, therefore, that the term "best" needs qualification.

Manifestly, the theory that there is a "best" test can not be urged. Nevertheless, there are certain essential characteristics which a good test —not to mention the best—should possess. Chief among these characteristics are:

(1). The test should be scientifically devised, and must reliably measure the function or functions which it purports to measure.

(2). It should be relatively easily administered, and its directions for giving and scoring should be as near "fool-proof" as it is possible to make them.

(3). It should not require too much time for administering.

(4). It should be capable of rapid and accurate scoring, it being agreed the more mechanical this process is made the more valuable the test will be.

In view of the high ranking of the Army Alpha Test in the foregoing characteristics, it was decided to use that test in the survey. Another consideration which caused that test to be selected was the fact that the examination booklets could be obtained from the War Department or else reproduced by us at a cost of from one-third to one-half that of the other tests suitable for high school use. 3.

Moreover, there was great popular interest in the Army Alpha Test due to its wide and successful use in the Army of the United States in the World War.

DESCRIPTION OF THE ARMY ALPHA TEST

The Army Alpha Test is a group test and may be given to an entire class or school at one time, the procedure requiring about forty minutes for each group. It consists of a battery of eight tests, each of which is designed to measure an important function. Test 1 measures ability to follow and carry out directions. Test 2 deals with arithmetical problems; Test 3, with practical judgment; Test 4, with synonyms and antonyms; Test 5, with disarranged sentences; Test 6, with number series completion;

3. The examination booklets, Manuals of Directions, and scoring stencils were distributed by the Bureau at actual cost.

Test 7, with analogies, and Test 8, with general information. Test 1 includes twelve exercises; Tests 2 and 6, twenty exercises; Test 3, sixteen exercises; Tests 4, 7 and 8, forty exercises, and Test 5, twenty-four exercises.

Form 8 of the test was used in the survey. In order that the nature of the tests may be better seen, Test 5, of Form 8 is reproduced here *in toto*.

TEST 5

The words A EATS COW GRASS in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: A COW EATS GRASS, and this statement is true.

Again, the words, HORSES FEATHERS HAVE ALL would make a sentence if put in the order ALL HORSES HAVE FEATHERS, but this statement is false.

Below are twenty-four mixed up sentences. Some of them are true and some are false. When I say "go," take these sentences one at a time. Think what each would say if the words were straightened out, but don't write them yourself. Then, if what it would say is true, draw a line under the word "true"; if what it would say is false, draw a line under the word "false." If you cannot be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.

SAMPLES	a cow eats grass	true	false
	horses feathers have all	true	false
1	oranges yellow are	true	false 1
2	hear are with to ears	true	false 2
3	noise cannon never make a	true	false 3
4	trees in nests build birds	true	false 4
5	oil water not and will mix	true	false 5
6	bad are shots soldiers all	trus	false 6
7	fuel wood are coal and for used	true	false 7
8	moon earth the only from feet twenty the is	true	false 8
9	to life water is necessary	true	false 9
10	are clothes all made of cotton	true	false 10
11	horses automobile an are than slower	true	false 11
12	tropics is in the produced rubber	true	false 12
13	leaves the trees in lose their fall	true	false 13
14	place pole is north comfortable a the	true	false 14
15	sand of made bread powder and is	true	false 15
16	sails is steamboat usually by propelled a	true	false 16
17	is the salty in water all lakes	true	false 17
18	usually judge can we actions man his by a	true	false 18
19	men misfortune have good never	true	false 19
20	tools valuable is for sharp making steel	true	false 20
21	due sometimes calamities are accident to	true	false 21
22	forget trifling friends grievances never	true	false 22
23	feeling is of painful exaltation the	true	false 23
24	begin a and apple acorn ant words with the	true	false 24

GIVING THE TESTS

In giving the tests a copy of the examination booklet was furnished each student In order that the tests might be given under uniform conditions, a Manual of Directions for giving and scoring them was prepared and was furnished each school. This Manual was adapted from the Examiner's Guide for Psychological Examining in the Army and was prepared after the writer had the experience of personally giving the tests in about a dozen high schools of the State.

All tests of the Army Tests are "time tests", i.e., there is a time

limit on each test. The time allowances on the exercises of Test 1 vary from five seconds to twenty-five seconds. That on Test 2 is five minutes. For Tests 3, and 4, one and one-half minutes are allowed; for Tests 5, two minutes; for Tests 6, and 7, three minutes; and for Test 8, four minutes.

SCORING THE TESTS

The tests were scored by the co-operating high schools by means of stencils and keys prepared by the writer. Full directions for scoring were given in the Manual of Directions which each school had.[4] No credit was given for examples only partially correct. An answer was marked either right or wrong.

The result of the examination was expressed in a total score which was the sum of the scores of the several parts of the test. The scores were obtained as follows:

Test	Method of Scoring[5]	Maximum Score
1	R	12
2	R	20
3	R	16
4	R-W	40
5	R-W	24
6	R	20
7	R	40
8	R	40
	Total	212

REPORTING THE SCORES

The nature of the data which were reported to the Bureau by the high schools may be seen from a glance at a portion of the record blank which was furnished the various schools. A portion of a sample blank follows:

Army Test Records

Make this out in duplicate, retain one copy, and mail the other to Bureau of Educational Standards and Measurements, State Teachers College, Moorhead, Minnesota.

School..... City..... State.....

Date of Examination..... Examiner.....

Name of Student	Total Score	Score on Separate Tests 1	2	3	4	5	6	7	8	Age Yrs.	Mos.	Grade	Sex

4. This Manual, together with the examination booklets, and scoring stencils may be had at cost from the Bureau of Educational Standards and Measurements, State Teachers College, Moorhead, Minnesota.

5. "R" denotes that the score was obtained by counting the number of rights; "R-W", that the score was obtained by subtracting the number of wrongs from the number of rights.

The data called for by the foregoing blank were furnished by one hundred and eight schools as follows:

Ada,	Elbow Lake,	Mabel,
Adams,	Ellsworth,	Magnolia,
Alden,	Eveleth,	Marble,
Alexandria,	Erskine,	Melrose,
Alvardo,	Eyota,	Minnesota Lake,
Amboy.	Fairmont,	Moose Lake,
Backus,	Felton,	Newfolden,
Baudette,	Fergus Falls,	Park Rapids,
Blackduck,	Fertile,	Pelican Rapids,
Bloomington Con.	Fisher,	Reading,
Bellingham,	Floodwood,	Remer,
Bird Island,	Foley,	Rushford,
Brandon,	Fosston,	Ruthton,
Browns Valley,	Franklin,	Sherburn,
Caledonia,	Frazee,	Sioux Valley,
Cannon Falls,	Glyndon,	Sleepy Eye,
Ceylon,	Goodhue,	So. Stillwater,
Chisago Lake,	Good Thunder,	Spooner,
Chokio,	Grasston,	Springfield,
Clarkfield,	Hanley Falls,	Spring Grove,
Clontarf,	Hawley,	Spring Valley,
Coleraine,	Hector,	Staples,
Comfrey,	Hendrum,	Stephen,
Comstock,	Herman,	Stewart,
Correll,	Hitterdahl,	Stewartville,
Cromwell,	Holt,	St. Paul Park,
Crookston,	Houston,	Strandquist,
Currie,	Hugo,	Tracy,
Cyrus,	Humboldt,	Ulen,
Dilworth,	Huntley,	West Concord,
Dodge Center,	Janesville,	Walker,
Doran,	Kasson,	Walnut Grove
Dundas,	Lake Benton,	Warroad,
Eagle Bend,	Lake City,	Wilmot,
East Grand Forks,	Long Prairie,	Zumbrota.
Eden Valley,	Luverne,	

TABULATING THE SCORES

All tabulations of scores and statistical computations were made by the Bureau. So far, these tabulations and computations have been made, and are herewith reported, on three bases, namely; (1) grade; (2) age; and (3) sex. It is the expectation of the writer to be able to present soon further studies of the scores made by the various schools.

In compiling the scores for each school it is necessary to know how many pupils made the various scores from 0 to 212. Such an arrangement of scores is known as a "distribution" of scores. Figure 1, which follows, presents a sample of the blank which was used in showing the distribution of scores for each school. The tabulations made upon it are for a typical school. The blank for tabulating the scores on the basis of age was the same, except that the various ages, from 11 to 20 inclusive, instead of the various grades, were placed at the top of the sheet.

FIGURE NO. I

A sample record blank for tabulating the scores of the pupils of each school. The scores tabulated on this blank were made by one of the schools.

SCORES	SEXES		CLASSES					
	Boys	Girls	7th	8th	9th	10th	11th	12th
205—212								
200—204								
195—199								
190—194								
185—189								
180—184								
175—179								
170—174								
165—169								
160—164								
155—159	2							
150—154	1							2
145—149								1
140—144		2				1		
135—139								1
130—134	1	1		1			1	
125—129		2			1		1	
120—124		1			1			
115—119		1						1
110—114	3	2	1	1	1	1	1	
105—109	2	1		1		2		
100—104	1	1		1		1		
95— 99	2	3			2	3		
90— 94	1	3		1	1	1	1	
85— 89	2	2	2	1	1			
80— 84	3	6	4	3	1			1
75— 79	1	2	1	1	1			
70— 74	2	1	1	1	1			
65— 69	3		1	2				
60— 64	3	2	2	2		1		
55— 59	3	3	4	1	1			
50— 54		1	1					
45— 49								
40— 44		1			1			
35— 39								
30— 34	1				1			
25— 29								
20— 24								
15— 19								
10— 14								
5— 9								
0— 4								
Median	83 2	87.5	71.5	80.6	86.5	99.5	119.5	142.5
No. of Students	31	35	17	16	13	10	4	6

Limitations of space prevent the presentation of the distribution of scores for each high school. The most that can be done within the limits of this bulletin is to present summary data for each school. This will be done in the remainder of the report. Table I is designed to show the medians for the various grades of the several schools. In this table, as in all succeeding tables, each school appears under an index number which is known only to the school which it denotes.

TABLE NO. 1.

Medians made by the various grades in Minnesota high schools.

School	Medians for the various grades						Number of pupils taking test					
	7th	8th	9th	10th	11th	12th	7th	8th	9th	10th	11th	12th
1	64.6	76.5	92.7	91.5	99.5	113.1	27	37	29	23	28	15
2			94.5	99.8	96.5	101.5			16	14	9	9
3	72.7	67.7	84.8	107.5	102.5	131.5	13	13	21	4	8	3
4	58.5	84.8	86.5	99.8	115.2	123.8	55	54	95	74	58	52
5	69.5	94.5	109.2	101.5	86.5	116.5	6	8	13	7	7	5
6			81.8	106.5	122.7	132.7			23	9	5	9
7	66.5	61.5	101.5	121.5		129.5	6	7	3	5		6
8	67.0	82.1	107.5	114.5	116.5	106.5	24	21	13	16	6	9
9	67.3	75.2	82.5	96.5	129.5	126.5	22	19	27	12	4	13
10	66.5	71.5	101.3	104.5	126.5		14	25	11	8	5	
11	56.5	67.7	72.5	86.5	110.2	94.5	12	11	6	3	7	4
12		88.2	99.5	105.6	102.7	111.5		11	12	11	11	9
13	92.5	96.5	102.5	121.5			1	3	9	8		
14			86.5	119.5	116.5	112.5			20	18	13	17
15			96.5	119.5	126.5	109.5			12	15	20	14
16	76.5	91.5	96.2	116.5	111.5	138.5	19	22	29	49	17	23
17	74.5	91.5	95.2	114.5	134.5	144.5	18	9	13	14	6	8
18	65.6	75.0	99.5	109.5	92.5	141.5	20	14	36	24	17	9
19	74.5	79.8	79.5	116.5	106.5	96.5	16	21	12	11	5	3
20	74.5	84.5	89.8	99.5	107.7	124.5	22	26	27	18	21	19
21	65.6	51.5	72.5	94.5			10	9	4	4		
22		96.5	99.4	109.5	121.5	124.8		25	45	32	42	31
23	59.5	84.5	84.7	104.5	106.5	134.8	20	22	22	14	17	13
24		64.5	115.2					10	5			
25		77.5	71.5	107.7	104.5	92.5		12	3	5	2	2
26	77.7	69.5	84.5	86.5	92.5	113.2	13	10	8	5	1	3
27			82.4	97.3	103.0	110.6			103	62	66	44
28	76.5	91.5	94.5	154.5		125.2	5	5	8	2		5
29	87.5	80.2	115.2	105.2	105.6	111.5	4	9	10	9	8	3
30	62.5	82.5					16	15				
31	86.9	99.5	100.2	99.5	111.5	121.5	21	18	27	16	15	12
32	69.5	85.6	95.2	105.2			12	10	9	3		
33	66.5		102.5	117.5		142.0	12		8	3		1
34	94.8	96.5					7	9				
35		81.5		97.0	129.5			15		4	2	
36	66.5	92.1	105.5	107.5	108.2	132.3	21	25	37	18	37	14
37		79.5	102.0	105.2	87.5			12	6	11	1	
38	72.5	72.1	88.2	96.5	107.2	108.2	24	23	33	33	25	29
39	72.5	62.5	97.5	102.2	82.5		5	10	4	5	1	
40		69.4	87.6	100.8	110.5	112.7		184	148	77	71	51
41	57.7	69.8	82.0	97.0	113.2	106.5	15	19	26	14	15	5
42	62.9	76.5	116.5	102.5	119.5	112.5	10	7	5	1	4	6
43	71.9	85.9					102	71				
44	87.5	86.5	121.5	116.5	117.5		8	9	5	5	4	
45	67.2	82.5	92.5	103.6	111.5	120.9	106	138	122	103	90	51
46	67.5	89.5	100.6	92.5	132.7	124.5	17	30	26	21	11	10
47	80.2	84.5	96.5	104.5	94.5	99.5	7	12	10	10	8	10
48	59.5	86.5	71.5	107.5			20	3	15	1		
49	71.5	85.6	95.0	118.2	129.5	136.5	29	32	16	15	4	8
50	58.2	69.5	88.2	102.3	109.5	114.5	17	16	21	24	20	16
51	86.5	74.5	90.6	104.5	111.5	107.5	11	18	16	14	15	4
52			81.5	94.5	120.2	112.5			17	26	11	7
53		102.5	100.0	116.6	95.0	117.5		11	16	14	10	7
54		75.2	73.2	117.5	87.5	102.5		9	11	8	1	
55		92.3	90.2	103.2	117.5			12	5	9	1	
56	61.5	69.5	107.3	77.5			9	8	10	3		
57	94.5	101.5	116.3	136.5	122.5	132.5	12	7	10	2	5	6
58	87.5	103.2	124.5	134.8	133.2	134.5	19	19	18	21	17	8
59		57.5	97.1	108.2	114.8	119.8		1	29	27	43	31
60	59.5	80.6	77.3	101.5	111.5	104.5	10	8	12	7	5	6
61	86.5	71.0	83.2	95.6	107.7	127.5	11	16	23	16	11	12
62	60.3	81.2	84.5	85.2	102.5	100.6	24	21	10	7	8	10
63		67.3	84.5	105.2				8	8	5		
64			100.2	102.1	107.7	121.5			25	19	19	7
65		57.3	111.5	109.8				18	9	7		
66		94.5	99.5	116.5	137.7	115.2		8	8	9	7	7
67	66.5	67.5	78.2	94.5	97.5		9	8	9	6	8	
68			98.5	99.5	109.6	94.5			21	26	11	10
69			81.5	99.5	114.5	116.5			29	32	19	29
70	69.5	75.2	81.5	92.7	101.5	117.5	18	15	23	21	7	8
71	79.8	74.5	105.2	124.7	121.5	136.6	41	42	66	45	29	37
72			98.6	92.3	112.3	119.5			51	34	26	32
73	80.3	89.5	99.5	105.3	120.6	135.2	47	40	64	35	40	36
74			97.5	97.7	107.7	127.7			24	17	13	19

(Continued on next page)

TABLE No. 1 (Continued)
Medians made by the various grades in Minnesota high schools.

School	Medians for the various grades						Number of pupils taking test					
	7th	8th	9th	10th	11th	12th	7th	8th	9th	10th	11th	12th
75	72.5	72.3	94.5	104.5	97.2	.....	7	10	6	6	4	.....
76	76.5	83.2	86.5	119.6	.....	.....	29	19	11	8	.....	.....
77	77.5	79.5	94.5	114.5	124.5	146.5	13	6	35	20	16	9
78	54.2	74.5	64.5	87.2	77.5	112.5	11	4	6	5	1	4
79	64.5	74.5	92.5	102.3	97.5	122.7	22	19	15	16	5	9
80	52.5	59.5	97.3	104.5	97.5	89.5	7	12	8	10	3	2
81	71.5	77.5	92.8	105.2	111.5	107.3	45	32	54	41	33	20
82	71.5	88.3	82.7	102.3	104.8	111.5	21	31	32	26	19	22
83	64.5	79.5	94.5	117.5	117.5	107.5	12	8	6	8	1	5
84	63.4	87.5	97.2	97.5	109.5	117.5	15	10	5	5	6	5
85	75.6	77.2	102.5	125.2	100.2	120.2	32	33	21	11	7	13
86	.....	102.5	102.5	112.5	126.5	.....	.....	10	5	2	5	.....
87	.....	.....	97.5	101.5	120.6	117.5	.....	.....	24	19	14	9
88	63.2	77.5	84.5	77.5	90.5	97.5	13	3	16	9	9	4
89	75.6	89.5	93.2	110.6	119.5	135.2	29	34	29	26	24	17
90	64.5	77.5	96.5	.....	.....	.....	18	20	9	.....	.....	.....
91	.....	.....	97.5	127.5	99.5	172.5	.....	.....	6	3	2	1
92	.....	.....	81.9	82.5	94.5	105.5	.....	.....	35	12	24	31
93	55.5	70.2	67.2	92.5	77.7	115.2	23	32	33	22	21	11
94	.....	.....	104.4	121.5	127.8	138.6	.....	.....	53	27	34	33
95	67.5	68.8	90.5	103.4	107.5	119.5	62	55	62	31	32	24
96	.....	.....	96.5	100.2	124.5	106.5	.....	.....	27	11	14	8
97	67.7	87.7	92.7	102.3	102.5	126.5	7	17	7	4	4	5
98	60.2	77.3	99.8	97.5	126.5	102.7	24	26	35	20	13	11
99	74.6	106.5	92.5	97.5	129.5	126.5	17	19	25	12	6	7
100	44.5	84.5	82.5	107.5	117.5	147.5	12	4	2	1	3	1
101	.....	.....	129.5	144.6	132.5	145.2	.....	.....	57	30	20	20
102	68.7	85.9	97.3	102.5	125.0	122.5	11	20	23	15	5	7
103	68.0	88.0	83.5	100.2	112.3	136.5	18	18	23	9	20	5
104	63.2	85.2	82.3	96.5	111.5	122.5	19	19	16	11	11	7
105	.....	.....	96.5	105.2	114.5	122.5	.....	.....	22	17	8	5
106	72.5	102.5	89.5	97.5	114.5	124.5	25	13	22	14	14	6
107	.....	72.7	84.5	94.5	.....	.....	.....	5	8	2	.....	.....
108	60.9	72.1	82.5	100.6	122.5	137.5	29	33	33	26	18	14
Totals	69.7	90.6	93.3	105.4	110.9	120.0	1,508	1,847	2,436	1,728	1,393	1,140

THE USE OF THE MEDIAN

In the foregoing table it is observed that the ability of each group is described by stating the median score for the group. The median is simply the mid-score. It is the score such that there are half of the scores above it and half below it. Since it is not unduly affected by the extreme scores, it is regarded by statisticians as the best measure of central tendency.

GRADE STANDARDS

Before the merit of the score made by an individual pupil, or that of a given group can be determined, it is necessary to know what score a pupil of a given grade is expected to make. This latter score we call a standard or a norm. It is found by discovering what score is made by the typical child of that grade. Standards or norms thus derived are stated in Table II. These were gotten from the data of Table I.

TABLE No. II

Grade standards for Minnesota high schools giving the Army Alpha Tests.

Grade	Median Score	Number of Students
7	69.9	1,508
8	90.6	1,847
9	93.3	2,436
10	105.4	1,729
11	110.9	1,393
12	120.0	1,140

From the above Table it is seen that there is a gradual increase in the medians from grade to grade. This is in accord with common observation that there is a qualitative selection of students as the higher grades are reached. This selective process seems to permit only the "fittest to survive."

Interpretation of the grade medians of the various schools is aided by a statement of the deviations of the medians from the grade standards. These deviations are expressed in Table III. This table is to be read as follows:

In the seventh grade the median score for City 1 is 5.3 points below the Minnesota standard. This is indicated by —5.3. For the same grade in City 3, the median score is 2.8 points above the Minnesota standard. This is expressed by +2.8. When the median score is the same as the grade standard, this fact is indicated by zero.

TABLE NO. III [6]

Grade medians for the various high schools expressed as deviations from the grade standards.

School	Deviations for the various grades						School	Deviations for the various grades					
	7th	8th	9th	10th	11th	12th		7th	8th	9th	10th	11th	12th
1	— 5.3	— 4.1	— .7	—13.9	— 1.4	— 6.9	55	.....	+11.7	— 3.2	— 2.2	+ 6.6	.....
2	.....	.....	+ 1.1	— 5.6	— 4.4	—18.5	56	— 8.4	—11.1	+13.9	—27.9	.....	.....
3	+ 2.8	—12.9	— 8.6	+ 2.1	— 8.4	+11.5	57	+24.6	+20.9	+22.9	+31.1	+11.6	+12.5
4	—11.4	+ 4.2	— 6.9	— 5.6	+ 4.3	+ 3.8	58	+17.6	+22.6	+31.1	+29.4	+22.3	+14.5
5	— .4	+24.6	+15.8	— 3.9	—14.4	— 3.5	59	.....	—23.1	+ 3.7	+ 2.8	+ 3.9	— .2
6	.....	.....	—11.6	+ 1.1	+11.8	+12.7	60	—10.4	.....	—16.1	— 3.9	+ .6	—15.5
7	— 3.4	—19.1	+18.1	+16.1	.....	+ 9.5	61	+16.6	— 9.6	—10.2	— 9.8	— 3.2	+ 7.5
8	— 2.9	+ 1.5	+14.1	+ 9.1	+ 5.6	—13.5	62	— 9.6	+ .6	— 8.9	—20.2	— 8.4	—19.4
9	— 2.6	— 5.4	—10.9	— 8.9	+18.6	+ 6.5	63	.....	—13.3	— 8.9	— .2	.....	.....
10	— 3.4	— 9.1	+ 7.8	— .9	+15.6	.....	64	.....	.....	+ 6.8	— 3.3	— 3.3	+ 1.5
11	—13.4	—12.9	—20.9	—18.9	— .7	—25.5	65	.....	—23.3	+ 8.1	+ 4.4	.....	.....
12	.....	+ 7.6	+ 6.1	+ .2	— 8.2	— 8.5	66	.....	+13.9	+ 6.1	+11.1	+26.8	— 4.8
13	+22.6	+15.9	+ 9.1	+16.1	.....	.....	67	— 3.4	—13.1	— 5.2	—10.9	—13.4	.....
14	.....	.....	— 6.9	+14.1	+ 5.6	— 7.5	68	.....	.....	+25.1	— 5.9	— 1.3	—25.5
15	.....	.....	+ 3.1	+14.1	+15.6	—10.5	69	.....	.....	—11.9	— 5.9	+ 3.6	— 3.5
16	+ 6.6	+10.9	+ 2.8	+11.1	+ .6	+18.5	70	— .4	— 5.4	—11.9	—12.7	— 9.4	— 2.5
17	+ 4.6	+10.9	+ 1.8	+ 9.1	+23.6	+24.5	71	+ 9.9	— 6.1	+11.8	+19.3	+ 9.6	+16.6
18	— 4.3	— 5.6	+ 6.1	+ 4.1	— 8.4	+21.5	72	.....	.....	+ 5.2	—13.1	+ 1.4	— .5
19	+ 4.6	— .8	—13.9	+11.1	— 4.4	—23.5	73	+10.4	+ 8.9	+ 6.1	— .1	+ 9.7	+15.2
20	+ 4.6	+ 3.9	— 3.6	— 5.9	— 3.2	+ 4.5	74	.....	.....	+ 4.1	— 7.7	— 3.2	+ 7.7
21	— 4.3	—29.1	—20.9	—10.9	.....	.....	75	+ 2.6	— 8.3	+ 1.1	— .9	—13.7	.....
22	.....	+15.9	+ 6.0	+ 4.1	+10.6	+ 4.8	76	+ 6.6	+ 2.6	— 6.9	+14.1	.....	.....
23	—10.4	+ 3.9	— 8.7	— .9	— 4.4	+14.8	77	+ 7.6	— 1.1	+ 1.1	+ 9.1	+13.6	+16.5
24	.....	—16.1	+21.8	.....	.....	.....	78	—15.7	— 6.1	—28.9	—18.2	—23.4	— 7.5
25	.....	— 3.1	—21.9	+ 3.3	— 6.4	—27.5	79	— 5.4	— 6.1	— .9	— 3.1	—13.4	+ 2.7
26	+ 7.8	—11.1	— 8.9	—18.9	— 8.4	— 6.8	80	—17.4	—21.1	+ 3.9	— .9	—13.4	—40.5
27	.....	.....	—11.0	— 8.1	— 7.9	— 9.4	81	+ 1.6	— 3.1	— .6	— .2	+ .6	—12.7
28	+ 6.6	+10.9	+ 1.1	+49.1	.....	+ 5.2	82	+ 1.6	+ 6.7	—10.7	— 3.2	— 6.1	—18.5
29	+17.6	— .4	+21.8	— .2	— 5.3	— 8.5	83	— 5.4	— 1.1	+ 1.1	+12.1	+ 6.6	—22.5
30	— 7.4	+ 1.9	.....	.....	.....	.....	84	— 6.5	+ 6.9	+ 3.8	— 7.9	— 1.4	— 2.5
31	+17.0	+18.9	+ 6.8	— 5.9	+ .6	+ 1.5	85	+ 5.7	— 3.4	+ 9.1	+19.8	—10.7	+ .2
32	— .4	+ 5.0	+ 1.8	— .2	.....	.....	86	.....	+21.9	+ 9.1	+ 7.1	+15.6	.....
33	— 3.4	.....	+ 9.1	+12.1	.....	+22.	87	.....	.....	+ 4.1	— 3.9	+ 9.7	— 2.5
34	+24.9	+15.9	.....	.....	.....	.....	88	— 6.7	— 3.1	— 8.9	—27.9	—20.4	—22.5
35	.....	+ .9	.....	— 8.4	+18.6	.....	89	+ 5.7	+ 8.9	— .2	+ 5.2	+ 9.6	+15.2
36	— 3.4	+11.5	+12.1	+ 2.1	— 2.7	+12.3	90	— 5.4	— 3.1	+ 3.1	.....	.....	.....
37	.....	— 1.1	+ 8.6	— .2	—23.4	.....	91	.....	.....	+ 4.1	+22.1	—11.4	+52.5
38	+ 3.6	— 8.5	— 5.2	— 8.9	— 3.7	—11.8	92	.....	.....	—11.5	—22.9	—16.4	—14.5
39	+ 3.6	—18.1	+ 4.1	— 3.2	—28.4	.....	93	—14.4	—10.4	—26.2	—12.9	—33.2	— 4.8
40	.....	—11.2	— 5.8	— 4.6	— .6	— 7.3	94	.....	.....	+11.0	+16.1	+16.9	+18.6
41	—12.2	—10.8	—11.4	— 8.4	+ 2.3	—13.5	95	— 2.4	—11.8	— 2.9	— 2.1	— 3.4	— .5
42	— 7.0	— 4.1	+23.1	— 2.9	+ 8.6	— 7.5	96	.....	.....	+ 3.1	— 5.2	+13.6	—13.5
43	+ 2.0	+ 5.3	.....	.....	.....	.....	97	— 2.2	+ 7.1	— .7	— 3.1	— 8.4	+ 6.5
44	+17.6	+ 5.9	+28.1	+11.1	+ 6.6	.....	98	— 9.7	— 3.3	+ 6.4	— 7.9	+15.6	—17.3
45	— 2.7	+ 1.9	— .9	— 1.8	+ .6	+ .9	99	+ 4.7	+19.9	— .9	— 7.9	+18.6	+ 6.5
46	— 2.4	+ 8.9	+ 7.2	—12.9	+21.8	+ 4.5	100	—22.5	+ 3.9	—10.9	+ 2.1	+ 6.6	+27.5
47	+10.3	+ 3.9	+ 3.1	— .9	— 6.4	—20.5	101	.....	.....	+36.1	+39.2	+21.6	+25.2
48	—10.4	+ 5.9	—21.9	+ 2.1	.....	.....	102	— 1.2	+ 5.3	+ 3.9	— 2.9	+14.1	+ 2.5
49	+ 1.6	+ 5.0	+ 2.4	+12.8	+18.6	+16.5	103	— 1.9	+ 7.4	— 9.9	— 5.2	+ 1.4	+16.5
50	—11.7	—11.1	—15.2	— 3.1	— .6	— 5.5	104	— 6.7	+ 4.6	—11.1	— 8.9	+ .6	+ 2.5
51	+16.6	— 6.1	— 2.8	— .9	+ .6	—12.5	105	.....	.....	+ 3.1	— .2	+ 3.6	+ 2.5
52	.....	.....	—11.9	—10.9	+10.3	— 7.5	106	+ 2.6	+21.9	— 3.9	— 7.9	+ 3.6	+ 4.5
53	.....	+21.9	+ 6.6	+11.2	— 5.9	— 2.5	107	.....	— 7.9	— 8.9	—10.9	.....	.....
54	.....	— 5.4	—21.2	+12.1	—13.4	—17.5	108	— 9.0	— 8.5	—10.9	— 4.9	+11.6	+17.5

6—See Table I for the number of students included in the investigation.

A survey of the grade medians for the various schools shows that, in general, the schools have about the same medians. The differences which

exist may be explained in two ways: (1) by the differences in the classification and promotion policies of the schools; and (2) by the differences in the character of pupil material. The unusually large deviations from the grade standards were found, as a rule, among the smaller schools, in which the small number of cases on which the grade medians were based might give a median unusually large or unusually small. Comment on differences in pupil material will be made in the next section of the report, but here it may be said that these differences are sufficient to account partially for the differences in grade medians among the various schools. Regarding the first factor noted, it may be said that it may materially affect the scores made by a particular school. In case the school has a liberal policy of promotion, the dull pupils will be placed in grades above those to which they would be assigned in a school which had a conservative promotion policy. The presence of these dull pupils in these grades would tend to decrease the median score. On the other hand, a conservative promotion policy, which results in holding back the bright pupils, would likely increase the median score. In general, a median score below the grade norm is indicative of a liberal policy of promotion, while one above the standard indicates a conservative policy of promotion. Thus, it is evident, that in interpreting the median scores for the different grades of the various schools the two above factors must be kept in mind.

The next part of the report deals with the scores made by the pupils with respect to their ages. Table IV shows the age medians for the pupils of the various schools.

TABLE NO. IV

Age medians of pupils in Minnesota high schools.

School	Age medians										No. of pupils of the various ages									
	11	12	13	14	15	16	17	18	19	20	11	12	13	14	15	16	17	18	19	20
1	.....	79	71	88	86	86	95	96	84	87	.....	2	16	25	35	32	21	16	8	6
2	.....	.....	97	83	99	99	114	97	102	107	.....	.....	1	5	8	14	8	3	3	1
3	.....	77	54	90	77	92	97	84	.....	.....	.....	4	6	13	12	18	5	4	.....	.....
4	.....	77	75	93	93	86	102	105	117	111	.....	8	43	49	70	80	77	43	22	9
5	.....	.....	92	95	104	93	88	116	.....	107	.....	.....	3	5	14	9	9	6	.....	1
6	.....	.....	77	112	94	89	99	122	114	.....	.....	.....	1	5	8	8	12	10	2	.....
7	97	77	67	77	102	127	122	84	.....	.....	1	1	3	6	5	1	8	2	.....	.....
8	.....	79	74	92	73	94	104	115	77	.....	.....	4	14	15	15	16	14	7	3	.....
9	89	104	74	82	81	77	109	132	112	97	2	4	12	20	22	14	8	7	5	1
10	67	74	72	73	74	117	92	109	.....	.....	6	4	9	14	16	7	5	2	.....	.....
11	.....	71	67	62	79	87	111	109	82	87	.....	6	5	11	8	5	5	2	1	1
12	.....	.....	107	112	91	109	84	108	94	102	.....	.....	3	7	14	12	4	13	2	1
13	.....	92	117	117	112	100	.....	102	.....	.....	.....	1	3	1	7	5	.....	1	.....	.....
14	.....	.....	87	99	104	105	112	111	109	92	.....	.....	2	6	6	20	16	9	6	2
15	.....	.....	117	109	92	122	122	108	97	117	.....	.....	1	8	5	19	13	9	7	1
16	.....	74	97	88	94	114	122	132	107	.....	.....	4	13	19	26	34	31	24	7	.....
17	.....	84	82	89	114	119	107	134	127	127	.....	6	11	8	14	10	10	2	4	3
18	.....	79	87	79	100	102	108	102	122	104	.....	4	6	28	21	32	19	5	3	2
19	69	73	85	77	82	89	112	93	.....	.....	4	13	11	15	13	12	8	5	.....	.....
20	.....	77	82	89	92	93	99	114	107	.....	.....	4	18	12	22	33	22	12	8	.....
21	.....	72	63	54	92	62	77	62	.....	.....	.....	1	7	6	4	5	3	4	.....	.....
22	.....	109	107	100	100	111	110	122	117	117	.....	4	5	19	30	30	42	33	9	3
23	.....	77	89	92	83	103	117	115	139	109	.....	4	16	23	21	13	17	9	2	2
24	.....	62	69	69	112	72	77	.....	.....	.....	.....	1	2	4	7	3	1	.....	.....	.....
25	.....	.....	72	97	72	94	92	132	.....	.....	.....	.....	2	4	7	4	4	2	.....	.....
26	.....	77	82	77	72	92	97	82	.....	.....	.....	1	7	11	11	3	5	2	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	92	87	120	92	94	112	167	97	117	.....	2	1	3	5	4	4	1	4	1	.....
29	.....	112	94	87	99	117	108	94	107	.....	.....	1	4	5	12	8	7	4	2	.....
30	.....	52	72	73	70	82	37	.....	.....	.....	.....	1	10	7	9	3	1	.....	.....	.....
31	127	88	99	88	105	112	102	115	94	117	1	7	12	17	17	24	22	9	4	1
32	132	67	77	79	94	72	.....	112	.....	.....	1	4	10	8	6	4	.....	1	.....	.....
33	112	67	72	.....	94	112	107	117	.....	.....	1	6	4	.....	4	4	6	1	.....	.....
34	.....	95	97	87	104	.....	.....	.....	.....	.....	.....	3	6	5	2	.....	.....	.....	.....	.....
35	.....	.....	77	89	70	90	112	112	.....	97	.....	.....	2	3	7	5	2	1	.....	1
36	62	82	90	107	101	103	111	89	100	142	1	8	24	25	28	33	21	6	5	1
37	.....	122	102	92	122	82	82	.....	79	.....	.....	1	2	5	5	8	7	.....	2	.....
38	92	72	85	82	95	99	120	97	102	82	1	14	23	31	27	24	25	16	4	2

(Continued on next page)

TABLE NO. IV—(Continued.)

Age medians of pupils in Minnesota high schools.

School	Age medians										No. of pupils of the various ages									
	11	12	13	14	15	16	17	18	19	20	11	12	13	14	15	16	17	18	19	20
39	.....	79	87	89	92	72	72	.....	.....	.....	.....	3	3	2	8	4	4	.....	.....	.....
40	.....	79	81	78	87	90	97	110	112	72	.....	18	44	122	113	98	78	41	18	4
41	74	83	58	70	82	96	114	107	.....	.....	35	59	15	19	26	13	16	.....	.....	.....
42	.....	69	69	72	119	117	132	87	162	72	.....	6	6	7	2	3	3	4	1	1
43	109	79	81	81	74	77	67	.....	64	.....	2	22	47	51	32	15	.....	3	2	.....
44	127	107	83	89	107	112	94	104	107	.....	1	2	5	4	7	3	6	2	1	.....
45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	47	79	74	87	92	92	99	97	109	72	4	4	14	19	25	15	24	8	8	1
47	99	74	82	85	82	96	108	101	92	87	2	2	6	6	5	16	9	7	2	1
48	.....	67	82	65	59	72	57	.....	.....	.....	.....	1	4	11	16	7	1	.....	.....	.....
49	87	77	79	86	97	109	94	129	117	.....	1	11	21	23	19	12	10	6	1	.....
50	72	72	58	87	92	92	107	110	99	139	3	2	9	11	26	20	15	13	12	4
51	97	77	77	90	95	92	112	112	94	.....	1	4	6	18	17	14	10	6	2	.....
52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53	.....	.....	107	117	112	113	102	94	124	97	.....	.....	1	8	14	13	10	9	2	1
54	.....	32	74	77	75	88	105	104	82	102	.....	1	2	6	9	9	5	4	2	1
55	.....	67	90	84	96	102	103	117	.....	.....	.....	1	3	4	6	7	5	1	.....	.....
56	.....	95	72	77	87	72	77	.....	82	.....	.....	3	5	6	9	7	1	.....	1	.....
57	.....	87	114	106	99	117	117	120	127	.....	.....	2	6	5	8	10	3	7	1	.....
58	102	107	92	112	121	133	140	127	132	132	1	10	8	19	21	21	13	3	3	3
59	.....	.....	104	97	110	111	112	117	114	147	.....	.....	6	15	25	37	22	20	4	1
60	.....	67	59	69	87	82	69	109	.....	92	.....	2	2	8	11	11	6	4	.....	4
61	87	.....	90	82	84	98	89	104	117	117	1	.....	5	17	18	15	14	12	3	4
62	.....	65	67	69	87	67	99	87	72	102	.....	9	10	16	15	11	10	3	5	5
63	.....	152	82	66	82	.....	85	87	.....	.....	.....	1	1	5	6	.....	3	2	.....	.....
64	.....	.....	127	117	115	104	103	104	102	102	.....	.....	1	2	13	16	19	10	4	1
65	.....	.....	79	89	58	102	87	97	.....	.....	.....	.....	4	6	13	8	2	1	.....	.....
66	.....	92	94	107	107	119	118	87	.....	.....	.....	1	4	7	5	8	11	3	.....	.....
67	.....	127	47	82	77	80	107	85	77	.....	...	1	5	4	7	11	7	3	2	.....
68	.....	.....	.....	127	100	99	102	91	87	97	.....	.....	.....	8	13	16	14	12	5	1
69	.....	.....	87	80	96	106	104	115	100	112	.....	.....	2	9	20	26	20	13	11	2
70	82	82	72	74	87	92	84	122	97	94	1	8	12	20	16	14	10	6	3	2
71	.....	90	71	87	108	119	120	124	135	129	.....	6	39	38	49	46	44	26	9	2
72	.....	.....	112	94	99	97	111	103	112	107	.....	.....	1	16	24	30	28	33	6	3
73	.....	99	83	97	95	112	109	113	122	77	.....	14	33	49	42	43	42	29	11	1
74	.....	.....	109	92	96	109	102	122	102	102	.....	.....	2	1	12	14	19	17	4	4
75	.....	67	74	112	87	74	94	104	.....	.....	.....	4	8	2	11	4	2	2	.....	.....
76	.....	97	84	87	84	82	87	77	62	.....	.....	3	14	15	14	11	6	1	1	.....
77	.....	107	77	94	107	100	112	117	.....	.....	.....	1	10	20	17	26	17	10	.....	.....
78	.....	87	68	57	67	62	57	104	112	.....	.....	1	5	1	7	3	7	4	2	.....
79	72	64	68	77	77	87	100	98	120	.....	1	2	9	17	18	13	17	7	3	.....
80	.....	67	102	70	81	102	87	94	62	.....	.....	1	4	9	11	8	7	2	1	.....
81	87	85	95	74	92	97	106	105	107	119	3	13	17	33	27	52	36	32	10	8
82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
83	72	74	59	92	102	90	94	99	117	122	3	4	6	4	4	7	4	6	1	1
84	.....	97	87	82	69	87	104	140	112	.....	.....	1	7	9	8	5	8	3	5	.....
85	82	92	85	81	76	67	102	.....	.....	.....	4	9	18	28	14	5	2	.....	.....	.....
86	.....	.....	107	97	98	114	124	122	.....	.....	.....	.....	1	3	9	4	4	1	.....	.....
87	.....	.....	102	102	100	107	103	114	132	.....	.....	.....	3	5	15	24	14	4	1	.....
88	.....	62	74	75	82	69	70	95	102	97	.....	1	2	9	13	10	9	9	4	1
89	87	87	86	92	87	117	114	117	97	92	1	4	22	29	29	30	26	14	5	1
90	.....	62	72	75	94	72	.....	.....	.....	.....	.....	4	13	19	10	1	.....	.....	.....	.....
91	.....	.....	.....	90	114	129	102	.....	.....	.....	.....	.....	.....	5	4	2	1	.....	.....	.....
92	.....	.....	74	100	88	84	91	103	117	97	.....	.....	2	9	17	21	26	23	3	1
93	59	72	67	58	77	72	80	71	72	67	2	11	17	31	25	26	25	13	5	3
94	.....	.....	114	114	112	118	125	137	135	102	.....	.....	4	14	27	35	31	28	7	1
95	77	71	75	78	89	87	92	107	117	99	3	22	32	47	57	47	25	20	8	4
96	.....	.....	122	99	104	107	99	103	107	.....	.....	.....	1	8	10	22	8	11	1	.....
97	69	77	82	69	86	99	122	127	.....	57	2	1	11	4	10	8	3	2	.....	1
98	72	67	74	77	100	84	113	90	124	.....	1	7	16	22	25	26	20	9	4	.....
99	112	97	103	92	82	90	104	119	102	.....	1	6	11	18	16	17	8	7	1	.....
100	.....	.....	67	62	54	42	87	134	.....	77	.....	.....	1	5	6	6	1	2	.....	1
101	.....	.....	142	137	141	136	132	137	132	.....	.....	.....	5	10	34	34	20	18	5	126
102	.....	72	67	92	100	100	107	119	102	.....	.....	2	11	10	23	13	12	8	3	.....
103	77	75	78	87	89	89	107	110	137	.....	1	5	13	18	24	12	10	7	1	.....
104	.....	72	82	76	82	89	104	112	97	107	.....	4	13	11	21	8	16	6	1	1
105	.....	.....	84	99	116	97	109	99	139	.....	.....	.....	2	8	14	14	8	4	2	.....
106	.....	88	95	82	94	100	85	102	124	.....	.....	9	10	12	16	15	13	12	4	.....
107	.....	.....	67	87	71	79	102	87	.....	.....	.....	.....	1	5	3	4	1	1	.....	.....
108	.....	62	71	79	88	84	108	134	117	87	.....	6	19	28	35	30	19	12	5	1
Totals	87	82	84	87	92	96	101	107	107	105	94	436	959	1,480	1,768	1,692	1,352	859	316	234

AGE STANDARDS

The merit of a score made by a pupil on a mental test may be best interpreted by comparing the score with the expectant score for pupils of his age. This expectant score is called an age standard or age norm. It is found by discovering what score is made by the typical child of a given age. Standards or norms, which have been thus derived from the data of Table IV, are stated in Table V.

TABLE No. V

Age standards for Minnesota high schools giving the Army Alpha Tests.

Age	Median Score	Number of Students
11	87	94
12	82	436
13	84	959
14	87	1,490
15	92	1,768
16	96	1,692
17	101	1,352
18	107	859
19	107	316
20	105	234

It should be noted that the above age groups include only the pupils found in grades 7 to 12 inclusive. It is evident that only a small portion of the 11-year-olds have reached grade 7, and, in general, those who have will be the brighter children. Therefore, there is a sense in which the 11-year standard is too high. The same is true, but to a less extent, of the 12-year standard. There is a sense also in which the 20-year standard it too low, because the brighter children have, as a rule, finished high school by this age. The same is true, but to a less extent, of the 19-year standard.

A better understanding of the merit of the age medians for the various schools may be had by seeing how the age medians deviate from the Minnesota standards. These deviations are shown in Table VI. The table is to be read as follows:

In City 1 the pupils twelve years of age are 3 points below the Minnesota standard for 12-year-old pupils. This is indicated by —3. In the same City the 14-year-old pupils are 1 point above the Minnesota standard for pupils of that age. This fact is indicated by +1.

TABLE NO. VI

Age medians for the various high schools expressed as deviations from the age standards.

	DEVIATIONS									
Schl	11	12	13	14	15	16	17	18	19	20
1	.....	— 3.	—13.	+ 1.	— 6.	—10.	— 6.	—11.	—23.	—18.
2	.....	.....	+13.	— 4.	+ 7.	+ 3.	+13.	—10.	— 5.	+ 2.
3	.....	— 5.	—30.	+ 3.	—15.	— 4.	— 4.	—23.	.....	.....
4	.....	— 5.	— 9.	+ 6.	+ 1.	—10.	+ 1.	— 2.	+10.	+ 6.
5	.....	.....	+ 8.	+ 8.	+12.	— 3.	—13.	+ 9.	.....	+ 2.
6	.....	.....	— 7.	+25.	+ 2.	— 7.	— 2.	+14.	+ 7.	.....
7	+10.	— 5.	—17.	—10.	+10.	+31.	+21.	—23.	.....	.....
8	.....	— 3.	—10.	+ 5.	—19.	— 2.	+ 3.	+ 8.	—30.	.....
9	+ 2.	+22.	—10.	— 5.	—11.	—19.	+ 8.	+25.	+ 5.	— 8.
10	—20.	— 8.	—12.	—14.	—18.	+21.	— 8.	+ 2.	.....	.....
11	.....	—11.	—17.	—25.	—13.	— 9.	+10.	+ 2.	—25.	—18.
12	.....	.....	+23.	+25.	— 1.	+13.	—17.	+ 1.	—13.	— 3.
13	.....	+10.	+33.	+30.	+20.	+ 4.	.....	— 5.	.....	.....
14	.....	.....	+ 3.	+12.	+12.	+ 9.	+11.	+ 4.	+ 2.	—13.
15	.....	.....	+33.	+22.	0.	+26.	+21.	+ 1.	—10.	+12.
16	.....	— 8.	+13.	+ 1.	+ 2.	+20.	+21.	+25.	0.	.....
17	.....	+ 2.	— 2.	+ 2.	+22.	+23.	+ 6.	+27.	+20.	+25.
18	.....	— 3.	+ 3.	— 8.	+ 8.	+ 6.	+ 7.	— 5.	+15.	— 1.
19	—16.	— 9.	+ 1.	—10.	—10.	— 7.	+11.	—14.	.....	.....
20	.....	— 5.	— 2.	+ 2.	0.	— 3.	— 2.	+ 7.	0.	.....
21	.....	—10.	—21.	—33.	0.	—34.	—24.	—45.	.....	.....
22	.....	+27.	+23.	+13.	+ 8.	+15.	+ 9.	+15.	+10.	+12.
23	.....	— 5.	+ 5.	+ 5.	— 9.	+ 7.	+16.	+ 8.	+32.	+ 4.
24	.....	—20.	—15.	—18.	+20.	—24.	—24.	.....	.....	.....
25	.....	.....	—12.	+10.	—20.	— 2.	— 9.	+25.	.....	.....
26	.....	— 5.	— 2.	—10.	—20.	— 4.	— 4.	—25.	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	+ 5.	+ 5.	+36.	+ 5.	+ 2.	+16.	+66.	—10.	+10.	.....
29	.....	+30.	+10.	0.	+ 7.	+12.	+ 7.	—13.	0.	.....
30	.....	—30.	—12.	—14.	—22.	—14.	—64.	.....	.....	.....
31	+40.	+ 6.	+15.	+ 1.	+13.	+ 6.	+ 1.	+ 8.	—13.	+12.
32	+45.	—15.	— 7.	— 8.	+ 2.	—24.	.....	+ 5.	.....	.....
33	+25.	—15.	—12.	.....	+ 2.	+ 6.	+ 6.	+10.	.....	.....
34	.....	+13.	+13.	0.	+12.	.....	.....	.....	.....	.....
35	.....	.....	— 7.	+ 2.	—22.	— 6.	+11.	+ 5.	.....	— 8.
36	—25.	0.	+ 6.	+20.	+ 9.	+ 7.	+10.	—18.	— 7.	+37.
37	.....	+40.	+18.	+ 5.	+30.	—14.	—19.	.....	—28.	.....
38	+ 5.	—10.	+ 1.	— 5.	+ 3.	+ 3.	+19.	—10.	— 5.	—23.
39	.....	— 3.	+ 3.	+ 2.	.....	—24.	—29.	.....	.....	.....
40	.....	— 3.	— 3.	— 9.	— 5.	—90.	— 4.	+ 3.	+ 5.	—33.
41	—13.	+ 1.	—26.	—17.	— 7.	0.	+13.	0.	.....	.....
42	.....	—13.	—15.	—15.	+27.	+21.	+31.	—20.	+55.	—33.
43	+22.	— 3.	— 3.	— 6.	—18.	—19.	—34.	.....	—43.	.....
44	+40.	+25.	— 1.	+ 2.	+15.	+16.	— 7.	— 3.	0.	.....
45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	—40.	— 3.	—10.	0.	0.	— 4.	— 2.	—10.	+12.	—33.
47	+12.	— 8.	— 2.	— 2.	—10.	0.	+ 7.	— 6.	—15.	—18.
48	.....	—15.	— 2.	—22.	—33.	—24.	—44.	.....	.....	.....
49	0.	— 5.	— 5.	— 1.	+ 5.	+13.	— 7.	+22.	+10.	.....
50	—15.	—10.	—26.	0.	0.	— 4.	+ 6.	+ 3.	— 8.	+34.
51	+10.	— 5.	— 7.	+ 3.	+ 3.	— 4.	+11.	+ 5.	—13.	.....
52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53	.....	.....	+23.	+30.	+20.	+17.	+ 1.	—13.	+17.	— 8.
54	.....	—50.	—10.	—10.	—17.	— 8.	+ 4.	— 3.	—25.	— 3.
55	.....	—15.	+ 6.	— 3.	+ 4.	+ 6.	+ 2.	+10.	.....	.....
56	.....	+13.	—12.	—10.	— 5.	—24.	—24.	.....	—25.	.....
57	.....	+ 5.	+30.	+19.	+ 7.	+21.	+16.	+13.	+20.	.....
58	+15.	+25.	+ 8.	+25.	+29.	+37.	+39.	+20.	+25.	+27.
59	.....	.....	+20.	+10.	+18.	+ 5.	+11.	+10.	+ 7.	+42.
60	.....	—15.	—25.	—18.	— 5.	—14.	—32.	+ 2.	.....	—13.
61	0.	.....	+ 6.	— 5.	— 8.	+ 2.	—19.	— 3.	+10.	+12.
62	.....	—17.	—17.	—18.	— 5.	—19.	— 2.	—20.	—35.	— 3.
63	.....	+70.	— 2.	—21.	—10.	.....	—16.	—20.	.....	.....
64	.....	.....	+43.	+30.	+23.	+ 8.	+ 2.	— 3.	— 5.	— 3.
65	.....	.....	— 5.	+ 2.	—34.	+ 6.	—14.	—10.	.....	.....
66	.....	+10.	+10.	+20.	+15.	+23.	+17.	—20.	.....	.....
67	.....	+45.	—37.	— 5.	—15.	—16.	+ 6.	—22.	—30.	.....
68	.....	.....	.....	+40.	+ 8.	+ 3.	+ 1.	—16.	—20.	— 8.
69	.....	.....	+ 3.	— 7.	+ 4.	+10.	+ 3.	+ 8.	— 7.	+ 7.
70	— 5.	0.	—12.	—13.	— 5.	— 4.	—17.	+14.	—10.	—11.
71	.....	+ 8.	—13.	0.	+16.	+23.	+19.	+17.	+28.	+24.
72	.....	.....	+28.	+ 7.	+ 7.	+ 1.	+10.	— 4.	+ 5.	+ 2.

(Continued on next page)

TABLE NO. VI.—Continued.

Age medians for the various high schools expressed as deviations from the age standards. 7

Schl	DEVIATIONS									
	11	12	13	14	15	16	17	18	19	20
73	.....	+17.	— 1.	+10.	+ 3.	+16.	+ 8.	+ 6.	+15.	—28.
74	.....	.....	+25.	+ 5.	+ 4.	+13.	+ 1.	+15.	— 5.	— 3.
75	.....	—15.	—10.	+25.	— 5.	—22.	— 7.	— 3.	.....	.....
76	.....	+15.	0.	0.	— 8.	—14.	—14.	—30.	—45.	.....
77	.....	+25.	— 7.	+ 7.	+15.	+ 4.	+11.	+10.	.....	.....
78	.....	+ 5.	—16.	—30.	—25.	—34.	—44.	— 3.	+ 5.	.....
79	—15.	—18.	—16.	—10.	—15.	— 9.	— 1.	— 9.	+13.	.....
80	.....	—15.	+18.	—17.	—11.	+ 6.	—14.	—13.	—45.	.....
81	0.	+ 3	+11.	—13.	0.	+ 1.	+ 5.	— 2.	0.	+14.
82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
83	—15.	— 8.	—25.	+5.0	+10.	— 6.	— 7.	— 8.	+10.	+17.
84	.....	+15.	+ 3.	—5.0	—23.	— 9.	+ 3.	+33.	+ 5.	.....
85	— 5.	+10.	+ 1.	—6.0	—16.	—29.	+ 1.	.....	.....	.....
86	.....	.....	+23.	+10.	+ 6.	+18.	+23.	+15.	.....	.....
87	.....	.....	+18.	+15.	+ 8.	+11.	+ 2.	+ 7.	+25.	.....
88	.....	—20.	—10.	—12.	—10.	—27.	—31.	—12.	— 5.	— 8.
89	0.	+ 5.	+ 2.	+ 5.	— 5.	+21.	+13.	+10.	—10.	—13.
90	.....	—20.	—12.	—12.	+ 2.	—24.	.....	.....	.....	.....
91	.....	.....	.....	+ 3.	+22.	+33.	+ 1.	.....	.....	.....
92	.....	.....	—10.	+13.	— 4.	—12.	—10.	— 4.	+10.	— 8.
93	—28.	—10.	—17.	—29.	—15.	—24.	—21.	—36.	—35.	—38.
94	.....	.....	+30.	+27.	+20.	+22.	+24.	+30.	+28.	— 3.
95	—10.	—11.	— 9.	— 9.	— 3.	— 9.	— 9.	0.	+10.	— 6.
96	.....	.....	+38.	+12.	+12.	+11.	— 2.	— 4.	0.	.....
97	—18.	— 5.	— 2.	—18.	— 6.	+ 3.	+21.	+20.	.....	—28.
98	—15.	—15.	—10.	—10.	+ 8.	—12.	+12.	—17.	+17.	.....
99	+25.	+15.	+19.	+ 5.	—10.	— 6.	+ 3.	+12.	— 5.	.....
100	.....	.....	—17.	—25.	—38.	—54.	—14.	+27.	.....	—28.
101	.....	.....	+58.	+50.	+49.	+40.	+31.	+30.	+25.	.....
102	.....	—10	—17.	+ 5.	+ 8.	+ 4.	+ 6.	+12.	— 5.	.....
103	—10.	— 7.	— 6.	0.	— 3.	— 7.	+ 6.	+ 3.	+20.	.....
104	.....	—10.	— 2.	—11.	—10.	— 7.	+ 3.	+ 5.	—10.	+ 2.
105	.....	.....	0.	+12.	+24.	+ 1.	+ 7.	— 8.	+32.	.....
106	.....	+ 6.	+11.	— 5.	+ 2.	+ 4.	—16.	— 5.	+17.	.....
107	.....	.....	—17.	0.	—21.	—17.	+ 1.	—20.	.....	.....
108	.....	—20.	—13.	— 8.	— 4.	—12.	+ 7.	+27.	+10.	—18.

7. For the number of pupils, see Table IV.

The large deviations noted above may be partially explained by the fact that they represent, as a rule, small schools and are sometimes based on only one, two, or three scores. In general, however, assuming that the tests were given and scored strictly according to directions, the deviations may be said to be due to differences in pupil material among the various cities. A study of the occupation, nativity, etc., of the parents of the students of the several schools would probably throw light on the differences in pupil material. Another interesting study would be one which compared the pupils of the small rural high schools with those of the larger city high schools.

Comparing the Minnesota age standards with those for Kansas, it is found that the standards are about the same. The age standards for both states are shown in parallel columns below.

TABLE No. VII

Minnesota age standards compared with those for Kansas.

Age	Minnesota Medians	Kansas Medians 8
11	87	60
12	82	74
13	84	78
14	87	75
15	92	96
16	96	110
17	101	112
18	107	107
19	107	104
20	105	107

8. The Kansas medians were reported by J. C. Devoss, Director of the Bureau of Educational Standards and Measurements, State Normal School, Emporia, Kansas. Letter of December 18, 1920.

From the above table it is seen that Minnesota exceeds the Kansas standards for ages 11, 12, 13, 14, 15, and 19; she equals those of Kansas for age 18; while Kansas excels Minnesota for ages 16, 17, and 20. The differences, however, are hardly enough to be significant.

The next part of the report deals with sex differences.

TABLE NO. VIII

Medians, according to sexes, for the various high schools.

School	Sex medians		Number of		School	Sex medians		Number of	
	Boys	Girls	Boys	Girls		Boys	Girls	Boys	Girls
1	86	88	61	98	55	92	98	10	17
2	97	97	25	22	56	72	84	15	16
3	91	83	17	45	57	115	106	23	19
4	91	97	188	217	58	119	124	36	66
5	102	99	22	24	59	113	109	53	78
6	90	105	9	37	60	78	86	17	31
7	86	91	8	19	61	82	95	26	63
8	89	90	22	67	62	74	82	34	46
9	81	93	42	55	63	80	81	9	10
10	76	75	32	31	64	105	103	22	48
11	80	73	25	19	65	63	95	13	21
12	104	101	22	32	66	121	104	15	24
13	101	110	6	15	67	75	83	17	23
14	107	105	29	39	68	102	98	30	38
15	119	109	33	28	69	98	104	41	67
16	105	107	59	100	70	85	84	38	54
17	106	93	29	39	71	98	98	108	153
18	96	92	42	78	72	98	102	51	92
19	84	88	26	42	73	98	102	87	175
20	93	94	56	77	74	111	98	26	47
21	60	64	15	20	75	77	84	15	18
22	108	110	74	101	76	83	83	36	31
23	99	95	51	57	77	96	103	43	56
24	65	84	7	8	78	64	82	18	13
25	80	98	11	13	79	82	88	39	47
26	73	91	24	16	80	75	88	15	27
27	103	92	103	171	81	92	99	93	142
28	94	113	12	13	82	84	88	75	102
29	102	106	20	23	83	93	87	13	27
30	64	72	18	13	84	95	92	23	23
31	96	102	37	72	85	86	92	58	59

(Continued on next page)

TABLE NO. VIII—Continued.

Medians, according to sexes, for the various high schools.

School	Sex Medians		Number of		School	Sex Medians		Number of	
	Boys	Girls	Boys	Girls		Boys	Girls	Boys	Girls
32	79	84	16	18	86	112	100	11	11
33	101	86	11	13	87	102	103	24	42
34	100	95	11	5	88	75	82	28	31
35	90	81	11	10	89	97	99	66	93
36	93	103	59	93	90	75	73	23	24
37	86	100	7	23	91	122	97	4	8
38	83	83	62	105	92	92	92	37	65
39	82	80	12	13	93	72	72	52	90
40	87	88	227	304	94	122	124	60	87
41	74	91	33	61	95	86	89	110	156
42	81	79	15	18	96	108	102	19	42
43	77	81	83	90	97	94	84	24	20
44	94	105	12	19	98	84	92	58	72
45	91	93	230	403	99	102	92	40	46
46	92	95	34	81	100	51	94	13	10
47	90	94	19	38	101	138	136	47	80
48	61	68	17	22	102	96	96	28	53
49	82	98	46	58	103	93	91	47	46
50	88	98	50	64	104	85	89	30	53
51	98	92	31	47	105	116	94	21	31
52	86	97	24	37	106	104	91	28	66
53	109	102	25	33	107	88	77	7	8
54	86	81	15	22	108	90	85	65	88
					Totals	91	93	4,116	6,143

Sex differences, as shown in Table VIII, are not large. The girls have a median which is two points larger that that for the boys. Other investigators, on the contrary, have found that the boys did slightly better on the Army Test than the girls. This advantage in favor of the boys has been usually explained by saying the Army Test is a "man's test."

In spite of the test being a "man's test," Minnesota high school girls do slightly better on it than boys. The Minnesota results, therefore, agree in general with the findings of most other investigators using other mental tests. Evidence is cumulative that girls are slightly more "intelligent" than boys of the same age; at least, they do slightly better on mental tests than boys.

CONCLUDING STATEMENT

To give mental tests, and then do nothing with the results, is to use the tests as mere "playthings." To have information regarding the mentalities of pupils is of interest, but to satisfy the curiosity alone probably does not justify the time and expense entailed in giving the tests. Each pupil who takes a mental test should be rewarded with a more scientific treatment by the school than he has previously had. His reward should come generally through a more rational classification or through work which is better adapted to his capacity.

It has been stimulating to note that Minnesota principals and superintendents have been whole-heartedly attempting to get the mental testing program to function in a rational plan of educational and vocational guidance. Much evidence is at hand to show that mental tests to them are not mere "playthings." Thousands of their students have been benefited through the successful use of these most modern instruments of educational diagnosis. Let the good work continue.

THE SUMMER SCHOOL

The summer school this year was the largest and best in the history of the school. The total attendance was 816 in the college and 176 in the Training School. The spirit was fine and excellent work was accomplished.

President L. C. Lord, County Superintendent N. A. Thorson, Crookston, Commissioner of Education J. M. McConnell and Dean M E. Haggerty, University of Minnesota, addressed the school. A series of five motion pictures was available, shown in the Auditorium on Friday evenings.

Rural School Week was a unique feature of the summer school. Mrs. Ada M. Shaw spoke on the morning and afternoon of the first day. The second day was devoted to county graduation exercises. County Superintendent Tang arranged to have this at the regular assembly period. A class of 57 eighth grade graduates reported. The address was delivered by Superintendent Thorson, Polk County. On the evening of that day the Rural Life Clubs had a "County Fair" on the campus, one of the most enjoyable evenings of the session. The third day was county superintendents' day. All those of the western portion of the state were invited. Several had conflicting engagements, but seven came. They visited the rural school methods classes, held a conference with Miss Bieri, head of the Rural School Department, and attended the general assembly of the school. Commissioner McConnell delivered an address entitled "Teachers and Teacher Training." Each county superintendent spoke briefly.

In the afternoon the superintendents were entertained by rallies of the teachers of their own counties, met their teachers and interviewed prospective teachers.

In the evening the music and the reading departments gave a formal recital. Mr. Daniel L. Preston sang a series of carefully selected songs and Miss Maude Hayes read "Disraeli."

This week was intended to emphasize the extent to which the Teachers Colleges are serving the rural schools. More than half of all the teachers in attendance, a total of 429, stated that they are to teach in rural schools this year. A total of 271 taught in such schools last year.

Advanced Work. The summer school also marked the beginning of definite plans to provide work for normal school graduates. Special classes were organized for their benefit. Forty-four were definitely working on their three year diplomas. More will be made of this work next year.

Field Work in Geography. Mr. C. E. Huff of the geography department arranged for a series of visits to industrial plants. His emphasis upon making geography and geographical materials real to children in the public schools led to a demand for a field course in geography. Several expressed a desire for him to take a class to Glacier Park. He finally consented to undertake such a trip. Consequently at the close of the summer term, a field course in geography was offered. A class of twelve went in a special car to Glacier National Park, spending a week in sight seeing and study. This part of the course, consisting of observations, note taking, and lectures by the way, freed from formalities and under the influence of wonderful mountain scenery, was pursued with enthusiasm. The course will be completed by writing up notes, reading a specified list of references, and written reports by correspondence or by personal conferences during the fall term.

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