

A STUDY OF THE IMPROVEMENT OF THE NINTH GRADE
IN THE FUNDAMENTAL PROCESSES

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A STUDY OF THE IMPROVEMENT OF THE NINTH GRADE
IN THE FUNDAMENTAL PROCESSES

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1933

Submitted to the School of Education
Oklahoma Agricultural and Mechanical College
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
1937

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Preface

The demands of our modern civilization upon education are increasing in complexity and scope. Many problems that arise for the youngster going from school at present were unheard of even fifteen or twenty years ago. As a result, many attacks have been made on the present educational system, which cannot change as quickly as living conditions, or at least it has not. Education must, however, cope with the situation sooner or later and is making progress. The new trends must necessarily be toward a broader program with the learning of the fundamentals still a necessity, but one that cannot be the primary function of the whole school activity.

Under the present financial condition of the schools of Oklahoma, many must of necessity have a minimum program weak from the standpoint of broadened activities. We must, then, try to make the best of what we have; when we see a value that may be used, we should immediately take advantage of it. This thesis attempts to call attention to such a value. Perhaps it is primarily the problem of the teacher, but an attempt is made to discuss it from the viewpoint of the superintendent or principal, one of whom has to act in the capacity of supervisor in a large percentage of our schools.

To be sure, there are many who will doubt the validity

of such a study and will disagree with even the idea connected with the results, but it is a theory in which the writer sincerely believes and he hopes it will provoke thought along this line.

Acknowledgments

There are many to whom I am indebted for aid in the preparation of this thesis, but to these in particular would I like to express my sincere appreciation:

To Mr. M. J. Hale, Superintendent of Schools, McAlester, Oklahoma, and Mr. R. E. Crudup, principal of McAlester High School for their coöperation in effecting the administration of testing and the gathering of data.

To Mr. George A. Pierce, principal of McAlester Junior High School for supervision and administration of testing and other data.

To Mr. C. H. Marshall, for administering tests to the high school group.

To Mr. B. C. Dyess, for his helpful criticism and suggestions.

And to Dr. M. R. Chauncey, for his guiding influence and invaluable suggestions throughout the process of the work. His time and effort spent is appreciated to the fullest.

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Chapter I
Introduction

The Study herein described is an outgrowth of observations made by the writer both as a student and a teacher. The general idea came when as a student teacher searching for aids and stimulations to learning high school algebra, he made individual and small group experiments along this line. Later on in actual situations similar ones were made.

The principal contention is that there is accelerated improvement in the fundamental subjects in the ninth grade. It is based upon the very logical conclusion that an immediate goal or use for a thing gives impetus to a more diligent learning effort. For example, to be successful in algebra the student must understand thoroughly the fundamental arithmetic operations, the details of which have been lost in the more complex operations of the seventh and eighth grade arithmetic.

It is further contended¹ that if in correlating the arithmetic with the algebra (or whatever the subject might be) the teacher would have as a sort of tacit objective the teaching of the fundamentals, the improvement

1. This contention is not proven experimentally in the thesis, but is mentioned as a feasible suggestion and is discussed from the standpoint of need for such a thing.

would be still more marked. This statement must not be construed to mean that much time should be spent in drill of these tool subjects, nor that the real teaching of them should be omitted until the student reaches this level. On the contrary, the skilful teacher can make the need for fundamentals so vital that the student will do his own drilling.

Even though the students graduated to college or life from the secondary schools are better prepared to meet the demands than in former years, there is still a lack on the part of the majority of them in the fundamentals. This lack is shown by college entrance examinations and marks, as well as everyday contacts with the average person who never enters college. Dewey says,²

"Our contention and aim affords a value for both college and life. And Colleges say they can't add or use correct language; Business says they can't add or read intelligently. In other words, a lack of knowledge in the fundamentals is too evident."³

One reason for all these inadequacies is the lack of motivation at the time these things are supposed to be learned. When the children from the primary through the eighth grade study, they do it by handling objects,

2. John and Evelyn Dewey, *The Schools of Tomorrow*, p.143.

3. Perhaps Mr. Dewey does not believe this indictment true, but Business and Colleges do, and, after all, they are the ones who hire or use the products of secondary schools. It is true, also, that the attitude of both toward the secondary schools should be changed, but it hasn't been; and this thesis attempts to deal with the real and practical situation and not the ideal theory.

or are made purveyors of information about objects or ideas much above their comprehension. These are excellent ways to make impressions of the fundamental operations, which may take on a fuller meaning as maturation proceeds; therefore, something must of necessity be done to make this fuller meaning fuller. The place to do it without use of a great deal of extra time is in the subjects of the ninth grade. Says Rousseau,

"It is not enough to use the senses in order to train them; we must learn to judge them by their means--we can not really see, hear, or touch except as we have learned. A merely mechanical use of the senses may strengthen the body without improvement of the judgment."

If this is true, the transition period from the mechanical to the philosophical stage must be, logically, the secondary level; the first year or years of it should be carefully guarded and planned so as to have the tools sharpened and in the best condition for use. If you train him to calculate the consequences of what he does and to correct the errors in this calculation by his own experiences, the more he does, the more nearly accurate he will become in his judgments.

The ninth grade in the schools of Oklahoma is right on the brink of what is generally considered the secondary level. In this grade there is a battery of new and varied subjects required, in which may be found a veritable garden for stimulation and motivation toward improvement in the formal subjects just completed in the

preceding eight years.

Subjects taken in more than ninety percent of the ninth grades in Oklahoma are English, Algebra, General Science, Oklahoma History, Civics, and possibly the substitution of Home Economics or a foreign language for one of the last two.⁴

The English course at this level definitely reviews grammar learned in the lower grades and gives them a chance to use it immediately in composition work which is marked specifically for errors in grammar. Book reports are rated for their correct usages of expressions of the child's interpretation of the book. This subject very nearly approaches the carrying out of the central theme of this paper, but it seems that most of the teachers only vaguely realize that there is a real and definite objective to be found here. How much better the results would be if they made one.

Careful observation in several Algebra classes under different instructors has shown that with few exceptions the mechanics of the operations are taught straightforwardly for results without the least semblance of bringing out the elements behind those operations. The students go on working, satisfactorily, all the problems and never know or think what lies beneath.

4. Oklahoma State Department of Education, Annual High School Bulletin, 112K, June 30, 1936.

Evidently this is done, because to show them would take more time and the text as written could not be completed as prescribed--possibly not the teacher's fault, but just an unhappy setup of circumstances. For this, Brown⁵ says,

"His knowledge of arithmetic and mensuration should be universalized in Algebra and Geometry."

The General Science and the Home Economics naturally turn the mind of the student back to everyday happenings in previous years. Here it should be made to turn their minds back to everyday happenings in school as well as at home and other outside situations. A strict correlation can be found with Geography, Hygiene, Arithmetic, and numerous character building aids such as accuracy, dependability, and the actual feeling of success or failure brought out in an experiment in General Science, or preparing certain dishes in Home Economics. These things are actually brought out in these subjects. Practically all of the authorities agree on this as an objective. For instance, Brown,⁶

"His fragments of information concerning natural phenomena are to be run together and worked over into some semblance of a rounded science."

According to Dewey,⁷

5. Brown, The Making of the Middle Schools, p. 114.

6. Ibid., p. 117.

7. Dewey, op. cit., p. 151.

"A girl in the school kitchen is not merely preparing a midday meal to satisfy the imperative wants of her family, as does the average housewife, but she is learning a multitude of other things. In following the recipe, she is learning accuracy, and the success or failure of the dish serves as an excellent measure of the pupil's success. In measuring quantities she is learning arithmetic and tables of measures; in mixing materials, she is finding out how substances act when they are manipulated; in baking or boiling she is discovering some of the elementary facts of science."

In the study of a language and Oklahoma History the same story is true and the elements can be given an immediate use here as advantageously as in the subjects previously described.

In order to attempt to prove, in a measure, the contention that the ninth grade is the place where it becomes conspicuous that there is a marked improvement in the essentials, the following plan will be pursued. A battery of dependable achievement tests is given at the beginning of the school year and a different form of the same tests is given at the close. As an auxiliary measure the same tests are given to a corresponding group of students in the eighth grade. The results and comparisons to be made tell their own story.

The writer realizes that the limitations to the accuracy and validity of the results are many. To get a dependable conclusion, a study of this kind would have to be nation-wide and made to cover nearly all the grades in our public school system. The groups would

have to be carefully analyzed and the study made over a period of several years to get individual comparisons in the several grades.

The chief objective of this paper, however, is not to get an absolute measurement of the situation, but it is to provoke thought on an idea and objective unnoticed by a large percentage of the teachers of the high schools of this country.

Chapter II

Data and Explanations

The writer selected, from the approximately two hundred fifty freshmen in McAlester High School, a group of one hundred students--chosen on the basis of a survey of their school marks in previous years and their attendance through those years in the schools of McAlester. These two bases he considered essential because to get an average group (all grades of marks) to make an experiment of this kind valid in any measure, the background of instruction must be at least similar. To attain this the best possible method is to select those trained in the same system. School marks are the most logical means of determination here and to make them reliable they must come from the same group of teachers. The term "selected" does not mean that the ability or effort of the group is above average. It is definitely an average cross-section, as the data will clearly show.

As an auxiliary comparison he similarly picked fifty persons from the eighth grade level for the same battery of tests. The number is smaller because it is only for comparison, as the main object is a study of the other group. Also, the marks of this grade were such that the group corresponding most closely to the freshmen could be found more conveniently in the smaller number.

The examinations were first given during the week of October 15, 1936, some five weeks after the opening date. This was done in order to allow the students to become familiar with the school room activities and situations after a long summer vacation. Authorities¹ say that a large amount of the learning is dormant after the vacation, but about eighty to ninety percent of the loss is regained in the first three or four weeks.

The last tests were given during the week of May 2, 1937, four weeks before the close of the term, to correspond with the five weeks start given at first.

All tests were given by the instructors under the supervision of the writer. Ample time was allowed for every one to finish the entire test rather than the exact time allotted in the directions for administering the test. This was done because the results of the study depend upon the measurement of ability in these fundamentals, of which time required is not a direct function.

Due to the fact that the time limits were not followed as prescribed for these tests, there must be some means devised for measuring the reliability of the scores. For all practical purposes this change will not affect it greatly, but there is a possible error unless some compensation is afforded.

1. Ruch and Stoddard, Tests and Measurements in High School Instruction, p. 167.

Table I is a compilation of all the total scores as against the school marks for the first semester 1936-37. The marks are given in terms of the point system in which there is a possible mark of four. A counts four; B counts three; C counts two; D counts one; and F counts none.

The findings here show definitely that the higher scores have the higher marks. All the four point averages fall above the one thousand fifty mark in the achievement scores and all the three point averages fall above the one thousand mark in achievement. With few exceptions the two and one point averages are in their respective places. Thus, A, B, C, and D fall right in with the order of the test scores.

Exactly the same is true of the Eighth Grade scores except the scores as a whole run some lower.

Table I

Correlation of the total scores on the achievement tests and the school marks for the first semester--
Ninth Grade

Pupil	Sc.	Mk.	Pupil	Sc.	Mk.	Pupil	Sc.	Mk.
1	1164	4.0	29	1001	2.3	57	929	1.8
2	1116	4.0	30	999	2.0	58	921	1.8
3	1101	3.5	31	997	2.0	59	921	1.8
4	1097	3.9	32	994	2.0	60	920	1.5
5	1089	3.7	33	984	2.1	61	918	1.5
6	1074	4.0	34	978	2.3	62	917	1.5
7	1065	3.5	35	976	2.0	63	916	2.0
8	1062	3.0	36	975	2.0	64	915	1.5
9	1059	3.3	37	975	2.0	65	915	2.0
10	1058	3.0	38	974	2.5	66	910	2.0
11	1054	4.0	39	972	2.0	67	891	1.8
12	1053	3.2	40	971	2.0	68	888	1.9
13	1046	3.5	41	968	2.0	69	884	1.5
14	1039	2.9	42	967	2.3	70	867	1.5
15	1037	3.0	43	967	2.3	71	854	1.5
16	1035	2.5	44	964	2.5	72	841	1.5
17	1028	2.9	45	964	2.0	73	840	1.1
18	1025	3.0	46	963	2.0	74	831	1.5
19	1020	3.0	47	960	2.0	75	831	1.0
20	1017	3.3	48	958	2.0	76	820	1.2
21	1015	3.2	49	957	2.0	77	818	1.2
22	1013	3.2	50	956	2.0	78	814	1.0
23	1012	3.0	51	955	1.8	79	804	1.0
24	1011	2.5	52	940	1.5	80	802	1.0
25	1011	2.3	53	938	2.0	81	787	1.0
26	1007	2.9	54	937	2.3	82	779	1.0
27	1007	2.5	55	935	2.0	83	777	.7
28	1005	2.0	56	934	2.0	84	681	.7

	Mean	Md.	S. D.
Score	956	964	89.0
Mark	2.2	2.3	1.1

Mean Chron. Age--14 years, 7 months

$$r = .915$$

Table II

Correlation of the total scores on the achievement tests and the school marks for the first semester--
Eighth Grade

Pupil	Sc.	Mk.	Pupil	Sc.	Mk.
1	1046	4.0	23	892	2.0
2	1024	3.5	24	883	2.0
3	995	3.8	25	883	2.0
4	992	4.0	26	880	1.5
5	975	4.0	27	870	2.3
6	973	3.5	28	863	1.5
7	972	3.0	29	859	1.5
8	969	3.0	30	856	1.5
9	969	3.0	31	850	1.5
10	966	3.0	32	829	1.5
11	949	3.2	33	825	1.5
12	945	3.7	34	815	2.0
13	935	3.5	35	812	1.7
14	930	3.5	36	784	1.2
15	927	3.5	37	772	1.0
16	918	3.0	38	756	1.0
17	916	3.0	39	743	.7
18	911	2.5	40	733	.5
19	907	2.5	41	732	1.0
20	904	2.5	42	729	1.2
21	900	2.0	43	718	1.0
22	894	2.8	44	676	.7

	Mean	Md.	S. D.
Score	879	893	69.2
Mark	2.3	2.5	.84

Mean Chron. Age--13 years, 1 month

$$r = .896$$

Tables III and IV show the scores for the arithmetic tests for both the first and second examinations. This test contains two parts numbered nine and ten in the battery; one is on arithmetic reasoning, the other on arithmetic computation.

The arithmetic reasoning fills the requirement of testing the real interpretative ability and is not made difficult through mere computation; the problems are so stated that they measure ability to think in quantitative terms without the language function or verbal intelligence factor interfering. Both tests, of course, have excellent arrangement of items in order of complexity and difficulty.

The scores are arranged in the same order (from one to eighty-four and from one to forty-four) that is found in Tables I and II, which represent the order of the total scores from high to low on the first examination. This order will be followed throughout unless otherwise stated.

Table III
Improvement for the Ninth Grade
-- Arithmetic --

Pupil	1st	2nd	Pupil	1st	2nd	Pupil	1st	2nd
1	223	250	29	210	219	57	208	219
2	224	224	30	186	229	58	139	190
3	208	206	31	171	203	59	189	210
4	224	230	32	216	224	60	213	226
5	230	230	33	224	229	61	180	197
6	234	223	34	200	216	62	226	232
7	245	227	35	205	226	63	181	203
8	219	221	36	163	197	64	157	197
9	206	211	37	219	186	65	184	230
10	229	239	38	209	227	66	178	186
11	238	240	39	200	224	67	188	198
12	230	252	40	205	232	68	205	205
13	204	239	41	186	197	69	183	203
14	212	230	42	207	216	70	207	159
15	231	232	43	190	203	71	173	187
16	224	233	44	192	206	72	142	178
17	195	226	45	177	186	73	150	158
18	199	217	46	197	214	74	178	181
19	218	225	47	150	197	75	158	178
20	216	226	48	203	200	76	164	205
21	220	239	49	183	211	77	166	225
22	171	229	50	177	186	78	171	190
23	219	239	51	188	194	79	207	226
24	230	244	52	177	198	80	126	142
25	196	217	53	199	224	81	218	227
26	184	203	54	207	226	82	150	182
27	203	216	55	170	200	83	135	176
28	203	211	56	215	219	84	135	187

	Mean	Md.	S. D.
1st Score	194.6	202	11.3
2nd Score	211	209	9.4

$$r = .915$$

Table III showing improvement for the ninth grade in arithmetic reveals that from the eighty-four cases seventy-six show improvement, two show the same score, and six show a loss.

The pupil who made the highest total score also made the highest arithmetic score. The first thirty-five with only three exceptions made above 210 on the second trial, which is remarkable improvement over the first scores. Many of those at the lower end made above 200 and all show improvement. Generally, the scores follow the curve of natural distribution, but only fairly correlate with total score rankings.

Table IV showing improvement for the eighth grade in arithmetic is arranged in a manner similar to that of Table III. In this group there are twenty-one who improved their scores, three made the same, and twenty showed a loss.² The highest score was not made by number one as in the ninth grade section, but the highest was in the first five. Those who improved seem to lie in groups--those very highest, then a skip to those around the mean, leaving the losses to the second high

2. Naturally, there will be some loss in taking the two tests. But as there is also loss shown for some in the ninth grade, it may be said that that natural amount is exceeded in the eighth grade. Indeed, other factors enter here, but the greatest ones are the short cuts and automatic operations followed in eighth grade arithmetic. This does not mean that teaching automatic operations and short cuts is a defect in method; it is rather a necessity, which has its own function.

group and to the very lowest group.

The distribution of scores is somewhat different for the two groups, but the amount of improvement for the ninth grade group may explain that; 90.5% of the individuals showed improvement compared to 47.7% for the other group.

Table IV
 Improvement for the Eighth Grade
 -- Arithmetic --

Pupil	1st	2nd	Pupil	1st	2nd
1	166	166	23	189	216
2	220	219	24	200	203
3	116	116	25	200	207
4	191	213	26	162	160
5	229	232	27	224	229
6	200	224	28	163	189
7	220	217	29	175	178
8	185	176	30	178	165
9	215	214	31	200	203
10	204	206	32	175	171
11	217	210	33	157	157
12	216	216	34	196	212
13	168	182	35	176	184
14	213	200	36	201	229
15	222	220	37	157	152
16	219	209	38	179	167
17	168	171	39	181	171
18	190	191	40	182	179
19	186	179	41	179	180
20	168	163	42	161	125
21	209	204	43	157	147
22	192	189	44	109	127

	Mean	Md.	S. D.
1st Score	186.7	187	14.7
2nd Score	186.7	185	13.9

$r = .891$

Tables V and VI provide compilation of the reading scores for both examinations in both groups. The test is in two parts, one is paragraph meaning, the other is word meaning.

The test on paragraph meaning is so constructed that a complete reading of every one is necessary for correctly filling in the blanks. The number of possible responses is kept at a minimum.

In the word meaning test, two items are present which are very essential to a reliable test of this kind. Sentences are included whose critical word is harder than the response words, and those in which it is easier. The range of frequency extends from the words in the first hundred to words between the ninth and tenth thousands in difficulty.

Table V
Improvement for the Ninth Grade
-- Reading --

Pupil	1st	2nd	Pupil	1st	2nd	Pupil	1st	2nd
1	228	247	29	226	224	57	176	182
2	221	235	30	207	210	58	197	197
3	233	243	31	205	223	59	198	210
4	223	224	32	217	229	60	175	199
5	226	229	33	197	197	61	196	197
6	209	209	34	201	219	62	199	197
7	207	221	35	197	201	63	108	203
8	213	214	36	205	216	64	195	160
9	224	224	37	191	202	65	177	197
10	207	216	38	210	232	66	192	201
11	228	232	39	195	199	67	189	201
12	205	196	40	196	203	68	205	228
13	204	225	41	196	201	69	201	205
14	226	224	42	209	210	70	189	189
15	203	206	43	201	213	71	191	192
16	212	229	44	199	200	72	194	195
17	207	215	45	201	195	73	173	180
18	213	189	46	192	197	74	205	219
19	203	219	47	194	201	75	187	198
20	194	220	48	204	207	76	173	187
21	218	219	49	189	210	77	188	202
22	212	220	50	208	209	78	165	202
23	196	210	51	188	210	79	198	207
24	201	208	52	192	205	80	175	199
25	215	232	53	205	207	81	172	176
26	209	217	54	184	197	82	155	166
27	221	229	55	215	228	83	173	201
28	207	199	56	195	201	84	180	191

	Mean	Md.	S. D.
1st Score	198.7	201.5	11.1
2nd Score	209.2	209.5	9.9

$$r = .93$$

Table V gives a picture of the ninth grade reading improvement. Seventy-one show improvement, six scored the same, and seven lost. Most of the losses are well scattered, showing a natural tendency.

Pupil number one made the highest score and all the high ranking pupils made substantial scores which allow very good correlation with the total scores.

Table VI shows improvement for the eighth grade reading. There are thirty-four with gains and ten showing losses. The higher scores still fall in the upper ranks, but there are more exceptions here than would be expected. Some of those who made lower total scores made rather high in the reading--a correlation which by certain studies would not be true, but considering individual cases, this relation can easily be explained.

The individual improvement for the two groups here is not so different (84.5% to 77.2%). The ninth grade is still superior.

Table VI
 Improvement for the Eighth Grade
 -- Reading --

Pupil	1st	2nd	Pupil	1st	2nd
1	199	206	23	166	172
2	193	197	24	159	199
3	214	215	25	161	194
4	184	201	26	183	188
5	193	190	27	178	188
6	177	171	28	169	202
7	170	169	29	168	207
8	187	205	30	183	177
9	214	231	31	201	197
10	208	210	32	147	153
11	162	186	33	165	176
12	188	209	34	177	183
13	175	183	35	203	184
14	208	196	36	153	163
15	167	176	37	170	171
16	194	195	38	157	163
17	198	201	39	148	143
18	191	206	40	176	171
19	207	177	41	187	191
20	198	192	42	160	167
21	190	217	43	137	143
22	183	175	44	142	152

	Mean	Md.	S. D.
1st Score	179.3	181.5	12.4
2nd Score	190.8	191.2	11.9

$r = .92$

Tables VII and VIII contain the scores on spelling for both examinations arranged in the same order as the preceding tables.

This test makes use of dictation exercises in which almost every word written by the pupil counts toward his spelling score. Such exercises are much more economical of time than those usually found which include but one critical word to the sentence. As compared with the dictation of isolated words, the sentence method is superior, because it approaches more nearly the conditions of everyday life in which spelling is involved.

The words used were taken from Ayres, Buckingham, Horn-Ashbaugh, and the 7S spelling lists.

Table VII
Improvement for the Ninth Grade
-- Spelling --

Pupil	1st	2nd	Pupil	1st	2nd	Pupil	1st	2nd
1	108	115	29	109	116	57	74	78
2	101	112	30	75	96	58	76	73
3	106	112	31	92	110	59	84	81
4	102	114	32	109	115	60	83	94
5	97	117	33	99	111	61	85	92
6	90	106	34	90	98	62	84	82
7	82	80	35	93	99	63	95	103
8	100	107	36	86	98	64	73	89
9	96	99	37	83	107	65	72	79
10	97	103	38	88	90	66	92	95
11	110	125	39	85	111	67	94	97
12	86	99	40	87	99	68	92	91
13	98	101	41	100	102	69	65	83
14	89	106	42	95	113	70	101	91
15	89	98	43	85	97	71	87	94
16	110	114	44	97	103	72	86	94
17	90	101	45	87	103	73	85	92
18	107	110	46	86	96	74	91	98
19	99	110	47	92	98	75	90	101
20	92	110	48	81	86	76	80	96
21	92	111	49	86	96	77	81	91
22	81	83	50	88	96	78	82	90
23	69	87	51	74	87	79	86	90
24	99	104	52	87	99	80	76	97
25	108	115	53	91	72	81	86	100
26	100	102	54	79	81	82	82	100
27	99	103	55	95	108	83	71	76
28	90	95	56	95	97	84	95	101

	Mean	Md.	S. D.
1st Score	89.8	88.1	12.1
2nd Score	98.4	98.8	11.3

$r = .902$

There are seventy-eight who improved, none made the same, and six showed losses (Table VII).

As is to be expected the persons in the higher ranks again cling substantially to the highest scores, but the lowest ranks do not in this case have the lowest scores, showing rather poor correlation with total scores.

Table VIII indicates twenty-four gaining, one the same, and nineteen losing.

This group shows unusual ability in spelling as compared to the ninth grade. Their scores run proportionately higher than that group. All the higher ranks still hold the larger scores.

Despite the above showing of the eighth grade, the individual improvement is greater for the ninth grade--92.9% compared to 54.5%.

Table VIII
 Improvement for the Eighth Grade
 -- Spelling --

Pupil	1st	2nd	Pupil	1st	2nd
1	110	114	23	109	110
2	117	127	24	104	97
3	118	116	25	90	104
4	116	111	26	107	107
5	103	99	27	107	101
6	106	95	28	106	108
7	108	110	29	109	103
8	115	111	30	106	93
9	113	114	31	110	115
10	106	112	32	99	111
11	108	101	33	114	111
12	106	100	34	112	121
13	106	113	35	118	99
14	106	110	36	104	98
15	115	123	37	108	101
16	97	100	38	117	100
17	118	112	39	103	108
18	88	108	40	110	96
19	99	104	41	109	110
20	115	108	42	90	98
21	99	95	43	87	89
22	115	97	44	79	81

	Mean	Md.	S. D.
1st Score	106.4	107.1	11.1
2nd Score	105.4	108.2	12.0

$$r = .896$$

Tables IX and X show improvement for both groups in language. This test is designed to measure two aspects of correct language usage--the choice of correct grammatical constructions, and the discriminatory choice of correct words for clearly expressing an idea. That is, it measures not only the pupils' ability to discriminate between correct and incorrect grammatical constructions, but also the ability to discriminate between good and poor expressions of the same idea, both of which may be considered grammatically correct.

Table IX arranged in the usual order shows seventy gains, seven ties, and seven losses. Contrary to the usual trend most of the losses were in the upper ranks, while substantial gains are made in the average and lower ranks.

The eighth grade (Table X) made generally lower in score--lower than was expected. Their gains of the second examination over the first, however, are very substantial. There are thirty-three gains, four ties, and seven losses.

A peculiar situation occurs here; seven losses in each case, which would indicate a greater per cent loss for the smaller group. Then the per cent gain for the larger group is greater (83.3% to 75%). Of course, the number making the same compensates this mathematically, but for the first time, perhaps, the effect of the difference in number of cases becomes noticeable.

Table IX
Improvement for the Ninth Grade
-- Language --

Pupil	1st	2nd	Pupil	1st	2nd	Pupil	1st	2nd
1	116	125	29	109	123	57	111	119
2	109	116	30	92	97	58	104	111
3	108	107	31	109	115	59	112	119
4	118	130	32	99	110	60	104	111
5	104	119	33	48	99	61	104	121
6	106	106	34	108	111	62	95	104
7	106	109	35	99	101	63	104	106
8	104	107	36	101	111	64	101	110
9	104	99	37	86	95	65	89	93
10	109	103	38	89	106	66	93	104
11	118	130	39	101	102	67	99	111
12	112	106	40	112	114	68	86	89
13	106	106	41	112	119	69	99	99
14	104	127	42	91	104	70	106	119
15	106	117	43	104	113	71	93	93
16	104	111	44	101	103	72	103	109
17	106	114	45	79	97	73	91	91
18	99	99	46	78	101	74	97	101
19	111	114	47	94	106	75	95	98
20	106	106	48	99	97	76	95	104
21	115	119	49	76	93	77	56	89
22	103	94	50	106	112	78	91	99
23	85	114	51	109	116	79	106	109
24	106	116	52	99	97	80	91	99
25	125	130	53	104	116	81	93	96
26	109	125	54	76	87	82	75	89
27	109	111	55	106	108	83	84	89
28	89	103	56	73	78	84	101	106

	Mean	Md.	S. D.
1st Score	99.2	102.1	11.6
2nd Score	106.9	107.4	9.7

$$r = .921$$

Table X
Improvement for the Eighth Grade
-- Language --

Pupil	1st	2nd	Pupil	1st	2nd
1	104	111	23	89	112
2	95	113	24	83	87
3	113	112	25	63	112
4	99	111	26	87	93
5	99	99	27	97	91
6	91	95	28	97	95
7	97	101	29	91	91
8	104	102	30	72	91
9	60	87	31	102	109
10	95	104	32	82	91
11	78	97	33	99	99
12	112	114	34	93	99
13	99	99	35	93	97
14	95	89	36	101	106
15	104	116	37	95	106
16	79	86	38	56	61
17	95	99	39	103	107
18	70	84	40	93	89
19	81	91	41	60	74
20	101	110	42	101	93
21	51	67	43	83	79
22	99	108	44	76	83

	Mean	Md.	S. D.
1st Score	89.4	87.4	13.1
2nd Score	94.5	98.1	10.8

$$r = .889$$

Tables XI and XII show the total scores of both examinations for both groups. The total of ten tests includes besides the ones just discussed, one in Literature, History, Civics, Geography, Physiology, and Hygiene.

Even though the total scores are given here, they may be changed to a comprehensible figure by dividing by ten (the number of tests). All scores are weighted in such a way as to allow very reliable comparison between two different subjects. For instance a 112 score in language is directly comparable to a 112 score in arithmetic; 99.5 on the total score is directly comparable to 99.5 in reading.

Table XI

Improvement for the Ninth Grade
Total for all Ten Tests

Pl.	1st	2nd	Pl.	1st	2nd	Pl.	1st	2nd
1	1164	1244	29	1001	1075	57	929	1009
2	1116	1161	30	999	1048	58	921	995
3	1101	1142	31	997	1040	59	921	958
4	1097	1162	32	994	1019	60	920	1032
5	1089	1171	33	984	996	61	918	897
6	1074	1079	34	978	1021	62	917	934
7	1065	1075	35	976	1045	63	916	904
8	1062	1083	36	975	1059	64	915	958
9	1059	1116	37	975	1083	65	915	936
10	1058	1103	38	974	1002	66	910	999
11	1054	1153	39	972	991	67	891	895
12	1053	1112	40	971	1058	68	888	871
13	1046	1015	41	968	1090	69	884	907
14	1039	1130	42	967	976	70	867	863
15	1037	1088	43	967	1003	71	854	898
16	1035	1186	44	964	981	72	841	836
17	1028	1127	45	964	976	73	840	889
18	1025	1090	46	963	978	74	831	907
19	1020	1051	47	960	1083	75	831	887
20	1017	1041	48	958	1004	76	820	891
21	1015	1113	49	957	939	77	818	837
22	1013	920	50	956	1067	78	814	856
23	1012	1160	51	955	1062	79	804	841
24	1011	1125	52	940	939	80	802	826
25	1011	1046	53	938	919	81	787	837
26	1007	1051	54	937	983	82	779	910
27	1007	996	55	935	940	83	777	873
28	1005	1192	56	934	965	84	681	836

	Mean	Md.	S. D.
1st Score	956.0	964.0	89.0
2nd Score	1006.7	1009.3	78.4

$$r = .961$$

Table XII

Improvement for the Eighth Grade
Total for all Ten Tests

Pupil	1st	2nd	Pupil	1st	2nd
1	1046	1096	23	892	850
2	1024	1089	24	883	885
3	995	1052	25	883	843
4	992	1119	26	880	823
5	975	1045	27	870	889
6	973	1003	28	863	875
7	972	955	29	859	867
8	969	1044	30	856	861
9	969	904	31	850	901
10	966	894	32	829	889
11	949	1061	33	825	832
12	945	994	34	815	854
13	935	985	35	812	843
14	930	914	36	784	907
15	927	931	37	772	841
16	918	960	38	756	876
17	916	913	39	743	857
18	911	923	40	733	831
19	907	1017	41	732	843
20	904	918	42	729	837
21	900	961	43	718	849
22	894	901	44	676	823

	Mean	Md.	S. D.
1st Score	879	893	69.2
2nd Score	898	901	65.4

$$r = .961$$

Chapter III

Assimilation and Analysis

The mean score for the ninth grade is 956, or reduced to a comparable scale, 95.6, with a mean of 2.2 for the semester marks. The group was selected as average and their marks show .2 above the two point average, but the test results show about the same amount above the norm given for them. Their chronological age is fourteen years and seven months, the norm¹ for which is 93. This makes their educational age fourteen years and eleven months or, in other words, four months advanced. The standard deviation of 8.9 and 1.1 being relatively small, indicates about eighty per cent falling in one standard deviation of the mean. Therefore, the teachers' marks are valid.

A score of 879 or 87.9 is shown for the eighth grade with a mean of 2.3 for school marks. This group was also selected as average, but the same situation occurs here as did in the other section. There is a .3 difference with the average, but for the chronological age of thirteen years and one month, the norm is 85.0, which shows a 5.8 months advance for the group. The standard deviation of 6.92 and .84 shows a fairly defi-

1. It is true the norm for the tests do not hold entirely for these data, but the months advancement in case of the eighth and the ninth grade compares favorably with the above average amount on teachers' marks; whether all the advancement is due to the above average groups is not of prime importance here.

nite grouping around the mean.

Both sets of results prove validity of teachers' marks; and the coefficients of correlation for score and marks of .915 and .896, respectively, indicate excellent agreement between the two. Thus, reliability of the tests after removing the time element is practically unhampered.

The following is a table showing the compilation of the mean, standard deviation, and coefficient of correlation for the four fundamental subjects--arithmetic, reading, spelling, and language.

Table XIII

Ninth Grade	Mean		S. D.		r.
	1st	2nd	1st	2nd	
Arithmetic	97.3	105.5	10.3	9.4	.915
Reading	99.3	104.6	11.1	9.9	.930
Spelling	89.8	98.4	12.1	11.3	.902
Language	99.2	106.9	11.6	9.7	.921
Avg.	96.4	105.2	11.5	10.1	.917

Eighth Grade	Mean		S. D.		r.
	1st	2nd	1st	2nd	
Arithmetic	93.3	93.3	14.7	13.9	.910
Reading	89.6	95.4	12.4	11.9	.920
Spelling	106.4	105.4	11.1	12.0	.896
Language	89.6	94.5	13.1	10.8	.889
Avg.	94.6	97.1	12.8	12.3	.903

Arithmetic

In arithmetic there is a coefficient of correlation of .915--excellent agreement, but practically all the scores show improvement; in fact, 90.5% do, and 2.3% made the same score.

At the beginning of the year, the ninth grade mean in arithmetic was 97.3, which gives an educational age of fifteen years and three months--the group is eight months advanced in this subject.²

The tests reveal a mean score of 105 for the educational age of sixteen years and three months, or an advancement of thirteen months. This allows for the seven months lapse between testing dates--a gain in advancement due to improvement of five months.

From the standpoint of actual point gains based on the totals of all the pupils' scores, there is an improvement of 11.2%. Calculating on the basis of the means, there is an improvement of 8.4%.

The coefficient of correlation for the eighth grade arithmetic is fairly high even though the changes here in scores are more evident. Only 47.7% made any increase in their scores. This group was eight months advanced at the

2. Here, as in all future references to months advancement, the term is used as a comparative device; the groups are not actually advanced this much; this situation is due to the deviation from standard procedure of administering tests.

beginning and having the same mean exactly (93.3) at the end, made no improvement whatever.

Reading

Good correlation may be noticed by the coefficient of .93; the standard deviation running rather high is both cases indicates quite a scattering of scores, but not too much for a fairly normal curve of distribution. 84.5% of the pupils show improvement in scores.

The mean of 99.3 is equivalent to an educational age of fifteen years and six months or eleven months advanced. The second mean of 104.3 is equivalent to sixteen years and two months--a gain of one month.

There is an improvement in the mean of the whole group of 5.2%.

Likewise, the eighth grade correlation is excellent, having .92, with a rather high standard deviation--a set very very similar to the one just studied. There were 77.2% who showed improvement.

The mean 89.6 allows an educational age of thirteen years and ten months or an advancement of nine months. The second mean, 95.4, gives an educational age of fourteen years and eleven months or an advancement of fifteen months. There is an increase in advancement of six months, due to improvement, during the year. The per cent improvement for the whole group is 6.4.

Spelling

As has been true for arithmetic and reading, the correlation is high, being .902. The standard deviation is about the same as the others also--12.1 and 11.3, respectively. 92.9% of the individuals had a gain in score the second time.

An educational age of thirteen years and eleven months is attained by the mean 89.8--eight months retarded. The second mean 98.4 is equivalent to an educational age of fifteen years and five months, or three months advanced--an improvement of eighteen months. Unusually low to start, but the change was great enough to overcome the deficiency. The per cent improvement was 9.5%.

Fair correlation compared to the rest is found for the eighth grade (896). The standard deviation shows a considerable scattering, and perhaps the scores fall a little out of the normal curve. 54.5% made a larger score the second time.

The mean, 106.4, gives this group an unusually high educational age of sixteen years and four months. Very peculiar, but all methods and scoring were checked and no mistake is present. Two years and five months is the advancement. The second test reveals a loss to 105.4--still two years and four months advanced, but a loss of two months. This is a decrease of .09% under the original score of 106.4.

Language

Excellent agreement of .921 on the scores, but quite a difference in standard deviations. This may be explained by the fact that the change in the lower group almost exactly compensated for the upper group. In some cases they exchanged places to the letter. 83.3% of the pupils showed improvement.

Ninety-nine and two tenths for the mean gives an educational age of fifteen years, six months, or eleven months advanced. A gain to 106.9 gives sixteen years and six months, or fifteen months advanced--an increase of four months. The per cent improvement over the first mean is 7.7.

The correlation for the eighth grade is a little off here, and the standard deviation is high. The group scatter leaves the curve somewhat more than the other tests. Seventy-five per cent improved in spite of the unusual distribution.

The 89.4 score indicates an educational age of thirteen years nine months, or an advancement of eight months over the chronological age. 94.5 for the last test is the equivalent of an educational age of fourteen years and eight months--an advancement of twelve months. This gives a gain of four months. The per cent improvement is 5.7.

The total scores, which include four more tests give approximately the same picture as each of the four

just described. The coefficient of correlation is .961, which is higher than most of the four individual tests. Such an agreement is surprising for almost any comparison. The coefficient given as a norm by the makers of the test is .94. The standard deviation is comparatively low, showing that a great number cling close to the median and that it is a desirable group for study. Eighty-eight per cent of the persons taking the test increased their scores the second time.

The educational age for the group at the first testing was fourteen years and eleven months or an advancement of four months over their chronological age. Perhaps the disagreement with the norm here as well as in the preceding studies is due partially to more time being given for the examination.

At the second testing the educational age was fifteen years and eight months--a gain of six months after deducting the seven months between tests. There is 5.2% improvement of the second over the first.

The coefficient for the eighth grade is exactly the same as the ninth grade--.961, which is more surprising, for it is a smaller group. The standard deviations differ somewhat, giving a different arrangement of scores. The first testing gives an educational age of thirteen years and six months, or five months ahead of the norm. The second reveals an educational age of thirteen years

and ten months, or two months improvement after the seven months are deducted. An improvement of 2.1% is evident.

Table XIV

Compilation of Months Gained, Per cent Improvement, and Percentage Individual Improvement

Ninth Grade	Months Gained	% Imp.	% Ind. Imp.
Arithmetic	5	8.4	90.5
Reading	1	5.2	84.5
Spelling	18	9.5	92.9
Language	4	7.7	83.3
Avg.	7	7.7	87.8

Eighth Grade	Months Gained	% Imp.	% Ind. Imp.
Arithmetic	-7	0	47.7
Reading	6	6.4	77.2
Spelling	-2	-.09	54.5
Language	4	5.7	75.0
Avg.	.25	2.75	63.6

From Table XIV it may be seen that the ninth grade gained in all four subjects from the stand point of months ability advancement, the greatest gain being eighteen months in spelling and next five months in arithmetic, an average of seven months advance in all four. Naturally the same order is followed in percentage improvement of the whole and percentage individuals improving, there being 7.7% and 87.8%, respectively.

On the other hand the eighth grade lost in months advanced for arithmetic and spelling, leaving .25 months average gain. Only 2.75% improvement is shown for the group as a whole. 63.6% of the individuals made improvement.

The results on the four tests compare favorably with the results on all ten. The percentage of individuals improving for the ninth grade is 88% compared to 87.8%; the average gain is six months compared to seven; and the per cent improvement is 5.2% compared to 7.7%.

The eighth grade percentage of individuals improving is 90% compared to 63.6%; two months compared to .25; and 2.10% improvement of the whole compared to 2.75%.

Therefore, in months advanced, percentage improvement, and percentage of individuals improving there is a substantial gain for the ninth grade in the four fundamentals as well as all the tests of the Stanford Achievement battery. This good gain is considerably greater than the eighth grade gain--and without any special effort. How much more could be done if a practical or even the necessary amount of effort were put out in this direction by the teachers of the ninth grade?

Chapter IV

Summary and Conclusions

This study, though admittedly having its limitations, has several valuable conclusions worthy of mention.

1. The ninth grade raised its mean for the four fundamental subjects from 96.4 to 105.2, an improvement of 7.7%.

For all ten the mean was raised from 95.6 to 100.6, an improvement of 5.2%.

2. The most notable improvement is in spelling, a gain of 9.5%. The next greatest improvement is in arithmetic, one of 8.4%.

3. An average of 87.8% of the individuals showed improvement in the four, while spelling led the percentage with arithmetic a mere 2% behind.

4. From all the points of view the one that falls lowest is the reading result. Improvement is evident, however.

5. For the purpose of comparison, the ninth grade improved in all four subjects, while the eighth grade showed gains in only two.

6. The ninth grade improvement was greater in every case except months advancement in reading.

7. The eighth grade losses are in the very two subjects showing the strongest gains in the ninth grade--arithmetic and spelling.

8. In arithmetic there is a difference in improvement between the two grades of 8.4%--ninth grade superior.

9. In reading there is a difference of 1.2%--eighth grade is superior.
10. In spelling there is a difference of 9.59%--the ninth grade is superior.
11. In language is found a difference of 2%--ninth grade is superior.
12. There is a 5% greater improvement in the ninth grade in all the four fundamentals.

As has been stated, the results of this paper may not be universally true in every measure, due to the limited number of cases, difference in teachers' abilities and methods, and dependability of a group of test scores for absolute measure of a pupil's knowledge of a subject. But it may be said that the results do check, almost to a surprising degree, with the contention of the writer at the beginning of the work.

For further investigation, and it would be worthwhile, the writer would suggest narrowing it down to a group of students in only one subject and have them instructed with the contention of this thesis as an objective. Make the same tests and watch for a much greater improvement.

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