FACTORS INFLUENCING THE SUCCESS OF
FRESHMEN IN MATHEMATICS

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By

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PREFACE

In the rural schools of northeastern Oklahoma may be found a very wide range of conditions under which pupils receive instruction. Various opinions exist concerning the efficiency of instruction under conditions which would seem to be far from desirable from many standpoints. Some are of the opinion that instruction is more nearly complete in the consolidated schools than in the one and two teacher schools. Such arguments are unethical since they have not been based on facts. Experience, college preparation, tenure, age, sex, and marital status on the part of the teacher have also been discussed in relation to pupil learning. Varied opinions are held concerning the effect of learning of such factors as economic conditions, age, sex and athletic participation on the part of the student.

The state legislature has passed laws in recent years, an ultimate purpose of which is to encourage consolidation of small schools and additional teacher preparation.[1]

So far as the writer knows, no study has been made concerning the relation of these factors to the mathematical status of beginning high school students.

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1. School Laws of Oklahoma, 1937, Compiled Under the Direction of A. L. Crable, State Superintendent of Instruction. Article XXIX, Section 505, pp. 146-149

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CHAPTER I

INTRODUCTION

The purpose of this study is to ascertain the factors contributing to the mathematical strength of beginning high school students. The factors involved are fourteen in number, namely: the size of school; qualification of teacher; experience of teacher; teacher tenure; marital status of teacher; teacher's age; sex of teacher; age of pupil; pupils' interest in athletics; sex of pupil; occupation of parents; number of parents living; and I.Q. of pupil.

A series of tables were prepared showing the pupils' score in mathematics in relation to the above mentioned factors.

There are ninety-six pupils and fifteen schools involved in this study. There are two one-teacher schools, ten two-teacher schools, one four-teacher school, and two five and six-teacher schools. The qualifications of teachers ranged from 18 to 200 college hours, experience from none to 31 years, tenure from 1 to 7 years, age of teachers from 21 to 53 years, age of pupils ranged from 12 to 19 years, I. Q. of pupils ranged from 58 to 122, and the arithmetic scores ranged from 11 to a perfect score of 34. Of the 96 students involved, 63 were children of parents not on relief rolls and 33 were children of parents on relief rolls; 83 received instruction from married teachers and 13 were taught by teachers who had not been married; 85 had men for their

teachers and 11 received instruction from women teachers;
50 were interested in athletic participation and 46 had
no desire to take part in athletics; 58 of the students
studied were girls and 38 were boys; 77 were children
whose parents were farmers and 19 of the children represented
families whose occupation was other than farming; in the
case of 83 of the students, both parents were living; only
one parent was living so far as 13 students were concerned.

The data cover a period of two years, beginning with
the school year 1936-37. Only scores made by beginning
high school students are used in this study.

CHAPTER II

COLLECTION OF DATA

From the records in the county superintendent's office, information was obtained concerning teacher qualifications, experience, tenure, age, sex, marital status and size of school. From permanent records in the Muldrow High School and from personal interview with the pupils, information was secured concerning the pupils' age, economic status, interest in athletics, occupation of parents, and whether one or both parents were living.

The pupils' I.Q. was determined by giving multi-mental scale test, Form I, by William A. McCall and his students, Teachers College, Columbia University. Full directions were given to the students, concerning the test by the writer.

A stop watch was used when giving the tests and exactly twenty minutes were allowed for the tests which were administered and scored by the writer.

Better than any other type of information that can be made available, the intelligence test gives the data from which a pupil's educational possibilities can be best foretold, and his further education be most profitably directed.[1]

To determine the pupils' strength in the fundamental operations of arithmetic, Woody McCall Mixed Fundamentals, Form IV was used. The test is published by Teachers College,

1. Ellwood P. Cubberley, Public School Administration, p. 444.

Columbia University. The test consists of thirty-four problems in which the fundamental operations of arithmetic are quite thoroughly involved. The most important and most practical thing to be learned in arithmetic is clear understanding and efficient use of the fundamental operations of addition, subtraction, multiplication, and division of integers, common fractions, and decimals.[2]

In the small high school where the number of instructors is very small, many students do not receive maximum benefit because of heterogeneous grouping of pupils.

The important thing to do for every pupil is to place him so that his ability to work will be most deeply challenged.[3]

By the time a pupil enters the junior high school, he should be able to perform with accuracy and fair speed, the fundamental operations with integers and with common and mixed fractions.[4]

The teacher should never hesitate to reteach any topic and drill upon it when pupils show the need of it. Often these reviews can be motivated by relating them to some new idea in mathematics. For instance, Barber suggests a project concerning the flag of the United States which involves the formula $L = 1.9h$ and brings in algebra, geometry and a

2. Jasper O. Hassler and Rolland R. Smith, The Teaching of Secondary Mathematics, p. 220.

3. Ellwood P. Cubberley, Public School Administration, p. 444.

4. National Committee on Mathematical Requirements, The Reorganization of Mathematics in Secondary Education, p. 28.

review of decimal fractions.[5]

It would appear that as qualifications increased, other factors being equal, the teacher would secure better results on the tests as shown by pupils. A year's training may not always be exactly the same, but it is a more constant and better measure than any other elements affecting the salary of teachers.[6]

Perhaps school board members should be more concerned about the qualifications and teaching ability of teachers. When in need of medical advice or attention, most, if not all, parents probably desire the very best physician obtainable within the limits of their financial ability but they seem willing to permit any mediocre teacher to direct the destinies of their children in school.

In a simple test given by one of the authors to twenty-five junior high school teachers in a large city system, many did not have the least idea how to find the hypotenuse of a right triangle when the length of each arm was given. And yet these same teachers were expected to jump into the new program being instituted by that city.[7]

Such findings would lead one to believe that the poor results obtained in our junior high schools are mainly due to poor teaching and not to fallacies in the curriculum.

5. Jasper O. Hassler & Rolland R. Smith, The Teaching of Secondary Mathematics, p. 222.

6. Lyle L. Morris, The Single Salary Schedule, p. 7.

7. Jasper O. Hassler & Rolland R. Smith, The Teaching of Secondary Mathematics, p. 222.

The more a teacher knows about his subject, the more [8] likely he is to make it interesting.

With the grading of instruction and the working out of graded courses of study,...there came a demand for uniformity in textbooks so that a common course of study might be taught to all children. Laws now were enacted requiring the people of the districts, towns, and cities to prevent too frequent changes, adoption for four or five years usually was required.[9]

If teachers are more important than books, and there is every reason to believe that they are, perhaps we should have some laws against the too frequent change of teachers.[10]

How many will be of the class known as superior will depend greatly on the incentives to become superior teachers which the salary schedule and the administration of the system provide. To stimulate industry on the part of the teachers, to encourage individual improvement, and to regard exceptional merit, should be characteristic of a good salary schedule as well as of a good system of school supervision. Take away incentives to growth and rewards for efficient service, and a teaching force tends to decline rapidly in efficiency.[11]

8. Jasper O. Hassler and Rolland R. Smith, The Teaching of Secondary Mathematics, p. 195.

9. Ellwood P. Cubberley, Public School Administration, p. 137.

10. Dennis H. Cooke, Problems of the Teaching Personnel, p. 90.

11. Ellwood P. Cubberley, Public School Administration, p. 377

CHAPTER III

DESCRIPTION AND ANALYSIS OF DATA

The data cover a period of two years beginning with the first semester of the school year 1936-37. Only the scores made by 96 beginning high school students are used in this study.

The mean for all the scores and the mean for each group were calculated. These were put into thirteen tables. From each of these tables a table was made to show differences in means, differences and critical ratios based on facts in the table. Table I shows the number of scores for each group of schools according to size, the mean of each group, the total number of scores in the study, the mean of all the scores in the study, and the excess of the mean of each group over the mean of all the scores. The schools were placed in groups, I, II, III, and IV representing one, two, four, and five and six-teacher schools respectively.

TABLE I

Number Of Scores, Mean, And Excess Of Mean Of

Each Group Over Mean Of All Scores In The Groups

According To The Size Of School

Group	Number Of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	3	22.33	- 1.23
II	31	23.03	- .53
III	10	19.40	- 4.16
IV	52	24.75	1.19
All	96	23.56	.00

The number of scores in Group I is 3, with a mean of 22.33, which is 1.23 score points below the all score mean. The number of scores in Group II is 31, with a mean of 23.03 or .53 score point below the average for all the scores. In Group III, 10 scores have a mean of 19.40, which is 4.16 score points below the average for all the scores. Group IV has 52 scores and a mean of 24.75 or 1.19 score points above the all score mean. There is a considerable difference between the means of the various groups. The range of the means is 5.35 score points. The pupils of the four-teacher schools made the lowest mean, while those of five and six-teacher schools made the highest mean. The mean representing the scores of the two teacher schools was slightly higher than that of the one-teacher schools. Probably the most efficient teachers make special efforts to become better qualified and thus merit a position in a larger and better system. In the small schools, the crowded schedule and limited material are very likely to discourage any teacher, especially the poorly trained, inexperienced teacher.

The rural schools might be used as a training center for town teachers. No finer all-round experience could be had than this. Rural sections would be certain to object to such a plan, first, because it would force all novice teachers upon them and second, because the plan would force the poorer teachers to stay in the rural districts while the best one would be picked to go to the urban positions.[1]

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1. Walter W. Ludeman, What About Teacher Experience, School & Society, Vol. 34, p. 538.

TABLE I-A

Differences, σ Differences And Critical

Ratios Based On Facts In Table I.

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
IV-I	2.42	1.03	2.35	IV
IV-II	1.72	1.06	1.62	IV
IV-III	5.35	1.74	3.07	IV

Table I-A shows all critical ratios in favor of Group IV, the five and six-teacher schools. There is a significant difference in favor of the five and six-teacher schools over the four-teacher schools. The difference between Groups I and IV as well as between Groups II and IV is not significant.

The use of a critical ratio for a group of only three cases is very likely unreliable, but in the study only three, one-teacher schools were involved.

For convenience, we arbitrarily define a statistically significant difference as one which is at least three times as large as its standard error or four times as large as its probable error. We may also define a statistically significant difference as one whose "significance ratio" is 3 or more, the significance ratio being the ratio between the obtained difference and its standard error.[2]

For an obtained difference to be statistically significant means that the difference was not caused by mere chance, but the fact that there is a difference does not indicate the exact cause of the difference.

2. E. F. Lindquist, A First Course In Statistics, p. 122.

Table II shows the number of scores for each group according to the qualification of the teacher, the mean for each group, and the excess of the mean for each group over the mean for all the scores in the study.

TABLE II

Number Of Scores, Mean, And Excess Of Mean Of
Each Group Over Mean Of All Scores In The Groups
According To Qualification Of Teacher

Group	Number Of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	3	23.00	- .56
II	8	23.75	.19
III	64	24.48	.92
IV	9	24.22	.66
V	12	18.17	5.39

In Table II, Group I includes the scores for pupils of teachers who had less than 40 college hours; Group II, the scores for pupils of teachers who had from 40 to 59 college hours; Group III, the scores for pupils of teachers who had from 60 to 89 college hours; Group IV, the scores for pupils of teachers who had 90 or more college hours but had not earned a degree; and Group V, the scores for pupils of teachers who had college degrees.

In Group I, the total number of scores is three and the mean is 23.00 or .56 below the all score mean. Group II has 8 scores and a mean of 23.75 or .19 above the mean for all the scores. Group III has 64 scores with a mean of 24.48 which is .92 above the mean for all the scores.

Group IV represents a total of 9 scores which yield a mean of 24.22, or .66 above the all score mean. Group V has 12 scores with a mean of 18.17, or 5.39 score points below the mean for all the scores. While the highest mean score is of the group in which the teacher had from 60 to 89 college hours, the lowest is the group in which the teacher had earned a college degree. The next lowest mean was made by pupils of the group in which the teachers had less than 40 college hours, while the next to the highest was made by pupils of teachers who had 90 or more college hours but had not earned a degree. These results would indicate that the teacher does not consistently improve with increased qualifications. The results show that teaching efficiency improves with increased college hours up to 89 hours, after which there is a very slight decrease followed by a marked decrease.

Probably the teacher with the large number of college hours had not attended school for a long time. It is only after growth ceases that ossification sets in. If it is true that teachers lose their greatest effectiveness sooner than do lawyers and doctors, the only reason assignable is that they cease to grow sooner than do lawyers and doctors.[3]

Twenty-one students received instruction from teachers who had earned from 90 to 200 college hours. For these 21 students, there was found a correlation of .62 between arithmetic scores and intelligence. The probable error was found to be .04, which would indicate that a large number

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3. P. W. Horn, "How Teaching Affects The Teacher Over A Period of Years." Nations Schools. VIII (August, 1931) p. 42.

of cases was involved. Teachers with 60 to 89 college hours taught 64 students who made the highest arithmetic scores. The 64 students had an average age of 14.84 years. The 21 students, who made the lowest average score, were taught by teachers with from 90 to 200 college hours and these students had an average age of 15.71 years, or an average of .87 of a year older than those who made the highest score. Between chronological age and arithmetic score, there was found a negative correlation, -.14.

Table XII shows that farmers' children make lower scores than do children from other occupations. Table X indicates that students who are athletically inclined make poorer scores than those who are not interested in athletics. Table IX would indicate that students from families on relief make poorer scores than other students not on relief. Table IV would indicate that teachers with the least amount of tenure are those who obtain the poorest results as shown by their pupils' scores. Of the 21 students who made the lowest scores and were taught by teachers having the greatest number of college hours, 20 were farmers' children. Thirteen of the 21 interested in athletics and fourteen of the 21 were from families on relief rolls. Thirteen of the students were taught by an instructor whose tenure was one year.

The 12 students, who were taught by teachers having from 124 to 200 college hours, had an average I.Q. of 76.42. Of the 12 students, only 3 had an I.Q. more than 80 and the

lowest I.Q. in the group was 63. Teachers having 90 to 123 college hours to their credit taught 9 pupils whose average I.Q. was 82.11. Teachers having 60 to 89 college hours instructed 64 students whose average I.Q. was 93.42. Eight students, with an average I.Q. of 92, had instructors with from 40 to 59 college hours to their credit. The 3 remaining students in the study represented a mean I.Q. of 86.67 and were taught by teachers having less than 40 college hours to their credit.

TABLE II-A

Differences, σ Differences, And Critical Ratios

Based On Facts In Table II

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
III-I	1.48	1.40	1.06	III
III-II	.73	1.72	.42	III
III-IV	.47	1.30	.36	III
III-V	6.31	1.22	5.17	III

Table II-A shows a difference in achievement in favor of pupils of teachers with qualifications up to 89 college hours. There is a significant difference in favor of teachers with from 60 to 89 college hours over those holding college degrees. From the previous tables and facts, it appears that teacher qualifications vary inversely as mental abilities of pupils in the teaching situations. It is doubtful if any teacher would be able to make favorable progress in such deplorable situations. Not in every case

does increased college hours mean increased teaching efficiency. Many of the college hours may have had no relation to improvement in methods of teaching.

TABLE III

Number Of Scores, Mean, And Excess Of Mean Of
Each Group Over The Mean Of All Scores In Groups
According To Experience Of Teachers

Group	Number Of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	4	22.50	- 1.06
II	8	23.63	.07
III	25	27.12	3.56
IV	33	22.24	- 1.32
V	26	21.96	- 1.60

Table III shows the number of scores for each group according to the experience of the teachers, the mean for each group, and the excess of the mean of each group over the mean of all the scores in the study.

Group I, in Table III, includes scores for pupils of teachers who had 0 prior years experience; Group II, scores for pupils of teachers who had 2 years prior experience; and Group V, scores for pupils of teachers who had 9 or more years prior experience.

Group I has 4 scores with a mean of 22.50 which is 1.06 score points below the mean for all the scores. Group II has 8 scores with a mean of 23.63, or .07 score point above the all score mean. Group III represents a total of

25 scores which yield a mean of 27.12, or 3.56 score points above the all score mean. Group IV has 33 scores with a mean of 22.24, or 1.32 score points below the mean for all the scores. Group V has 26 scores with a mean of 21.96 or 1.60 score points below the all score mean.

It will be noticed that teaching efficiency increases with experience up to and including the third year of teaching, after which there is a falling off of efficiency. The highest mean was made by pupils of teachers having 2 years prior experience. The next to lowest mean was made by pupils of teachers having from 3 to 8 years prior experience. The range of scores is 5.16 score points.

TABLE III-A

Differences, σ Differences, And Critical Ratios

Based On Facts In Table III

Group	Differences	σ Differences	Critical Ratio	In Favor Of Group
I-V	0.54	1.95	.28	I
II-V	1.67	1.89	.88	II
III-V	5.16	1.48	3.49	III
IV-V	.28	1.31	.21	IV

In Table III-A, there is a significant difference in favor of Group III over Group V. Groups I, II, and IV are superior to Group V but not significantly.

TABLE IV

Number Of Scores, Means, And Excess Of Group
Means Over All Score Mean In Groups According
To Tenure Of Teacher

Group	Number Of Scores	Mean	Excess Of Group Mean Over Mean Of All Scores
I	22	20.50	- 3.06
II	32	26.59	3.03
III	42	22.86	- .70

Table IV shows the number of scores for each group according to the tenure of the teacher, the mean of each group, and the excess of the group mean over the all score mean of the study.

In Table IV, Group I includes scores of pupils of teachers who had one year prior tenure in the school; Group II, of teachers who had 2 and 3 years prior tenure, and Group III, of teachers who had 4 or more prior years tenure in the school.

Group I has 22 scores and a mean of 20.50, or 3.06 score points below the mean of all scores in the study. Group II has 32 scores with a mean of 26.59, or 3.03 score points above the mean for all the scores. Group III had 42 scores which yield a mean of 22.86, or .70 score point below the mean for all the scores.

Table IV would indicate that teachers improve with the first three years of tenure, after which there seems to be a falling off in efficiency.

TABLE IV-A

Differences, σ Differences, And Critical Ratios

Based On Facts In The Table IV

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
II-I	6.09	1.24	4.91	II
II-III	3.73	1.13	3.30	II
III-I	2.36	1.13	2.09	III

Table IV-A shows that two and three years tenure is superior to one year tenure and is also superior to four or more years tenure. The fact is also evident, from Table IV-A, that one year tenure is least effective so far as efficiency of school work is concerned.

TABLE V

Number of Scores, Mean And Excess Of Group Means

Over All Score Mean In Groups According To

Marital Status of Teacher

Group	Number of Scores	Mean	Excess Of Group Mean Over Mean Of All Score
I	13	23.69	.13
II	83	23.54	- .02

Table V shows the number of scores for each group according to the marital status of the teacher, the mean of each group, and the excess of the group mean over the mean for all the scores in the study.

In Table V, Group I includes the scores for pupils of unmarried teachers and Group II represents the scores made by pupils of married teachers.

Group I has 13 scores with a mean of 23.69, or .13 score point above the mean for all the scores. Group II has 83 scores and a mean of 23.54, or .02 score point below the all score mean.

Table V would indicate that the marital status of the teacher has very little influence on teaching efficiency.

TABLE V-A

Difference, $\sqrt{}$ Difference And Critical Ratio Based On Facts In Table V

Group	Difference	$\sqrt{}$ Difference	Critical Ratio	In Favor Of Group
I-II	15	1.14	.13	I

Table V-A shows that unmarried teachers are slightly superior to married teachers but not significantly.

TABLE VI

Number Of Scores, Mean, And Excess Of Group Mean Over All Score Mean

Group	Number Of Scores	Mean	Excess Of Group Mean Over Mean Of All Scores
I	85	23.64	.08
II	11	23.00	- .56

Table VI shows the number of scores for each group according to the sex of the teacher, the mean of each group, and the excess of the group mean over the mean for all the scores in the study.

In Table VI, Group I represents the scores for pupils of men teachers and Group II the scores for pupils of women teachers.

Group I has 85 scores with a mean of 23.64, or .08 score point above the all score mean. Group II has 11 scores with a mean of 23.00 or .56 score point below the mean for all the scores in the study.

Table VI would indicate that men teachers are superior to women teachers as teachers of mathematics.

TABLE VI-A

Difference, σ Difference, And Critical Ratio Based

On Facts In Table VI

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
I--II	.64	1.25	.51	I

Table VI-A would indicate that men teachers are superior to women teachers as teachers of mathematics but not significantly superior.

TABLE VII

Number of Scores, Mean, And Excess Of Group

Mean Over All Score Mean

Group	Numbers of Scores	Mean	Excess Of Group Mean Over Mean Of All Scores
I	23	23.26	- .30
II	42	25.07	1.51
III	13	24.92	1.36
IV	18	19.44	- 4.12

Table VII shows the number of scores for each group according to the age of the teacher, the mean of each group, and its excess over the mean for all scores in the study.

In Table VIII, Group I includes the scores for pupils of teachers whose ages are from 21 to 25 years inclusive; Group II, of teachers from the age of 26 to 30 years inclusive; Group III, of teachers from the age of 31 to 35 inclusive; and Group IV, of teachers 36 years of age and older.

Group I has 23 scores and a mean of 23.26, or .30 score point below the mean for all scores in the study. Group II has 42 scores and a mean of 25.07, or 1.51 score points above the mean for all the scores. Group III represents 13 scores which yield a mean of 24.92, or 1.36 score points above the mean for all the scores involved in the study. Group IV has 18 scores and a mean of 19.44, or 4.12 score points below the all score mean. The trend is toward an improvement in teaching until the age of 30 years, after which there is a very small decline followed by a rather sudden decline in efficiency after the age of 35 years.

TABLE VII-A

Differences, σ Differences, And Critical Ratios

Based On Facts In Table VII

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
III-I	1.66	1.72	.97	III
II-III	.15	1.64	.09	II
III-IV	5.48	1.74	3.15	III
II-IV	5.63	1.23	4.58	II
II-I	1.81	1.20	1.51	II

Table VII-A shows all critical ratios in favor of Group II and III for teachers whose ages range from 26 to 35 years inclusive. The difference between Group II and III is negligible. Groups II and III are each significantly superior to Group IV which is for teachers 36 years of age or older.

TABLE VIII

Number of Scores, Mean, And Excess of Group Mean

Over All Score Mean

Group	Number of Scores	Mean	Excess Of Group Mean Over Mean Of All Scores
I	11	25.27	1.71
II	23	24.26	0.70
III	62	23.00	- .56

Table VIII shows the number of scores for each group according to the age of the pupil, the mean of each group, and its excess over the mean for all the scores in the study.

In Table VIII, Group I includes the score of pupils whose ages are less than 14 years; Group II represents the scores of pupils 14 years of age, and Group III the scores of pupils 15 years of age or older.

Group I has 11 scores and a mean of 25.27, or 1.71 score points above the mean for all the scores. Group II has 23 scores and a mean of 24.26, or .70 score point above the all score mean. Group III represents 62 scores which yield a mean of 23.00, or .56 score point below the mean for all scores in the study.

TABLE VIII-A

Differences, σ Differences, And Critical Ratios

Based On Facts In Table VIII

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
I-II	1.01	1.74	0.58	I
I-III	2.27	1.63	1.39	I
II-III	1.26	1.14	1.11	II

Table VIII-A would indicate that, before finishing the eighth grade, pupils decrease in efficiency with increasing age. Though the range of means is 2.27 score points, no group is significantly superior to another group.

TABLE IX

Number Of Scores, Means And Excess Of Group Mean

Over All Score Mean In Groups According To The

Economic Status Of The Pupils' Parents

Group	Number of Scores	Mean	Excess Of Mean Of Group Over Mean Of All Scores
I	33	23.33	- .23
II	63	23.63	.12

Table IX shows the number of scores for each group
according to the economic status of the pupil, the mean
of each group, and its excess over the mean for all scores
in the study.

In Table IX, Group I includes the scores for pupils
whose parents are on relief rolls and Group II represents
the scores for pupils whose parents are not on relief
rolls.

Group I has 33 scores with a mean of 23.33, or .23
score point below the mean for all the scores involved in
the study. Group II has 63 scores with a mean of 23.63, or
.12 score point above the mean for all the scores for the
study. The range of the mean is .35 score point in favor
of the pupils whose parents are not on relief rolls.

TABLE IX-A

Difference, σ Difference, And Critical Ratio

Based On Facts In Table IX

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
II-I	.35	1.10	.32	II

Table IX-A would indicate that pupils whose parents are not on relief rolls do superior work in arithmetic to children of parents on relief rolls. The difference is not significant.

TABLE X

Number Of Scores, Mean, And Excess Of Group Mean

Over All Score Mean In Groups According To The

Students' Interest In Athletics

Group	Number Of Scores	Mean	Excess Of Mean Of Group Over Mean Of All Scores
I	50	22.48	- 1.08
II	46	24.74	1.18

Table X shows the number of scores for each group according to the students interest in athletics, the mean of each group and its excess over the mean for all the scores in the study.

In Table X, Group I includes the scores of pupils who participate in and are keenly interested in athletics, and Group II represents the scores of pupils who are not interested in athletics.

Group I has 50 scores and a mean of 22.48, or 1.08 score points below the mean for all the scores in the study. Group II is composed of 46 scores and a mean of 24.74, or 1.18 score points above the all score mean. The range of the mean is 2.26 score points in favor of the students not interested in athletics.

TABLE X-A

Difference, σ Difference, and Critical Ratio

Based On Facts In Table X

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
II-I	2.26	1.02	2.22	II

In Table X-A, Group II is superior to Group I but not significantly. Table X-A would indicate that either the weaker students are athletically interested or too much attention is given to athletics.

TABLE XI

Number Of Scores, Mean, And Excess Of Group Means

Over All Score Mean In Groups According To

Difference In Sex

Group	Number Of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	58	23.78	.22
II	38	23.24	-.32

Table XI shows the number of scores for each group according to differences in sex, the mean of each group, and its excess over the mean for all scores in the study.

In Table XI, Group I is composed of the scores made by girls and Group II represents the scores earned by the boys.

Group I has 58 scores and a mean of 23.78, or .22 score point above the mean for all the scores. Group II has 38 scores and a mean of 23.24, or .32 score point below the all score mean of the study.

TABLE XI-A
Difference, σ Difference, And Critical Ratio Based
On Facts In Table XI

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
I-II	.54	1.10	.49	I

In Table XI-A, Group I is only slightly superior to Group II. The difference is not significant.

TABLE XII
Number Of Scores, Mean, And Excess Of Group Mean
Over All Score Mean In Groups According To
Parental Occupation

Group	Number Of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	77	23.03	- .53
II	19	25.74	2.18

Table XII shows the number of scores for each group according to the parents occupation, the mean of each group, and its excess over the all score mean of the study.

In Table XII, Group I is made up of scores by pupils whose parents are farmers and Group II represents the scores made by pupils whose parents have as their occupation something other than farming, as filling station operators, post master, carpenter, livestock dealer, etc.

Group I has 77 scores and a mean of 23.03, or .53 score point below the all score mean. Group II has 19 scores and a mean of 25.74, or 2.18 score points above the all score mean.

TABLE XII-A

Difference, σ Difference, And Critical Ratio Based

On Facts In Table XII

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
II-I	2.17	1.21	2.24	II

Table XII-A would indicate that pupils whose parents are not farmers, do superior work to farmers' children. There is considerable range in means, 2.71, but the difference is not a significant one.

TABLE XIII

Number Of Scores, Mean, And Excess Of Group Mean

Over All Score Mean In Groups According To Whether

Only One Or Both Of The Pupil's Parents Are Living

Group	Number of Scores	Mean	Excess Of Group Mean Over All Score Mean
I	83	23.20	- .36
II	13	25.85	2.29

Table XIII shows the number of scores for each group according to whether only one or both of the pupil's parents are living, the mean of each group, and its excess over the all score mean of the study.

In Table XIII, Group I, is made up of scores by pupils whose parents are both living and Group II is composed of scores by pupils with only one parent living.

Group I has 83 scores and a mean of 23.20, or .36 score point below the average for all the scores in the study. Group II has 13 scores which yield a mean of 25.85, or 2.29 score points above the mean for all scores involved in the study.

TABLE XIII-A

Difference, σ Difference, And Critical Ratio Based

On Facts In Table XIII

Group	Difference	σ Difference	Critical Ratio	In Favor Of Group
II-I	2.65	1.15	2.30	II

Table XIII-A shows a difference of 2.65 score points in favor of Group II but the difference is not significant.

CHAPTER IV

CONCLUSION

An attempt has been made in this study to compare the mean of the arithmetic scores made by 96 beginning high school students in Muldrow, Oklahoma from the following viewpoints: (1) number of teachers; (2) qualification of teachers; (3) experience of teachers; (4) tenure of teachers; (5) marital status of teachers; (6) sex of teachers; (7) age of teachers; (8) age of pupil; (9) exonomic status of pupil; (10) student's interest in athletics; (11) sex of pupil; (12) occupation of parents; (13) whether only one or both parents were living; (14) pupil's intelligence.

It was found as the number of teachers increased the mean of the pupils' score increased, with the exception of the 4-teacher school. All critical ratios were in favor of the five and six-teacher schools. There is a significant difference in favor of the five and six-teacher schools over the four-teacher schools.

The pupils' scores increased with the teachers' qualifications up to 90 college hours, after which there was a decrease. There is a significant difference in favor of teachers with 60 to 89 college hours over those with degrees.

It is possible and quite probable that a teacher, who is alive and growing educationally, may get commendable results from a group of very intelligent children who are surrounded with adequate material. On the other hand, a teacher who is educationally dead and doesn't know it,

yet has a large number of college hours, will very likely make little progress with poor material and students of low I.Q. Such teachers probably received a degree many years ago and haven't attended school since.

It was found that the pupils' scores increased with teacher experience up to two years prior experience, after which there was a falling off in efficiency. There is a significant difference in favor of teachers with two years prior experience.

The results of Table IV would indicate that teachers increase in efficiency with tenure up to three years. Two and three years prior tenure produce results significantly superior to that obtained by one year prior tenure or four and more years prior tenure.

Marital status and sex of the teacher cause a very insignificant difference in the mean of pupils' scores. There is a very small difference in favor of unmarried men teachers.

The pupils' scores increase as the teachers' age increases up to 30 years. The results of scores for teachers whose age is from 25 to 35 years is significantly superior to that obtained by teachers who are 36 years of age or older.

It was found that the pupils' scores in the arithmetic test decrease as the age of the pupil increases. There was not found a significant difference. Such results would indicate that pupils should not be retained in a grade or be kept out of school when of school age.

It was found that none of the following factors produced a significant change in the pupils' scores: (1) economic status; (2) interest in athletics; (3) sex of the pupil; (4) parental occupation; and (5) whether only one or both parents are living.

The study would indicate that the mathematical status of pupils is influenced more by factors not included in this study. Probably a better approach to the solution of the problem would be to formulate some criteria to measure the degree to which a teacher stimulated the desire to learn, or the degree to which the teacher lessened the desire to learn.

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