

THE SCHOLASTIC STANDING OF THE HIGH SCHOOL
SENIORS (1947) OF OSAGE COUNTY

by

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INTRODUCTION

The purpose of this study was to determine the scholastic standing of the high school seniors of Osage county and to establish some index of the outlook of these students with respect to further progress in their formal education.

As a measure of aptitude, the Henmon-Nelson Test of Mental Ability was selected and as a measure of educational outcome the Iowa High School Content Examination was used.

Answers to such questions as the following were sought in the study:

What scores would these students make on tests of mental ability and achievement?

How would their scores compare with norms established for these tests?

Would the scores be affected by the size of the school?

Would sex make any difference?

Would they show any marked differences in scores of achievement made in tests in various fields of subject matter?

Will the results of the tests as shown in the scores made by these students indicate that their achievement is on a level with their mental ability?

Should these students be advised to go to college?

Could any helpful guidance be given them as to the type of curriculum they should select if they do continue formal education?

Osage county is situated in the eastern part of the state of Kansas just south of the county in which Topeka is located and has a population of 13,117. The communities provided with high schools have population as follows:

Osage City	2,016
Burlingame	1,045
Lyndon (county seat)	787
Overbrook	480
Scranton	475
Quenemo	444
Carbondale	415
Melvern	356
Olivet	136
Michigan Valley	110

The 1947 report of O. H. Thomas, Osage county Superintendent of Schools, gives the classification and enrollment of the high schools of the county as follows:

		: Total	: No. of
Rural High Schools		: enrollment	: seniors
Carbondale	A	43	8
Melvern	A	53	13
Michigan Valley	C	17	2
Overbrook	A	81	22
Quenemo	B	40	11
City-Village Schools			
Burlingame	A	91	20
Lyndon	A	96	23

Olivet	C	24	2
Scranton	B	43	5
Senior High School			
Osage City	A	181	47

The students of these high schools come from average American homes. The western half of the county contains a number of scattered coal mines in which employment is secured about six months of the year. This district includes the towns of Osage City, Burlingame, Scranton, and Carbondale. The remainder is largely rural with Topeka an important trade and employment center.

This study was not undertaken with the idea of making critical comparisons to the disparagement or compliment of any one school system, group of students, or individual student. The interest in the study was not entirely impersonal but in tabulating results, means of identification of particular schools and individuals were concealed as much as possible, and in some instances the schools were mentioned by name when it seemed less confusing in making comparisons to do so.

PROCEDURE

The process of making the study of the scholastic standing of the high school seniors of Osage county in 1947 consisted of measuring these students as to aptitude and achievement. This measurement involved three steps:

- (1) Selecting the tests to be used
- (2) Administering the tests
- (3) Scoring the tests and tabulating the results

Test Selection

A student of measurement is familiar with the oft-quoted statement by Thorndike (16, p. 16) "Whatever exists at all exists in some amount". He also recognizes the statement made by McCall (10, p. 15) in his philosophy of measurement, Thesis 7, "Anything that exists in amount can be measured", if there are appropriate measuring instruments. Measurement is not a new educational devise and there are many types of tests on the market. The choice of a particular test had to be made on the basis of deciding which type was best suited to the circumstances under which the study was being made. Since the term, "scholastic standing", was interpreted as being the results obtained by measuring academic aptitude and achievement, the Henmon-Nelson Test of Mental Ability, Form B and the Iowa High School Content Examination, Form M were selected.

These tests were selected for the following reasons:

They are popular tests

They have a high degree of validity and reliability

They are not lengthy

They were easy to administer

They were easily scored

They were economical in cost

A brief summary of the nature of these tests and descriptive comments regarding the tests by those familiar with them follow.

The Henmon-Nelson Tests of Mental Ability, Forms A and B, were prepared by V. A. C. Henmon, Ph. D., Chairman of the Department of Psychology, University of Wisconsin, and M. J. Nelson, Ph. D., Dean of the Faculty, Iowa State Teachers College, Cedar Falls, Iowa.

Purpose and Nature. The tests were designed to measure the aptitude of high school seniors and college freshmen to indicate the student's probable success in college. Two forms of the test, which are identical in difficulty and construction, are available. Each form consists of 90 items arranged in order of increasing difficulty. A wide variety of types of questions is used, thus furnishing a test of many kinds of ability. Some of the tests of mental ability have not as yet been used in other tests of mental ability. The administration is very simple and the directions brief but easy to understand. The time limit is 30 minutes. The scoring can be done in a very short time as the Clapp-Young Self-Marking Device is used. No scoring keys are necessary.

Validity and Reliability. In the construction of the tests a great deal of work has been done in an effort to secure items that would be of maximum service. Two hundred twenty-four carefully prepared items were divided into two forms and administered to approximately five hundred students. Only such items

as proved to discriminate between superior and inferior students were retained. The two forms of 90 items each were prepared from the items having the greatest predictive value. The tests were then printed in experimental form and it is on the basis of the administration of this printed edition that statistical data were derived.

Four studies to determine validity by comparison were made. In three cases the test with which comparisons were made was the American Council Psychological Examination, 1931 edition. In the study made from data obtained from Ball State Teachers College, the correlation between scores was $r = .77 \pm .03$. At the University of North Dakota the correlation was found to be $r = .68 \pm .02$. At Iowa State Teachers College the correlation was $r = .76 \pm .02$. The fourth study involved the Otis Self-Administering Tests of Mental Ability, Higher Examination, Form A. The correlation between scores on this test and the Henmon-Nelson Test, Form A, was $r = .79 \pm .03$. When the narrow range of talent involved is taken into consideration, these correlations will be seen to be relatively high.

The reliability, as determined by correlating the scores earned by 171 freshmen on Form A with those earned by the same students on Form B was $r = .89 \pm .01$ where Form A was administered first.

Predictive Value. To show that the tests were capable of predicting academic success in college, correlations were made between test scores and grades assigned in various subjects at

Iowa State Teachers College. These subjects were Psychology I, Educational Psychology, English I, American Government, Elements of Geography, and others. While the correlations were not high, they compare favorably with correlations obtained between grades and scores on other tests of mental ability.

Norms. Norms for the test have been determined on the basis of scores made by approximately 5,500 students in colleges and universities of varying sizes in different parts of the United States. None of the schools in which the tests were administered uses any means of excluding students who have graduated from high school except as they are found to be unable to carry their work successfully. With the possible score for the test being 90, the norms show the 50 percentile for college freshmen to be 44 (19).

Descriptive Comments.

The material of the Henmon-Nelson Test is not segregated but is arranged in a 'scrambled' sequence, with the different types of test items following one another in apparently random order but increasing difficulty. The wide variety of items includes vocabulary, sentence completion, disarranged sentences, classification, logical selection, series completion, directions, analogies, anagrams, proverb interpretations, and arithmetic problems. This arrangement has the advantage of simple administration, because the examiner need not start and stop the pupils for each subtest, as is necessary when the different types of material are segregated and timed (13, p. 295).

The content and standardization of these tests seem as satisfactory as those of the better group tests of intelligence but not strikingly more so. In two respects they have definite advantages - viz., price and mechanical features. They are almost completely self administering and self scoring. The scoring device (a carbon record) is simple and fool-proof, and has about

the highest degree of convenience and perfection short of machine scoring (5, p. 1398).

An examination of these group tests and manual and scoring keys that accompany them impresses one immediately with the kind of care and expertness with which one wishes all tests were constructed.... The tests are appropriately entitled 'Tests of Mental Ability' rather than 'Tests of Intelligence'. The authors imply very clearly that intelligence is the unity which they are measuring. This being the emphasis, it is fortunate that they include a variety of items which demand a variety of mental operations, thus touching many areas of mental ability not sampled in so-called tests of intelligence.... The validity of the college form as an indicator of scholastic aptitude is as high as can now be obtained from so short a test with coefficients ranging between .45 and .65 for both specific and general scholastic averages (8, p. 1398).

The Iowa High School Content Examination, Revised Form M, was prepared by D. B. Stuit, Ph. D., Associate Professor of Psychology, State University of Iowa; H. A. Greene, Ph. D., Professor of Education, State University of Iowa; and G. M. Ruch, Ph. D., U. S. Office of Education, Washington, D. C.

Purpose and Nature. The original edition of the Iowa High School Content Examination was based upon the principle that the best single basis for estimating an individual's probable success in a special field of learning is his past record of achievement in that field. The new edition is not changed except to meet the need arising from changes in curricular emphasis and testing techniques.

The revised quick-scoring edition is available in two closely equated forms, Form L and Form M, requiring a total testing period of 75 minutes. It is designed to provide a quick and accurate appraisal of the student's knowledge in each

of the four basic areas of the typical academic high school curriculum. These four areas, (1) English and Literature, (2) Mathematics, (3) Science, (4) History and Social Studies, are sampled by a total of 335 items. The total score furnishes an over-all evaluation of the student's general mastery of the subject matter content of these fields. The four sub-test scores reveal the extent to which the student is strong or weak in the four basic areas of the secondary school curriculum. The tests are designed for appraisal of the knowledge of high school juniors and seniors and college freshmen, and can be used as a guide in taking further work.

Section 1. English Grammar and Literature. The items in this section test the student's vocabulary, his understanding of grammar and his knowledge of literature.

Section 2. Mathematics. These items cover the most important skills and information of high school algebra and the topics of plane geometry most likely to be remembered and understood.

Section 3. Science. This section samples the knowledge of facts and concepts in general science and six special fields. These fields are physics, chemistry, geology, physiology, botany, and zoology with the largest percentage of items taken from physics.

Section 4. History and Social Studies. This section covers the fields of ancient, medieval, and modern history with special emphasis upon United States and the modern world. A

few important concepts in civics and economics are also included.

Validity and Reliability. Claims to validity are based upon the careful selection of items in the four fields and the standardizing of scores through comparison with test results of the original edition test forms. The results from the tests have been found to correlate well with success in high school and college courses. Coefficients of correlation between grades and scores in the individual sections of the test range from .50 to .60, and the total scores on the test correlate to about the same degree.

The reliability was established on the scores made by approximately 6,000 students which are used in preparing the tables of norms and show both forms of the test to be highly reliable.

Predictive Value. The thoroughness with which the test items cover the four basic fields of knowledge provides proof that the test is an ample guide as to the probable level of achievement that can be attained by the high school senior who plans to attend college.

Norms. To make the results on the separate scores more comparable, standard scores based on the variability of a specially selected group have been prepared. Two thousand five hundred and nineteen individual students, 17 and 18 years old and in the fourth year of high school, were used in making the table of these standard scores. Norms are based

upon returns of about 6,000 students in 35 high schools scattered through the nation (20).

Descriptive Comments. The original edition of the Iowa High School Content Examination, edited by Ruch et al. and published in 1925, has been used successfully for many years. The revised form is based upon this edition, and the eminence of the authors of both editions is an indication of the merit of the work done in construction of the tests.

Describing the original edition, Darley (3, p. 106) states: "This battery provides an excellent end-of-high-school survey in basic subject matter fields: English (literature and grammar), mathematics, sciences, and history and social sciences."

Bingham (2, p. 37) lists the test in a discussion of representative tests of school achievement as one of "a battery of tests which has yielded highly satisfactory results."

Odell (12, p. 379), in describing the test, comments: "The items included appear to be such that the use of this examination should not be limited to Iowa. Indeed, it has been used in several other states with good results."

The newness of the test accounts for the lack of comment to be found either in text books or in periodicals on the revised form of the test.

In a personal letter dated September 25, 1947, H. A. Greene, Director of the Bureau of Educational Research and Service, State University of Iowa and one of the authors of the revised test, states "the earlier experience with the first

edition of the Iowa High School Content Examination also gave us considerable evidence of its general validity as a measure of secondary school accomplishment in the four fields specified." He stated further that a bibliography of references on the use of the test or comparative data had not been compiled but that Dr. Joseph Avent of the University of Tennessee at Knoxville had used the test in his state survey during the past two years and appeared to be quite enthusiastic about the results.

In answer to an inquiry regarding his opinion of the test, Doctor Avent made this personal reply:

(copy of letter)

10-3-47

Dear Sir:

I am thoroughly satisfied as to the validity, reliability, and usability of the Iowa High School Content Examination.

I send you under separate cover a copy of our last year's Report. This year's Report has not been published.

Sincerely yours,

Jos. E. Avent

Test Administration

In the fall of 1946, the superintendents and principals of the high schools of Osage county were visited for the purpose of securing permission to test the seniors of the various

schools. When the nature and purpose of the testing were explained to these officials, they were more than willing to assist in the study being made of these students. Later, a schedule of dates was arranged to suit the convenience of the schools participating in the testing program.

In April, 1947 the Henmon-Nelson Test of Mental Ability was given to the seniors of each school in succession and approximately 10 days later it was followed by the Iowa High School Content Examination.

In each case the tests were given under conditions as nearly alike as possible. The examiner was assisted by a monitor in the larger schools.

Scoring and Tabulating Results

In both tests, the scoring was simplified by special time-saving devices. The Henmon-Nelson Test of Mental Ability was printed in the Clapp-Young Self-Marking Test form and the Iowa High School Content Examination answer sheet was scored by a punched stencil-type key.

Each test was rescored and checked for accurate count.

The results of the tests were tabulated as follows:

Henmon-Nelson Test of Mental Ability: (1) a distribution of the scores made by the 153 seniors of Osage county, (2) a distribution of the scores made by the boys, (3) a distribution of the scores made by the girls of the county, (4) a

distribution of the scores made by the separate schools. The medians of these distributions were computed.

Iowa High School Content Examination: (1) an unranked list of raw and standard scores made in each subject and the total score made by each student, (2) a distribution of the standard scores made in each subject by boys and by girls, (3) a distribution of total scores made by boys and by girls, (4) a distribution of standard scores made by separate schools of the county. The medians of these distributions were computed.

Finally, two additional tables were prepared: one showing the correlation of the scores made in the two tests, and the other showing the comparison of the medians of the scores in the two tests made by the separate schools.

RESULTS AND INTERPRETATIONS

The Henmon-Nelson Test of Mental Ability

Table 1 shows the distribution of the scores made by the boys and the girls separately and the total scores of the 153 seniors of Osage county in 1947. The median computed from the distribution of the total scores is 37.7 for the county as a whole. The mean for this distribution is 37.6. The very slight difference between the median and the mean indicates a symmetrical distribution (18, p. 152).

Table 1. The distribution of the scores made by the boys and the girls of the senior classes of Osage county in the Henmon-Nelson Test of Mental Ability.

Score	:	Boys	:	Girls	:	Total
69 - 75		1		-		1
62 - 68		2		2		4
55 - 61		5		2		7
48 - 54		14		8		22
41 - 47		12		12		24
34 - 40		28		17		45
27 - 33		9		11		20
20 - 26		7		7		14
13 - 19		9		7		16
Totals		87		66		153
Medians		38.1		36.8		37.7

The medians computed from the distribution of scores made by the boys of the county and the girls of the county are 38.1 and 36.8, respectively. This difference is probably not enough to be statistically significant nor is it as marked as differences found by others in testing boys and girls. But the trend in all the comparisons throughout the study indicating sex differences is in favor of the boys. This is not an unusual situation. Strickland (15, p. 28) found similar results in a study of the intelligence of seniors in

a number of Kansas high schools. He states: "...higher scores of the boys in comparison with the girls in the total test scores are quite in harmony with the usual results when intelligence tests are given comparative groups of boys and girls." He cites results of studies made in a state-wide survey of the intelligence of seniors in Indiana and also a test of over three thousand high school seniors in Massachusetts. Each study revealed that the boys' scores excelled that of the girls.

A survey of the single scores made by the Osage county group shows the percent of boys exceeding the median for the county was 52 percent and that of the girls was 47 percent. The total number of boys in Osage county senior classes was 87 and the total number of girls was 66. Thus, it would seem that there is not a noticeable difference in the mental ability of the boys and the girls of Osage county as noted from the results of the Henmon-Nelson Test of Mental Ability.

Since some comparison of these scores with those made by other Kansas high school seniors was desired, the names of several schools having given the same test were secured from Dr. J. C. Peterson of the Department of Education and Psychology, Kansas State College. No records of another all-county testing program could be found with which a comparison could be made. Table 2 shows the comparisons that were made.

Scores from Abilene high school seniors, 1947, showed a median of 42.5. The enrollment of Abilene Senior High School

was 457, which was considerably larger than that of any one school in Osage county. The class enrollment was 87 which was more than half as many as the 153 in the Osage county group. This higher median is probably due to the difference in size of the enrollments of the schools. In the larger school the weaker students are often eliminated before their senior year. Strickland (15, p. 30-31) found this situation in his study of the intelligence of high school seniors and states that "Book accounts for a similar finding in his Indiana study by suggesting that 'the larger schools are better graded and seem to have eliminated all inferior students before their senior year'." In judging the comparison of scores from a single school with those of the Osage county group, another factor should be taken into consideration. The students from the single school will probably be a more uniform group than the students from the 10 different schools ranging in size and classification as the Osage county schools. It is to be expected that the medians of the more uniform group - both of the class and the boys and girls - would be higher in comparison.

Scores from the senior classes of 1944 and 1945 were secured from Lindsborg High School which had an enrollment of 136. This is not as large as that of Osage City which is the largest high school in Osage county, but it is the nearest to the enrollment of most of the schools of the county. Therefore, the two classes compare favorably with the Osage

Table 2. Comparison of the distributions of the scores made by the Osage county seniors, 1947, and those of separate schools on the Hermon-Nelson Test of Mental Ability (college level).

Score	: Schools represented*				
	: A	: B	: B'	: C	: D
90 - 96	-	-	-	1	-
83 - 89	-	-	-	-	-
76 - 82	-	-	-	2	-
69 - 75	1	-	1	15	1
62 - 68	10	2	1	28	4
55 - 61	10	5	2	82	7
48 - 54	9	5	2	103	22
41 - 47	19	10	7	129	24
34 - 40	13	12	7	69	45
27 - 33	16	8	3	32	20
20 - 26	8	7	1	13	14
13 - 19	1	1	-	1	16
Total no.	87	50	24	475	153
Median	42.5	38.7	41.5	47.0	37.7

- *
 A - Abilene High School seniors, 1946
 B - Lindsborg High School seniors, 1944
 B' - Lindsborg High School seniors, 1945
 C - Fort Hays State College Freshman Entrance Examination, 1946
 D - Osage County High School seniors, 1947

county group for the medians are most nearly the same. The median of the class of 1944 is 38.7 and that of the class of 1945 is 41.5.

To make a comparison with a college freshman group, scores were secured from Fort Hays State College where the test was given as an entrance examination in 1946. The median of this group was 47. This is evidently a select group for it is usually understood that only the better students are advised to continue their formal education. Furthermore, as is shown in Table 3, 65 percent of this freshman group equalled or excelled the median norm established for the freshman group in the Henmon-Nelson Test of Mental Ability.

Table 3. The percent of students of each group that equalled or excelled the median for the freshman norms established for the Henmon-Nelson Test of Mental Ability.

Group	:	Percent
Fort Hays College freshmen, 1946		65
Abilene High School seniors, 1946		48
Lindsborg High School seniors, 1944		36
Lindsborg High School seniors, 1945		33
Osage county seniors, 1947		32

Another interesting comparison, shown in Table 4, was made of the distributions of scores of the Lindsborg High School seniors, 1944 and of the Osage City High School seniors, 1947. This comparison shows these two groups had nearly the same medians when the number of students was nearly equal. Lindsborg seniors, numbering 50, had a median of 38.7 and Osage seniors, numbering 47, had a median of 39.8.

Table 4. A comparison of the distributions of the senior class of the Osage City High School and the senior class of Lindsborg High School.

Score	:Lindsborg High School:	Osage City High School
69 - 75	-	-
62 - 68	2	2
55 - 61	5	-
48 - 54	5	8
41 - 47	10	12
34 - 40	12	16
27 - 33	8	6
20 - 26	7	2
13 - 19	1	1
Total	50	47
Medians	38.7	39.8

In Table 5, the schools were listed by name to show the rank of the medians of the total scores made by each school.

This would not seem to be a true ranking since the first and last schools have a total class membership of two boys each. But the eight schools in between the two extremes present a more nearly true ranking. The medians of the scores made by the boys and the girls of each school are also shown in Table 5. Therefore, as stated before, it would seem that the general quality of the senior students of the larger high school is somewhat superior probably because the weaker student is dropped before he reaches his fourth year of high school training.

Table 5. Medians of the separate schools in Osage county.

School	:	Boys	:	Girls	:	Total
Michigan Valley		41		-		41
Burlingame		46.5		37.5		40.5
Osage City		40.5		40		40
Lyndon		43		35		37
Overbrook		37		36		36.5
Quenemo		36		52		36
Scranton		49		23		34
Carbondale		20.5		36		29.5
Melvorn		20		27.5		25
Olivet		21.5		-		21.5

The Iowa High School Content Examination

Four measures were made by means of the Iowa High School Content Examination: in English, Mathematics, Science, and Social Science. The results of the tests are given in Tables 6, 7, 8, and 9.

Table 7 shows the distribution and medians of the total standard scores made by the boys and the girls of the county. The total standard score gives an average of the student's achievement in all four fields. The median for the boys was computed to be 196.8, for the girls, 187, and for both or the median for the county was 192. This is one point below the median given in the table of norms for the test. Again it is shown that the boys rank higher than the girls.

In Table 8, the distributions of the standard scores made in each section by the girls and the boys, and by both boys and girls is shown and compared with the medians of scores given in the table of norms established for the test. In English, the Osage county group was 1.3 points below the norm and similarly, in social science the group ranks 2.5 below the norm. However, in mathematics and science, the county group ranks above the median by 2.3 and 3.3 points, respectively. This is not a favorable showing for the county when the state requirements demand more units for graduation in English and in social science than mathematics and science. But the stress

Table 6. Iowa High School Content Examination, unranked scores.

Case no.	:English and: Literature		:Mathematics:		:Science:		:History and: Social Sci.:		Total		:Total %
	R	S	R	S	R	S	R	S	R	S	files
Osage City High School											
1*	82	77	55	81	66	84	77	72	208	314	99
2*	64	64	54	80	61	79	68	66	247	289	97
3*	65	65	39	66	63	81	66	65	233	277	95
4*	68	67	31	59	37	57	71	68	207	257	89
5*	56	59	37	64	48	67	56	58	187	248	89
6	71	69	23	52	42	62	71	68	207	251	89
7	35	45	9	38	31	52	37	45	112	180	37
8	40	48	12	41	38	58	29	40	119	187	44
9*	32	42	11	40	12	35	26	38	81	155	13
10	51	56	20	49	25	46	42	49	138	200	58
11*	37	46	14	43	31	52	35	44	117	185	42
12	33	43	12	41	22	44	34	43	101	171	27
13	34	44	12	41	32	53	35	44	113	182	39
14*	28	40	22	51	32	53	32	42	114	186	43
15*	30	41	27	55	28	49	27	39	112	184	41
16*	39	47	25	53	33	54	50	54	146	208	65
17*	36	45	24	53	31	52	48	53	139	203	61
18	37	46	21	50	22	44	24	36	104	176	32
19	31	42	19	48	20	42	21	35	91	167	23
20*	36	45	27	55	29	50	38	46	130	196	54
21*	35	45	22	51	21	43	36	45	114	184	41
22*	37	46	28	56	37	57	45	51	147	210	66
23	46	52	24	53	30	51	47	52	147	208	65
24	95	86	45	71	55	74	84	77	279	308	99
25*	51	56	14	43	22	44	40	48	127	191	48
26	69	68	21	50	34	55	60	61	184	234	83
27	41	49	13	42	33	54	45	51	132	196	54
28*	52	56	24	53	36	56	54	56	166	221	75
29	41	49	18	47	30	51	46	52	135	199	57
30	31	42	18	47	34	55	30	40	113	184	41
31*	44	51	23	52	42	62	53	56	162	221	75
32*	45	51	27	55	40	60	38	46	150	212	68
33*	47	53	27	55	36	56	41	48	151	212	68
34*	42	49	34	62	31	52	27	39	134	202	60
35*	42	49	18	47	22	44	50	54	132	194	51
36*	43	50	18	47	34	55	58	60	153	212	68
37	45	51	18	47	30	51	50	54	143	203	61
38*	41	49	27	55	30	51	39	47	137	208	65
39*	33	43	23	52	38	58	41	48	135	201	59
40*	55	58	21	50	55	74	68	66	199	248	89
41*	25	38	12	41	28	79	23	36	88	164	21
42	39	47	22	51	27	48	38	46	126	192	49
43	58	61	33	61	37	57	46	52	174	231	81
44*	42	49	25	54	33	54	48	53	148	210	66
45*	47	53	15	44	39	59	58	60	159	216	72
46	44	51	24	53	28	49	36	45	132	198	56
47	50	55	7	36	37	57	57	59	151	207	64

Table 6. (cont.).

Case no.	:English and: Literature		:Mathematics:		:Science:		:History and: Social Sci.:		Total		:Total : % :files	
	R	S	R	S	R	S	R	S	R	S		
Burlingame High School												
48	30	41	15	44	17	40	34	43	96	168	24	
49	20	34	14	43	19	41	33	43	86	161		
50	66	66	29	57	29	50	56	58	180	231	81	
51*	55	58	29	57	42	62	54	56	180	233	82	
52	63	64	16	45	41	61	71	68	191	238	85	
53*	47	53	45	71	50	69	39	47	181	240	85	
54*	57	60	40	67	49	68	64	64	210	259	92	
55*	39	47	22	51	33	54	35	44	129	196	54	
56*	37	46	26	55	28	49	39	47	130	197	55	
57	40	48	14	43	20	42	28	39	102	172	28	
58	28	40	29	57	15	38	28	39	100	174	30	
59*	28	40	14	43	24	45	39	47	105	175	31	
60	71	69	34	62	53	72	62	62	220	265	93	
61*	35	45	21	50	35	55	45	51	136	201	59	
62*	40	48	24	53	45	65	52	55	161	221	75	
63	39	47	11	40	17	40	42	49	109	176	32	
64*	73	71	39	66	36	56	87	79	235	272	94	
65*	55	58	47	73	62	80	64	64	228	275	95	
66	33	43	22	51	35	55	25	37	115	186	43	
67	38	47	25	54	26	47	37	45	126	193	50	
Scranton High School												
68*	51	56	46	72	34	55	51	55	182	238	85	
69*	30	41	25	54	25	46	43	50	123	191	48	
70*	31	42	25	54	25	46	25	37	106	179	36	
71	22	36	30	58	20	42	27	39	99	175	31	
72	33	43	19	48	18	41	25	37	95	169	25	
Carbondale Rural High School												
73	50	55	24	53	36	56	53	56	163	220	75	
74	42	49	18	47	35	55	39	47	134	198	56	
75	42	49	19	48	26	47	38	46	125	190	47	
76	35	45	15	44	32	53	39	47	121	189	46	
77	36	45	19	48	26	47	28	39	109	179	36	
78*	34	44	10	39	27	48	28	39	99	170	26	
79*	30	41	9	38	13	36	25	37	77	152	11	
80	30	41	12	41	30	51	19	33	91	166	23	
Overbrook Rural High School												
81	72	70	21	50	32	53	55	57	180	230	81	
82*	27	39	24	53	42	62	48	53	141	207	64	
83*	61	62	52	78	50	69	61	62	224	271	94	
84	17	32	11	40	21	43	22	35	71	150	10	
85*	38	47	13	42	17	40	37	45	105	174	30	
86*	55	58	49	75	46	65	56	58	206	256	91	
87*	23	26	13	42	19	41	25	37	80	156	14	

Table 6. (cont.).

Case no. :	:English and:		:Mathematics:		:Science:		:History and:		:Social Sci.:		:Total		%
	R	S	R	S	R	S	R	S	R	S	R	S	
88*	25	38	18	47	19	41	47	52	109	178	35		
89	34	44	13	42	23	45	32	42	102	173	29		
90	33	43	2	32	21	43	26	38	82	156	14		
91*	77	74	20	49	42	62	85	78	224	263	93		
92*	41	49	14	43	32	53	36	45	123	190	47		
93*	33	43	13	42	25	46	27	39	98	170	26		
94*	49	43	12	41	23	45	46	52	130	192	49		
95	40	48	26	55	30	51	30	40	126	194	51		
96	26	38	17	46	25	46	28	39	96	169	25		
97	39	47	18	47	16	39	25	37	98	170	26		
98*	26	38	23	52	21	43	30	40	100	173	29		
99*	47	53	22	51	43	63	51	55	163	222	76		
100	48	54	11	40	25	46	36	45	120	185	42		
101*	50	55	27	55	38	58	52	55	167	223	77		
102	37	46	23	52	37	57	38	46	145	201	59		

Lyndon High School

103*	39	47	22	51	0	25	0	20	61	143	6		
104	77	74	45	71	59	77	81	75	262	297	98		
105*	20	34	15	44	21	43	27	39	83	160	18		
106	59	61	23	52	40	60	66	65	188	238	85		
107	54	58	29	57	38	58	54	45	166	224	77		
108	50	55	39	66	33	54	50	54	172	229	80		
109	42	49	9	38	18	41	26	38	95	166	23		
110*	51	56	37	64	41	61	54	56	183	237	84		
111*	56	59	29	57	24	45	44	50	153	211	67		
112	26	38	22	52	29	50	30	40	108	180	37		
113*	60	62	32	60	37	57	61	62	248	190	86		
114*	26	38	17	46	30	51	36	45	109	180	37		
115*	30	41	14	43	36	56	31	41	111	181	38		
116	53	57	31	59	33	54	42	49	159	219	74		
117	44	51	21	50	32	53	31	41	128	195	53		
118	34	44	14	43	23	45	22	35	93	167	23		
119	27	39	11	40	20	42	25	37	83	158	16		
120*	18	33	9	38	23	45	37	45	87	161	18		
121*	54	58	36	64	44	64	62	62	196	248	89		
122	34	44	29	57	14	37	29	40	106	178	35		
123	56	59	39	66	35	55	51	55	181	235	83		
124*	42	49	37	64	46	65	49	54	174	232	82		
125	32	42	18	47	21	43	25	37	96	169	25		

Melvern Rural High School

126*	37	46	5	35	20	42	26	38	88	161	18		
127*	41	49	39	47	50	55	49	54	179	205	63		
128*	27	39	17	46	37	57	31	41	112	183	40		
129*	17	32	10	39	21	43	17	32	65	146	8		
130*	34	44	16	45	31	52	27	39	108	180	37		

Table 6. (concl.).

Case no.	:English and: Literature		:Mathematics:		:Science		:History and: Social Sci.:		Total		:Total %	
	R	S	R	S	R	S	R	S	R	S	files	
131*	35	45	21	50	37	57	28	39	121	191	48	
132	25	38	14	43	18	41	15	30	72	152	11	
133	22	36	9	38	18	41	22	35	71	150	10	
134*	29	40	24	53	28	49	36	45	117	187	44	
135	19	34	18	47	18	41	24	36	79	158	16	
136*	17	32	15	44	16	39	23	36	71	151	11	
137*	24	37	16	45	14	37	20	34	74	153	12	
138	25	38	11	40	11	35	22	35	69	148	9	
Quenemo Rural High School												
139*	19	34	13	42	20	42	28	39	80	157	15	
140	53	57	35	63	40	60	61	62	189	242	86	
141*	34	44	24	53	25	46	27	39	110	182	39	
142	21	35	16	45	11	35	18	32	66	147	8	
143*	22	36	13	42	19	41	27	39	81	158	16	
144*	32	42	13	42	26	47	40	48	111	179	36	
145*	20	34	21	50	34	55	44	50	119	189	46	
146*	34	44	41	68	30	51	36	45	141	208	65	
147*	30	41	34	62	40	60	40	48	144	211	67	
148	50	55	43	69	37	57	52	55	182	236	84	
149*	66	66	59	84	65	83	73	69	263	302	98	
Olivet High School												
150*	18	33	13	42	16	39	15	30	62	144	7	
151*	19	34	13	42	16	39	15	30	65	145	7	
Michigan Valley Rural High School												
152*	50	55	44	70	32	53	49	54	175	232	82	
153*	20	34	17	46	26	47	24	36	87	163	20	

* = male

R = raw score

S = standard score

Form for summary of scores taken from answer sheet for Iowa
High School Content Examination.

	:Time (min.): Possible score	
English and Literature	20	100
Mathematics	20	60
Science	15	75
History and Social Studies	20	100
Total	75	335

Table 7. Distribution and medians of total standard scores made by boys and girls in Iowa High School Content Examination.

Standard scores	Boys	Girls	Total	%-iles
305 - 314	1	1	2	100
295 - 304	1	1	2	99
285 - 294	1	-	1	98
275 - 284	2	-	2	97
265 - 274	2	1	3	95
255 - 264	3	1	3	93
245 - 254	4	1	5	90
235 - 244	3	5	8	85
225 - 234	3	5	8	80
215 - 224	6	3	9	75
205 - 214	12	2	14	70
195 - 204	7	8	15	50
185 - 194	11	8	19	46
175 - 184	11	9	20	40
165 - 174	4	13	17	25
155 - 164	9	4	13	16
145 - 154	5	5	10	6
135 - 144	2	-	2	1
Total	87	66	153	
Medians	196.8	187	192	

Table 8. Distribution and medians of standard scores made by boys and girls by sections or subjects in Iowa High School Content Examination.

Score	English and Literature			Mathematics			Science			Social Sciences		
	Frequency											
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
85 - 89	-	1	1	-	-	-	-	-	-	-	-	-
80 - 84	-	-	-	3	-	3	4	-	4	-	-	-
75 - 79	1	-	1	2	-	2	1	1	2	2	2	4
70 - 74	2	2	4	4	2	6	1	2	3	1	-	1
65 - 69	3	4	7	4	3	7	7	-	7	5	3	8
60 - 64	4	3	7	7	3	10	9	4	13	7	3	10
55 - 59	13	9	22	11	7	18	16	12	28	10	6	16
50 - 54	8	5	13	22	14	36	15	15	30	16	6	22
45 - 49	21	17	38	11	15	26	15	10	25	17	13	30
40 - 44	17	14	31	18	17	35	12	17	29	6	11	17
35 - 39	8	8	16	5	4	9	6	5	11	18	19	37
30 - 34	9	3	12	-	1	1	-	-	-	4	3	7
25 - 29	1	-	1	-	-	-	1	-	1	-	-	-
20 - 24	-	-	-	-	-	-	-	-	-	1	-	1
Total	87	66	153	87	66	153	87	66	153	87	66	153
Medians	46.5	46.9	46.7	51.7	48.2	50.3	52.7	49.8	51.3	58.8	44.5	46.5
Median*			48			48			48			49

* Median or 50 percent equivalent of norms of Iowa High School Content Examination.

placed upon mathematics and science during the war period may have bearing on the differences in these scores. Undoubtedly, the fact that only the three largest schools, Osage City, Lyndon, and Burlingame, offer English electives accounts in part for the poor showing, also. It was noted in checking over the tests that the questions on literature were the ones most often omitted or incorrectly answered. It is evident that more emphasis could be placed upon instruction in the fields of English and social science in Osage county.

From the table it can be seen that the girls did not make a favorable showing, exceeding the boys by only .4 of a point in English, while falling below them by 3.5 in mathematics, 2.9 points in science, and 4.3 points in social science.

No separate norms for boys and girls were published for the Iowa High School Content Examination but Dr. Joseph E. Avent (1, p. 73-76), in a report of a state-wide testing program in Tennessee, gave medians for boys and girls and a comparison is shown below.

	<u>English</u>		<u>:Mathematics</u>		<u>:Science</u>		<u>:Social Sci.</u>	
	<u>:Boys</u>	<u>:Girls</u>	<u>:Boys</u>	<u>:Girls</u>	<u>:Boys</u>	<u>:Girls</u>	<u>:Boys</u>	<u>:Girls</u>
Tennessee	50	48	54	48	51	44	50	44
Osage Co.	46.5	46.9	51.7	48.2	52.7	49.8	48.8	44.5

This gives the Osage county girls a favorable showing in comparison with the Tennessee girls but shows the Tennessee boys made higher scores than the Osage county boys in all fields except science.

Tables 9 and 10 show comparisons of the schools in the county. In Table 9, the medians of the boys and the girls and of both are given in each of the four fields. A study of the table reveals the relative strength and weaknesses of the individual schools. The policy of this study was not to be critical of any one school system but this comparison is made rather to discover existing conditions.

These tables show an answer in part to the oft-discussed question as to whether the size of the school makes any difference in the achievement of the students. In every field the schools of the county with the larger enrollment equalled or exceeded the median norm. For instance, in English, Osage City and Lyndon high schools led the county exceeding the norm by one point; in mathematics Burlingame led the county exceeding the norm by 6.5 points; in science and social science Osage City again led the county exceeding the median norm by 6 points and 3 points, respectively.

Table 10 shows the rank of these schools by the medians of the total standard scores. It can be seen that this ranking almost parallels their ranking by enrollment.

These larger high schools have many advantages with which the smaller ones cannot compete. The most important advantages from the standpoint of achievement are: a larger and probably more qualified teaching staff, curricula that meet the diversified needs of the students, and even more extensive extracurricular activities to hold the interest and develop personal-

Table 9. Medians for the high school seniors in the separate schools of Osage county, Iowa High School Content Examination.

School	English and			Mathematics			Science			Social Sciences		
	Literature											
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Osage City	49	49	49	53	48	51	54.5	52	54	52	49	51
Michigan Valley	44.5	0	44.5	58	0	58	50	0	50	45	0	45
Scranton	42	39.5	42	54	53	54	46	41.5	46	50	38	39
Olivet	33.5	0	33.5	42	0	42	38	0	38	30	0	30
Quenemo	41.5	55	42	51.5	63	53	49	57	51	46.5	55	48
Lyndon	48	51	49	54	52	52	53.5	53	53	47.5	41	45
Overbrook	49	46	47	49	46	47	53	46	46	52	40	45
Carbondale	42.5	47	43	38.5	47.5	45	42	52	49.5	36	46.5	42.5
Melvern	40	37	38	45	41.5	45	49	41	42	39	35	36
Burlingame	50.5	47	47.5	69	44.5	54.5	56	53	53.5	53	44	48

Table 10. Medians by rank of the total standard scores of the separate schools of Osage county.

School	:	Boys	:	Girls	:	Total
Osage City		209		198		203
Burlingame		227		181		199
Lyndon		196		195		195
Quenemo		185.5		236		189
Overbrook		192		173		187.5
Scranton		191		172		181
Carbondale		161		189.5		180
Melvern		180		151		158
Michigan Valley*		197.5				
Olivet*		144.5				

* The two schools not ranked were omitted because the membership of each senior class was only two boys.

ity. In recent years in Kansas, the question of Reorganization and Consolidation has emphasized the limits of the small high school. But this is not a new problem. Roemer (14, p. 302-704) states "One of the biggest problems confronting American secondary education is the organization and administration of the small high school." He enumerates the weaknesses of the small high school: excessive teaching load, lower standards of teacher qualification, poor distribution of teacher assignment; limited, poorly arranged and ill-balanced curricula; poor equip-

ment and consequent poor quality of instruction; not enough students to foster activities for diversified types of interest.

He goes on to say:

The crux of the whole matter is that nowhere in the economy of our educational thinking can we justify the financial outlay necessary to the bringing of these conditions up to standard under our present organization. By eliminating a great number of these useless high schools thru consolidation, or through the inauguration of some such scheme as the Illinois community high school plan, or by establishment of more junior high schools to feed centrally located and well-organized senior high schools, can this problem be solved.... Progress will come in no other way.

The unequal valuation of the high school districts keeps the smaller high school from maintaining the standards of the larger high schools. Gaumnitz (7, p. 732), in a summary of a study of small high schools in Oregon, states:

It is very difficult in many cases to secure an economical working situation as regards the pupil-teacher ratio, with the result that most small schools operate with an exceedingly small number of pupils per teacher, thus producing a very high per capita cost.

In Kansas because of the school aid apportionment of \$175 per pupil, the enrollment of the small high school is often kept up regardless of the quality of work the student does. This, too, might account for the less desirable showing made by students of the smaller high school in achievement in general.

But the fact that the larger school may be the better one is not the sole factor of advantage. Perhaps the students with which the school must work might be on a higher level of ability. It has been noted that the larger school often drops the weak-

er student. Sometimes parents and students, themselves, recognize the greater opportunities of the larger school and deliberately withdraw from the smaller school to attend the larger one on that account. It is not an uncommon occurrence nor one that can be criticized when a student seeks the institution offering him distinct advantage. In addition, one might note that probably more college-bred parents are to be found in larger towns. Also, more students may come from homes with a higher status financially. Such conditioning factors would probably tend to affect the rating of the student group of the larger school. Environment and inherited capacity have been recognized as determining factors in education. Bingham (2, p. 39) states:

To be sure, inherited capacities make greater contribution than environmental influences to the ultimate outcome. We may agree with Barbara Burks whose summary of the scientific evidence led to the conclusion that probably close to 75 or 80 per cent of I Q variance is due to the innate and inheritable causes; that about 17 per cent is due to differences in home environment and that home environment in rare cases may account for as much as 20 points increment above the expected, or congenital, level.

Tables 11 and 12, to conclude the study of the results of the Iowa High School Content Examination, show a comparison of the results obtained from the use of the test on the Osage county seniors, the results obtained in the Tennessee testing program, and the norms established for the tests as published in the Examiner's Manuel.

Table 11. A comparison of medians by subjects.

	: English			: Mathematics			: Science			: Social Science		
	:Boys	:Girls	:Total	:Boys	:Girls	:Total	:Boys	:Girls	:Total	:Boys	:Girls	:Total
Iowa High School Content Examination	-	-	48	-	-	48	-	-	48	-	-	49
Tennessee State Testing Program	50	48	49	54	49	51	51	44	47	50	44	46
Osage county seniors, 1947	47	47	47	52	48	50	53	50	51	49	46	47

This table furnished evidence for an estimate of the scholastic standing of the seniors tested for the purpose of this study. It shows the extent to which the mastery of the content of each field has been successful.

Table 12 gives an over-all evaluation of the general mastery of the subject matter content of all fields together.

Table 12. Medians of total standard scores.

	: Boys	: Girls	: Total
Iowa High School Content Examination	-	-	193
Tennessee State Testing Program	201	189	193
Osage county seniors, 1947	196.8	187	192

It is to be noted that the Osage county seniors exceeded the norms in the fields of mathematics and science and are only one point below the norm of the total standard scores. The Examiner's Manual (20) states:

A probable error is 6.22 on the total standard scores for all four sections of the examination which means that the total standard score of 193 (50th percentile) might fall as low as 187 or go as high as 199 due to chance factors.

Therefore, it can be stated that the Osage county seniors are apparently "right in line" with the average high

school student as revealed in the results secured from the use of this test.

Probably some credit for this standing can be attributed to the certification and tenure record of the teachers of the county, as shown in the reports of the county superintendent for the four years these students were in high school. Nineteen teachers of the total of 216 high school teachers taught with emergency certificates and 9 of the 10 schools had the same administrator for the 3 or 4 years in succession. The change in all teachers was noticeably small.

To add more significance to the comparison made with the Tennessee testing program, the fact must be noted that the scores of only the white boys and girls were used from the report.

A ranking of the states according to their respective over-all performance in education was made by Hughes and Lancelot (9, p. 21-39). According to the criteria of their study, they place Tennessee thirty-third and Kansas second. This contrast is not so great when it is known that both states are credited with high efficiency in spite of a handicap of below-average ability. In reality, it is to the credit of Tennessee that the median of the scores obtained by the white students equals that of the norm in the Iowa High School Content Examination.

A correlation of the scores secured in the test of mental ability with the scores secured in the test of achievement

was made in concluding the study. The resulting coefficient of correlation was $.806 \pm .019$. This showing would indicate that in general the achievement of the group tested paralleled its ability. This fact together with the fact that in both cases the Osage county group approached very closely the standard norm for high school students in the tests, would indicate they are working up to capacity as well as students in general over the country. The student whose mental ability is not as high according to the test showing as his achievement might have been ill, distraught, or even disinterested at the particular time of the testing. The student whose mental ability is shown by the testing to be higher than his achievement may have been doing too much work in addition to school work, may have had too many outside interests, or might not have been interested enough in his work. It is interesting to note from the chart that only eight cases of the entire group of 153 lie in the first and third quadrants and that no case can be designated as an outstanding extreme.

A summary of the ranking of the separate schools of the county as indicated by the medians made in the two tests is shown in Table 13.

It is recognized that predictions of probable success should be left to specialists in that field. But the standardized test is one of the most important devices for evaluating aptitude and achievement. McCall (10, p. 227) states: "Standardized educational and psychological tests, inaccurate

though they may be, are rapidly becoming recognized as the best means of educational service." And similarly, Odell (12, p. 528), in discussing prognosis and guidance, states also that intelligence test scores and standardized test scores are among the chief items of information upon which predictions may best be made.

Table 13. A comparison of the ranking of the separate schools in the test of aptitude and the tests of achievement.

School	:Median in: :aptitude	: Rank:	: Median in : :achievement:	: Rank:	: Difference
Michigan Valley	41	1	197.5	3	-2
Burlingame	40.5	2	199	2	0
Osage City	40	3	203	1	2
Lyndon	37	4	195	4	0
Overbrook	36.5	5	187.5	6	-1
Quenemo	36	6	189	5	1
Scranton	34	7	181	7	0
Carbondale	29.5	8	180	8	0
Melvern	25	9	158	9	0
Olivet	21.5	10	144.5	10	0

Strickland (15, p. 39, 89), in a research study of the intelligence of high school graduates, found that "Nine-tenths of those successful in college come from the upper half of high school graduates in ability, and 80% of them come from

the upper 40% of high school graduates." Dr. Nelson (11), co-author of the Henmon-Nelson Test of Mental Ability and Dean of the Faculty at Iowa State Teachers College, stated that they found that "a student with a score under 50 on a college test would probably not be a particularly good college risk".

Guided by the statements of these two men, and the comparison of the results obtained in the Henmon-Nelson Test of Mental Ability and the Iowa High School Content Examination with the norms established for these tests, one can make this estimate of probable success for college for the seniors of Osage county: approximately 32 percent of the girls and 49 percent of the boys of this group were college material.

But this does not mean that one can say any one or all of this select group can positively carry college work. Garrett (6, p. 494), in the summary of a report on the use of the Ohio State Psychological Examination as an instrument for predicting success in college, says:

It is the common assumption that if the student's quality point average is in the upper half of the graduating class the chances for success in college are even, providing the student likes to study and is willing to do so. A combination of intelligence and effort is essential for success.

The scholastic requirements set up by the colleges are sufficiently high to discourage the laggard. Regardless of the intelligence of the individual, diligent study and application are necessary for success. The home room teacher must weigh the advisability of urging a student to attend college. The cost of a year of failure in college is high both in terms of money and the effect that failure may have on the personality of the student.

It must be recognized that ability is not the only requisite for a continuation of formal education successfully. In addition, it must be taken into consideration that there is a marked difference in the many colleges and universities throughout the country. Not all of them have the same scholastic requirements by a surprisingly marked degree. This fact was stated and verified by additional report in the conclusions to an account of a group of studies conducted over a period of six years at the University of Minnesota. The studies were made in an attempt to show the relationship between scholastic success in college and previous records, tests, etc. Douglass (4, p. 184), writer of the report, makes this assertion:

"There are even greater differences among institutions." To verify this he gives a table reprinted from Thurstone (17, p. 271-277) showing the scores made at different institutions on the American Council of Education Intelligence test as published in the Educational Record. The data showed that there is a marked difference in the types of students in the various colleges. He completes his comments on the facts revealed with this paragraph:

The principal conclusion is that it is not only futile but dangerous to attempt to advise categorically any given individual whether or not he should go to college or even whether he could probably make an average scholastic record. As much apparently depends upon the institution he enters and the curriculum he follows as on general mental ability.

Thus it must be recognized that specific guidance is an essential factor in helping the student answer the question,

"Can I succeed in college?" The student with the high scores is not generally the one who needs as much guidance as the one who is more on the average in accomplishment. He may need help in deciding on a vocation and attendant courses of study but the average student requires encouragement and caution at the same time. Speaking of this type of student as a group, Garrett (6, p. 494) says:

It should be pointed out to them that they may succeed in college, provided: they pick their college with care, they select carefully their college courses, they study both longer and more efficiently than the average of their classmates, they take a reduced college load extending their college attendance over a period of five years or more, and they refrain from anything such as work for self-support, athletics, and extra-curricular activities, which may interfere with their studies.

Such advice in guidance would probably discourage all but those who have a "strength of purpose" and a "will to do". But the urge and desire of attainment is above all the fundamental quality necessary to the success of an individual in any undertaking. This principle applies to the pursuit of learning as well as any other endeavor.

CONCLUSIONS

1. In the Henmon-Nelson Test of Mental Ability, the scores made by the Osage county seniors, 1947, ranged from 13 to 69 out of a possible 90.

2. The median of the distribution of the scores made in the Henmon-Nelson Test of Mental Ability was 37.7.

3. In the Iowa High School Content Examination, the total standard scores made by this same group ranged from 144 to 314 out of a possible 335.

4. The median of the distribution of the scores made in the Iowa High School Content Examination was 192.

5. The Osage county group ranked 6.3 below the median norm, 44, established in the Henmon-Nelson test. Since the college level form of the test was used, this probably should not be considered low.

6. The Osage county group was shown to be relatively equal in performance on the Henmon-Nelson test to other high school groups from schools of approximately the same enrollment.

7. Thirty-two percent of the Osage county group equalled or exceeded the median norm established for the Henmon-Nelson Test of Mental Ability.

8. The Osage county group made a creditable showing in achievement as evidenced by results of the Iowa High School Content Examination which showed they ranked one point below the median norm in total standard scores.

9. The size of the school showed a noticeable relationship to the scores obtained in the achievement test especially. The higher scores were made by students from the larger schools in nearly every instance.

10. There was not a marked difference in favor of the boys in the results obtained from either test.

11. The girls exceeded the boys by .4 in the English section of the Iowa Content Examination.

12. The results of the scores made in the various sections in the achievement test revealed that the Osage county group exceeded the median in mathematics and science by 2 points and 3 points, respectively.

13. The same group fell below the median in English and social science by one point and 2 points, respectively. This would indicate that there is not enough emphasis placed upon the instruction in these two fields.

14. A correlation of the scores made in the aptitude and the achievement tests showed a coefficient of correlation of $.806 \pm .019$.

15. This correlation of the scores made in the test of aptitude and the test of achievement should indicate that the achievement of this group is on a level with their mental ability. This fact together with the fact that in both cases the Osage county group approached very closely the standard norm for high school students in the tests, would indicate they are working up to capacity as well as students in general over the country.

16. Approximately 32 percent of the girls and 49 percent of the boys have the ability to carry college work as judged from the results of the tests.

17. It might be suggested that the higher the test scores earned by the student, the more likely his chance of success

in continuing formal education.

18. The group nearer the average should be warned of individual libitations as well as advised to be careful in selecting the college and the courses they should follow.

19. The individual scores made in the separate sections of the Iowa Content Examination furnish a guide by which the student can learn of his strength and weakness in any of the four basic fields of education.

20. Interests, past records in school, and personality should be as much a determining factor in decision as results of test scores that indicate ability and achievement.

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APPENDIX

X represents scores on achievement test.

Table 14.

Y represents scores on mental ability test

	135-144	145-154	155-164	165-174	175-184	185-194	195-204	205-214	215-224	225-234	235-244	245-254	255-264	265-274	275-284	285-294	295-304	305-314		f_y	y'	$f_y y'$	$f_y y'^2$	$f_{xy} x'$	$y' f_{xy} x'$
71-75																									
66-70													1				1	1		3	6	18	108	30	180
61-65																	1	1		2	5	10	50	23	115
56-60										1	2		2	1						6	4	24	96	36	144
51-55						1			1	1	5	2		1	2	1				14	3	42	126	80	240
46-50	1		1			2	3	3	2	4	2	2								20	2	40	80	45	90
41-45						6	1	3	2				1							13	1	13	13	20	20
36-40				3	7	2	7	5	4	2		1								31	0	0	0	30	0
31-35			3	5	7	4	1	1												21	-1	-21	21	-23	23
26-30		2	3	4	1	2	2	1												15	-2	-30	60	-22	44
21-25		3	3	2	1	1		1												11	-3	-33	99	-24	72
16-20	1	3	2	3	4	1														14	-4	-56	224	-33	132
11-15		2	1																	3	-5	-15	75	-11	55
f_x	2	10	13	17	20	19	14	14	9	8	9	5	4	2	2	1	2	2	153						
x'	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12							
$f_x x'$	-10	-40	-39	-34	-20	0	14	28	27	32	45	30	28	16	18	10	22	24	151						
$f_x x'^2$	50	160	117	68	20	0	14	56	81	128	225	180	196	104	162	100	242	288	2191						
$f_{xy} y'$	-2	-35	-29	-31	-28	-2	2	3	9	15	27	10	15	7	6	3	11	11	81						
$x' f_{xy} y'$	10	140	87	62	28	0	2	6	27	60	135	60	105	56	30	121	132	115	1115						

Correlation Chart

$$r_{xy} = \frac{a}{\sqrt{bc}}$$

$$a = 1115 - \frac{(151)(-8)}{153} = 1122.895$$

$$b = 2191 - \frac{22801}{153} = 2041.974$$

$$c = 952 - \frac{64}{153} = 951.582$$

$$r_{xy} = \frac{1122.895}{\sqrt{1943105.7028}} =$$

$$\frac{1122.895}{1393.1} = .806 \pm .019$$